



# Marine Coatings product manual

[Data sheets](#) | [System sheets](#) | [Information sheets](#)



**PPG Protective &  
Marine Coatings**

Bringing innovation to the surface.™

## Data Sheets

7468	NOVAGUARD 840
7409	PHENGUARD 930
7435	PHENGUARD 935
7436	PHENGUARD 940
7959	PHENGUARD 965
7589M	PITT-CHAR FM MESH
7589	PITT-CHAR XP
7546	PSX 700
7273	SIGMA ALPHAGEN 230
7270	SIGMA ALPHAGEN 240
7262	SIGMA ALPHAGEN 650
7150	SIGMA AQUACOVER 25
7250	SIGMA AQUACOVER 45
7293	SIGMA ECOFLEET 238 A
7297	SIGMA ECOFLEET 290
7385	SIGMA ECOFLEET 530
7221	SIGMA ECOFLEET 690
7219	SIGMA NEXEON 710
7296	SIGMA NEXEON 750
7222	SIGMA SYLADVANCE 700
7294	SIGMA SYLADVANCE 800
7318	SIGMA VIKOTE 18
7355	SIGMA VIKOTE 56
7417	SIGMACOVER 280
7970	SIGMACOVER 350
7977	SIGMACOVER 350 LT
7979	SIGMACOVER 380
7980	SIGMACOVER 380 LT
7465	SIGMACOVER 435
7466	SIGMACOVER 456
7902	SIGMACOVER 525
7905	SIGMACOVER 555
7906	SIGMACOVER 580
7537	SIGMADUR 550
7533	SIGMADUR ONE
7386	SIGMAGLIDE 790
7399	SIGMAGLIDE 890
7397	SIGMAGLIDE 990
7921	SIGMAGUARD 225
7953	SIGMAGUARD 425
7985	SIGMAGUARD 603
7433	SIGMAGUARD 720
7551	SIGMAGUARD 750

7455	SIGMAGUARD 795
7785	SIGMAGUARD CSF 585
7443	SIGMAGUARD CSF 650
7416	SIGMAPRIME 200
7931	SIGMAPRIME 200 LT
7930	SIGMAPRIME 700
7946	SIGMAPRIME 700 LT
7938	SIGMAPRIME 800
7940	SIGMAPRIME 800 LT
7117	SIGMARINE 28
8103	SIGMARINE 42
7238	SIGMARINE 48
7263	SIGMARINE 80
7922	SIGMASHIELD 220
7926	SIGMASHIELD 220 LT
7951	SIGMASHIELD 420
7955	SIGMASHIELD 420 LT
7952	SIGMASHIELD 460
7972	SIGMASHIELD 460 LT
7978	SIGMASHIELD 610
7948	SIGMASHIELD 620
7954	SIGMASHIELD 905
7490	SIGMASHIELD 1090
7744	SIGMASHIELD 1200
7746	SIGMASHIELD 1200 LT
7260	SIGMATHERM 175
7261	SIGMATHERM 500
7171	SIGMAWELD 165
7167	SIGMAWELD 190
7177	SIGMAWELD 199

## System Sheets

3101	ANTICORROSIVE SYSTEMS FOR UNDERWATER AND BOOTTOP
3140	HEAT RESISTANT SYSTEMS
3141	HOT WATER RESISTANT SYSTEMS
3108	MISCELLANEOUS SYSTEMS
3328	NOVAGUARD TANKCOATING SYSTEM
3329	PHENGUARD 965 TANKCOATING SYSTEM
3322	PHENGUARD TANKCOATING SYSTEM
3015	PREFABRICATION PRIMERS
3127	SIGMAGLIDE FOULING RELEASE COATING SYSTEM
3320	SIGMAGUARD 720 TANKCOATING SYSTEM
3325	SYSTEM FOR DRINKING WATER TANKS
3106	SYSTEMS FOR BALLAST TANKS

3102	SYSTEMS FOR BOOTTOP AND TOPSIDE
3107	SYSTEMS FOR CARGO HOLDS
3103	SYSTEMS FOR DECKS
3105	SYSTEMS FOR INTERIOR(S)
3109	SYSTEMS FOR POLLUTED WATER TANKS
3104	SYSTEMS FOR SUPERSTRUCTURE AND DECK FITTINGS
3310	TANKLINING SELECTION TABLE

## **Information Sheets**

1410	CONVERSION TABLES
1434	DIRECTIVES FOR VENTILATION PRACTICE
1411	EXPLANATION TO PRODUCT DATA SHEETS
1650	RELATIVE HUMIDITY - SUBSTRATE TEMPERATURE - AIR TEMPERATURE
1433	SAFE WORKING IN CONFINED SPACES
1431	SAFETY IN CONFINED SPACES AND HEALTH SAFETY EXPLOSION HAZARD - TOXIC HAZARD
1430	SAFETY INDICATIONS
1491	SPECIFICATION FOR MINERAL ABRASIVES (ISO 11126)



# NOVAGUARD 840

5 pages

February 2013  
Revision of March 2011

**Description** two component solvent free amine cured novolac phenolic epoxy coating

- PRINCIPAL CHARACTERISTICS**
- one coat tank coating system
  - clear version for glassmat reinforced solvent free tank bottom system (see system sheet 4145)
  - excellent resistance to crude oil up to 90°C
  - suitable for storage of unleaded gasolines
  - good chemical resistance against a wide range of chemicals and solvents
  - good visibility due to light colour
  - glossy and smooth appearance
  - easy to clean
  - can be applied by heavy duty single feed airless spray equipment (60:1)
  - reduced explosion risk and fire hazard
  - approved to Air BP F2D2 section 2.1 for the storage of jet fuels

**COLOURS AND GLOSS** green, cream, clear – gloss

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.3 g/cm <sup>3</sup>
Volume solids	100%
VOC (Supplied)	max. 106 g/kg
	max. 142 g/l (approx. 1.2 lb/gal)
VOC (EPA Method 24)	73 g/ltr (0.6 lb/gal) (by EPA Method 24) see information sheet 1411
Recommended dry film thickness	300 - 600 µm depending on system
Theoretical spreading rate	3.3 m <sup>2</sup> /l for 300 µm *
Touch dry after	6 hours at 20°C
Overcoating interval	min. 24 hours *
	max. 2 months *
Full cure after	5 days * at 20°C

Shelf life (cool and dry place) (data for components)  
at least 12 months  
\* see additional data

- RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**
- steel; blast cleaned to a minimum of ISO-Sa2½, blasting profile 50 - 100 µm
  - substrate temperature must be above 5°C and at least 3°C above dew point during application and curing
  - steel with suitable primer (SigmaGuard 260) which must be dry, clean and free from any contamination

# NOVAGUARD 840

February 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be at least 20°C
- at lower temperature the viscosity will be too high for spray application
- no thinner should be added
- for recommended application instructions: see working procedure

Induction time

none

Pot life

1 hours at 20°C \*

\*see additional data

## AIRLESS SPRAY

use heavy duty single feed airless spray equipment preferably 60:1 pump ratio and suitable high pressure hoses/in-line heating or insulated hoses may be necessary to avoid cooling down of paint in hoses at low air temperature length of hoses should be as short as possible

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.53 mm (= 0.021 in)

Nozzle pressure

at 20°C (paint temperature) min. 28 MPa (= approx. 280 bar; 4061 p.s.i.)

at 30°C (paint temperature) min. 22Mpa (=approx. 220 bar: 3000 p.s.i.)

## BRUSH/ROLLER

only for spot repair and stripe coating

Recommended thinner

no thinner should be added

## CLEANING SOLVENT

Thinner 90-83 (preferred) or Thinner 90-53

- paint inside the spraying equipment must be removed before the pot life time has been expired
- all equipment used for application must be cleaned immediately after use

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	3.3	1.7
dft in µm	300	600

Maximum dft when brushing:

150 µm

### measuring wet film thickness

- a deviation is often obtained between the measured apparent wft and the real applied wft
- this is due to the thixotropy and the surface tension of the paint which retards the release of air trapped in the paint film for some time
- recommendation is to apply a wft which is equal to the specified dft plus 60 µm

# NOVAGUARD 840

February 2013

**measuring dry film thickness**

- because of low initial hardness the dft cannot be measured within some days due to the penetration of the measuring device into the soft paint film
- the dft should be measured using a calibration foil of known thickness placed in between the coating and the measuring device

**Overcoating with Novaguard 840 (spot repair and stripe coating)**

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	80 hours	36 hours	24 hours	16 hours
maximum interval	3 months	3 months	2 months	1 month

- surface should be dry and free from any contamination

**Curing**

**Curing table**

substrate temperature	dry to handle	full cure
5°C	60 hours	15 days
10°C	30 hours	7 days
20°C	16 hours	5 days
30°C	10 hours	3 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- for storage and transport of drinking water the recommended working procedure should be followed

**WASHING PROCEDURE**

- all personnel should wear watertight suits, boots and gloves properly cleaned with a sodium hypochlorite solution (1% active chlorine per liter)
- all tank sides, bottom and deckheads etc. should be brush cleaned or high-pressure spray cleaned with 1% active chlorine solution as above  
note: this can also be done by butterworth washing
- all parts should be high pressure cleaned with tap water and tanks drained
- concentrated active chlorine solution should be sprinkled on bottom; approx. 1 ltr/10 m<sup>2</sup>
- tanks should be filled with tap water to a depth of approx. 20 cm and the water should remain in the tank for at least 2 hours (max. 24 hours)
- tanks should be thoroughly flushed out with tap water
- depending upon local regulations it may be necessary to take water samples, after filling tank completely, to check on bacteria
- after this procedure the tanks will be fit to carry drinking water

# NOVAGUARD 840

February 2013

### Pot life (at application viscosity)

20°C	60 min.
30°C	45 min.

- due to exothermic reaction, temperature during and after mixing may increase

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

### REFERENCES

Safety indications	see information sheet 1430
Safe working in confined spaces	see information sheet 1433
Cleaning of steel and removal of rust	see information sheet 1490
Explanation to product data sheets	see information sheet 1411
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Directives for ventilation practice	see information sheet 1434
Specification for mineral abrasives	see information sheet 1491
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Relative humidity - substrate temperature - air temperature	see information sheet 1650
Conversion tables	see information sheet 1410

### SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes
  - no solvent present; however, spray mist is not harmless, a fresh air mask should be used during spraying
  - ventilation should be provided in confined spaces to maintain good visibility



# NOVAGUARD 840

February 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

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	PDS	7468
237775	cream	3012002200
180207	green	4000001400



# PHENGUARD 930

5 pages

July 2012  
Revision of March 2011

## Description

two component high build amine adduct cured novolac phenolic epoxy primer

## PRINCIPAL CHARACTERISTICS

- primer coat in the Phenguard tankcoating system
- excellent resistance to a wide range of organic acids, alcohols, edible oils, fats (regardless of free fatty acid content) and solvents
- maximum cargo flexibility
- low cargo absorption
- good resistance to hot water
- recognized corrosion control coating (Lloyd's register), see sheet 1886
- good application properties, resulting in a smooth surface

## COLOURS AND GLOSS

offwhite – eggshell

## BASIC DATA AT 20 °C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density

1.7 g/cm<sup>3</sup>

Volume solids

66% ± 2%

VOC (Directive 1999/13/EC, SED)

max. 191 g/kg (Directive 1999/13/EC, SED)

VOC (UK PG 6/23(92) appendix 3)

max. 315 g/l (approx. 2.6 lb/gal)

(UK PG 6/23(92) Appendix 3)

Recommended dry film thickness

100 µm \*

Theoretical spreading rate

6.6 m<sup>2</sup>/l for 100 µm \*

Touch dry after

2 hours at 20 °C

Overcoating interval

min. 36 hours \*

max. 21 days \*

Full cure after

see curing table \*

Shelf life (cool and dry place)

at least 12 months

\* see additional data

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- steel; blast cleaned in situ to at least ISO-Sa2½ and free from rust, scale, shop primer and any other contamination
- blasting profile 50 - 100 µm
- the substrate must be perfectly dry before and during application of Phenguard 930
- substrate temperature must be above 10°C and at least 3°C above dew point during application and curing

## SYSTEM SPECIFICATION

marine

system sheet: 3141

tankcoatings

system sheet: 3322

# PHENGUARD 930

July 2012

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 88 : 12

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity

- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Pot life

4 hours at 20 °C \*

Induction time

- allow induction time before use
- 15°C - 20 min.
- 20°C - 15 min.
- 25°C - 10 min.

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

2 mm

Nozzle pressure

0.3 MPa (= approx. 3 bar; 44 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.46 - 0.53 mm (= 0.018 - 0.021 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

only for spot repair and stripe coating

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

- Thinner 90-53

## Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	6.6	5.3
dft in µm	100	125

Maximum dft when brushing: 60 µm

## Overcoating table for Phenguard 935

substrate temperature	10°C	15°C	20°C	30°C	40°C
minimum interval	60 hours	48 hours	36 hours	24 hours	16 hours
maximum interval	28 days	25 days	21 days	14 days	7 days

- surface should be dry and free from any contamination

# PHENGUARD 930

July 2012

## Curing

### Curing table for Phenguard tankcoating system before transport of cargoes without note 4, 7, 8 or 11 and ballast water and tanktest with sea water

substrate temperature	Service
10°C	14 days
15°C	14 days
20°C	10 days
30°C	7 days
40°C	5 days

- minimum curing time of Phenguard tankcoating system before transport of cargoes with note 4, 7, 8 or 11: 3 months
- for detailed information on resistance and resistance notes, please refer to the latest issue of the Cargo Resistance List
- for transport of methanol and vinyl acetate monomer, a hot cure is required which cannot be substituted by a service period of 3 months with non-aggressive cargoes
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- the performance of the applied system strongly depends on the curing degree of the first coat at time of recoating. Therefore overcoating time between 1st and 2nd coat is extended in comparison between 2nd and 3rd coat (see overcoating details)
- when used as a primer under solvent free tank-linings the dft must be limited to a maximum of 100 µm

### Pot life (at application viscosity)

10 °C	6 hours
20 °C	4 hours
30 °C	1.5 hour

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

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# PHENGUARD 930

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July 2012

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# PHENGUARD 930

July 2012

## WARRANTY

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## LIMITATIONS OF LIABILITY

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This data sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this data sheet is current prior to using the product. Current data sheets for all PPG Protective & Marine Coatings products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com).

The English text of this data sheet shall prevail over any translation thereof.

180706	PDS offwhite	7409 7001002200
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# PHENGUARD 935

5 pages

November 2012  
Revision of July 2012

**Description** two component high build amine adduct cured novolac phenolic epoxy coating

**PRINCIPAL CHARACTERISTICS**

- second coat in the Phenguard tankcoating system
- excellent resistance to a wide range of organic acids, alcohols, edible oils, fats (regardless of free fatty acid content) and solvents
- maximum cargo flexibility
- low cargo absorption
- good resistance to hot water
- recognized corrosion control coating (Lloyd's register), see sheet 1886
- good application properties, resulting in a smooth surface

**COLOURS AND GLOSS** pink – eggshell

**BASIC DATA AT 20 °C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density 1.7 g/cm<sup>3</sup>  
 Volume solids 66% ± 2%  
 VOC (Directive 1999/13/EC, SED) max. 191 g/kg (Directive 1999/13/EC, SED)  
 VOC (UK PG 6/23(92) appendix 3) max. 315 g/l (approx. 2.6 lb/gal)  
 Recommended dry film thickness 100 µm \*  
 Theoretical spreading rate 6.6 m<sup>2</sup>/l for 100 µm \*  
 Touch dry after 2 hours at 20 °C  
 Overcoating interval min. 24 hours \*  
 max. 21 days \*  
 Full cure after see curing table \*

(data for components)  
 Shelf life (cool and dry place) at least 12 months  
 \* see additional data

**RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**

- previous coat of Phenguard 930; dry and free from any contamination
- the substrate must be perfectly dry before and during application of Phenguard 935
- substrate temperature must be above 10°C and at least 3°C above dew point during application and curing

**SYSTEM SPECIFICATION** marine tankcoatings system sheet: 3141  
system sheet: 3322

# PHENGUARD 935

November 2012

## INSTRUCTIONS FOR USE

- mixing ratio by volume: base to hardener 88 : 12
- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
  - too much solvent results in reduced sag resistance and slower cure
  - thinner should be added after mixing the components

Induction time allow induction time before use  
 15°C - 20 min.  
 20°C - 15 min.  
 25°C - 10 min.

Pot life 4 hours at 20 °C  
 \*see additional data

## AIR SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 10%, depending on required thickness and application conditions  
 Nozzle orifice 2 mm  
 Nozzle pressure 0.3 MPa (= approx. 3 bar; 44 p.s.i.)

## AIRLESS SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 10%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.46 - 0.53 mm (= 0.018 - 0.021 in)  
 Nozzle pressure 15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 5%

## CLEANING SOLVENT

Thinner 90-53

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	6.6	5.3
dft in µm	100	125

Maximum dft when brushing: 60 µm



# PHENGUARD 935

November 2012

### Overcoating table for Phenguard 935

substrate temperature	10°C	15°C	20°C	30°C	40°C
minimum interval	36 hours	32 hours	24 hours	16 hours	12 hours
maximum interval	28 days	25 days	21 days	14 days	7 days

- surface should be dry and free from any contamination

### Curing

#### Min.curing time of Phenguard tankcoating system before transport of cargoes without note 4, 7, 8 or 11 and ballast water and tanktest with sea water

substrate temperature	Service
10°C	14 days
15°C	14 days
20°C	10 days
30°C	7 days
40°C	5 days

- minimum curing time of Phenguard tankcoating system before transport of cargoes with note 4, 7, 8 or 11: 3 months
- for detailed information on resistance and resistance notes, please refer to the latest issue of the Cargo Resistance List
- for transport of methanol and vinyl acetate monomer, a hot cure is required which cannot be substituted by a service period of 3 months with non-aggressive cargoes
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- the performance of the applied system strongly depends on the curing degree of the first coat at time of recoating. Therefore overcoating time between 1st and 2nd coat is extended in comparison between 2nd and 3rd coat (see overcoating details)

#### Pot life (at application viscosity)

10 °C	6 hours
20 °C	4 hours
30 °C	1.5 hour

# PHENGUARD 935

November 2012

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Conversion tabels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# PHENGUARD 935

November 2012

## WARRANTY

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179115      PDS                      7435  
                 pink                      6007002200



# PHENGUARD 940

5 pages

July 2012  
Revision of March 2011

<b>Description</b>	two component high build amine adduct cured novolac phenolic epoxy finish
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– finish coat in the Phenguard tankcoating system</li> <li>– excellent resistance to a wide range of organic acids, alcohols, edible oils, fats (regardless of free fatty acid content) and solvents</li> <li>– maximum cargo flexibility</li> <li>– low cargo absorption</li> <li>– good resistance to hot water</li> <li>– recognized corrosion control coating (Lloyd's register), see sheet 1886</li> <li>– good application properties, resulting in a smooth surface</li> <li>– easy to clean</li> </ul>
<b>COLOURS AND GLOSS</b>	light grey – eggshell
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.7 g/cm <sup>3</sup>
Volume solids	66% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 191 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 315 g/l (approx. 2.6 lb/gal)
Recommended dry film thickness	100 µm *
Theoretical spreading rate	6.6 m <sup>2</sup> /l for 100 µm *
Touch dry after	2 hours at 20 °C
Overcoating interval	min. 24 hours * max. 21 days *
Full cure after	see curing table * at 20 °C * see additional data
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat of Phenguard 935; dry and free from any contamination</li> <li>– the substrate must be perfectly dry before and during application of Phenguard 940</li> <li>– substrate temperature must be above 10°C and at least 3°C above dew point during application and curing</li> </ul>

# PHENGUARD 940

July 2012

## SYSTEM SPECIFICATION

marine  
tankcoatings

system sheet: 3141  
system sheet: 3322

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 88 : 12

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Pot life

4 hours at 20 °C \*

\*see additional data

Induction time

- allow induction time before use
- 15°C - 20 min.
- 20°C - 15 min.
- 25°C - 10 min.

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

2 mm

Nozzle pressure

0.3 MPa (= approx. 3 bar; 44 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.46 - 0.53 mm (= 0.018 - 0.021 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	6.6	5.3
dft in µm	100	125

Maximum dft when brushing: 60 µm

# PHENGUARD 940

July 2012

### Overcoating table for Phenguard 940

substrate temperature	10°C	15°C	20°C	30°C	40°C
minimum interval	36 hours	32 hours	24 hours	16 hours	12 hours
maximum interval	28 days	25 days	21 days	14 days	7 days

- surface should be dry and free from any contamination

### Curing

#### Min.curing time of Phenguard tankcoating system before transport of cargoes without note 4, 7, 8 or 11 and ballast water and tanktest with sea water

substrate temperature	Service
10°C	14 days
15°C	14 days
20°C	10 days
30°C	7 days
40°C	5 days

- minimum curing time of Phenguard tankcoating system before transport of cargoes with note 4, 7, 8 or 11: 3 months
- for detailed information on resistance and resistance notes, please refer to the latest issue of the Cargo Resistance List
- for transport of methanol and vinyl acetate monomer, a hot cure is required which cannot be substituted by a service period of 3 months with non-aggressive cargoes
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- the performance of the applied system strongly depends on the curing degree of the first coat at time of recoating. Therefore overcoating time between 1st and 2nd coat is extended in comparison between 2nd and 3rd coat (see overcoating details)

#### Pot life (at application viscosity)

10 °C	6 hours
20 °C	4 hours
30 °C	1.5 hour

### Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

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# PHENGUARD 940

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July 2012

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# PHENGUARD 940

July 2012

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product.

THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG.

Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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179118	PDS grey	7436 5000002200
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# PHENGUARD 965

5 pages

June 2013  
Revision of March 2011

**Description** two component high build amine adduct cured novolac phenolic epoxy coating

- PRINCIPAL CHARACTERISTICS**
- Phenguard 965 system
  - excellent resistance to a wide range of organic acids, alcohols, fats (regardless of free fatty acid content) and solvents
  - maximum cargo flexibility
  - low cargo absorption
  - easy to clean
  - good resistance to hot water
  - can be applied and cures at temperatures down to +5°C
  - good application properties, resulting in a smooth surface

**COLOURS AND GLOSS** offwhite, pink, grey – eggshell

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density 1.7 g/cm<sup>3</sup>  
 Volume solids 68 ± 2%  
 VOC (Supplied) max. 195 g/kg (Directive 1999/13/EC, SED)  
 max. 329 g/l (approx. 2.7 lb/gal)  
 Recommended dry film thickness 100 µm \*  
 Theoretical spreading rate 6.8 m<sup>2</sup>/l for 100 µm \*  
 Touch dry after 2 - 3 hours at 20°C  
 14 - 16 hours at 5°C  
 Overcoating interval min. 8 hours \*  
 max. 14 days \*  
 Full cure after see curing table \*

(data for components)  
 Shelf life (cool and dry place) at least 12 months  
 \* see additional data

- RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**
- steel; blast cleaned in situ to at least ISO-Sa2½ and free from rust, scale, shop primer and any other contamination
  - blasting profile 50 - 100 µm
  - the substrate must be perfectly dry before and during application of Phenguard 965
  - substrate temperature must be above 5°C and at least 3°C above dew point during application and curing

**SYSTEM SPECIFICATION**

Phenguard 965 offwhite	100 µm
Phenguard 965 pink	100 µm
Phenguard 965 grey	100 µm

# PHENGUARD 965

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 87 : 13

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance
- thinner should be added after mixing the components

Induction time

allow induction time before use

5°C - 20 min.

10°C - 15 min.

15°C - 10 min.

Pot life

2 hours at 20°C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

2 mm

Nozzle pressure

0.3 MPa (= approx. 3 bar; 44 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.46 - 0.53 mm (= 0.018 - 0.021 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	6.8	5.4
dft in µm	100	125

Maximum dft when brushing:

60 µm

# PHENGUARD 965

June 2013

### Overcoating table for Phenguard 965 for dft up to 100 µm

substrate temperature	5°C	10°C	15°C	20°C	30°C
minimum interval	24 hours	20 hours	14 hours	8 hours	6 hours
maximum interval	28 days	25 days	21 days	14 days	7 days

- surface should be dry and free from any contamination

### Curing

### Curing table for dft up to 100 µm

substrate temperature	Minimum curing time of PhenGuard 965 system before transport of cargoes without note 4,7,8 or 11 and ballast water and tank test with sea water
5°C	7 days
10°C	5 days
15°C	4 days
20°C	3 days
30°C	2 days

- minimum curing time of Phenguard 965 system before transport of cargoes with note 4, 7, 8 or 11: 3 months
- for detailed information on resistance and resistance notes, please refer to the latest issue of the Cargo Resistance List
- for transport of methanol and vinyl acetate monomer, a hot cure is required which cannot be substituted by a service period of 3 months with non-aggressive cargoes
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- when used as a primer under solvent-free tank-linings the dft must be limited to a maximum of 100 µm

### Pot life (at application viscosity)

5°C	8 hours
10°C	6 hours
15°C	4 hours
20°C	2 hours
30°C	1 hour

# PHENGUARD 965

June 2013

**Worldwide availability**

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**REFERENCES**

Conversion tables	see information sheet 1410
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Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# PHENGUARD 965

June 2013

## WARRANTY

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	PDS	7959
199289	offwhite	7001002200
199282	pink	6007002200
199284	grey	5000002200

# PITT-CHAR® FM Mesh

2 pages

June 2012  
Revision of June 2012

**Description** High heat resistant fibre mesh

**PRINCIPAL CHARACTERISTICS** – reinforcement mesh for PITT-CHAR® XP for hydrocarbon and jet fire scenarios

**COLOURS AND GLOSS** white

**BASIC DATA**

- Nominal Weight: 205 ±15 g/m<sup>2</sup>
- Width: 1000 ± 50 mm Roll Length: 50-0 /+ 2 m
- Mesh: 3.5 x 3.5 ± 0.5 mm

# PITT-CHAR® FM Mesh

June 2012

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The English text of this data sheet shall prevail over any translation thereof.

283900	PDS white	7589M 0000001100
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4 pages

July 2013  
Revision of July 2010**Description**

solvent free thick film intumescent epoxy coating for hydrocarbon pool and jet fires

**PRINCIPAL CHARACTERISTICS**

- highly durable intumescent coating for protection of steel against hydrocarbon and jet fires; typical applications include:  
Offshore - structural steel members, bulkheads and decks  
Onshore - pipework, storage tanks and vessels
- unique flexibility offers enhanced performance on vibrating structures and in conditions of explosion overpressure
- suitable for use in cryogenic conditions
- good resistance to splash and spillage of chemicals
- excellent abrasion resistance
- suitable for corrosivity categories up to C5-I and C5-M
- meets the requirements for Norsok M501 rev 5 accelerated aging tests
- approved by ABS, BV, DNV, LR, UL and GASAFE

**COLOURS AND GLOSS**

grey – matt

**BASIC DATA AT 20°C**(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

## Mass density

1.10 g/cm<sup>3</sup>

note: the applied density is dependent upon many variables such as temperature, test method and application method

## Volume solids

100%

## VOC (Supplied)

max. 0 g/kg (Directive 1999/13/EC, SED)

max. 0 g/l (0.0 lb/gal)

## Recommended dry film thickness

normally 1000 - 7000 µm applied in one coat

note: the required dry film thickness must be in accordance with the approval certification

## Theoretical spreading rate

1.10 kg/m<sup>2</sup> for 1000 µm \*

## Touch dry after

10 hours \*

## Overcoating interval

min. 4 hours

max. 1 month

## Shelf life (cool and dry place)

base: at least 24 months

hardener: at least 24 months

\* see additional data

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- approved primer, dry, sound and free from contamination
- where mesh reinforcement of PITT-CHAR XP is necessary, this should be carried out in accordance with the PITT-CHAR XP Application Guidelines
- substrate temperature should be at least 5°C and at least 3°C above dew point during application and curing
- curing will be retarded at temperatures below 10°C and will cease below 5°C
- relative humidity during application must be lower than 85%



## PITT-CHAR® XP

July 2013

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 2.33 : 1  
 mixing ratio by weight 3.25 : 1  
 for details see the PITT-CHAR XP Application Guidelines  
 45 minutes at 25°C \*

Pot life

**AIRLESS SPRAY**

Recommended thinner

**single feed application**

5% - 7% of Thinner 60-30 may be necessary, but the quantity shall never exceed 10%.

The addition of thinner will affect sag resistance and overcoating intervals.

Nozzle orifice

approx. 0.84 - 0.89 mm (= 0.033 - 0.035 in)

Nozzle pressure

35 MPa (= approx. 350 bar; 5076 p.s.i.)

use of spray equipment with a ratio of 74 : 1 is recommended

material temperature (mixed): 23 - 35°C

the maximum length of the hoses should not exceed 30 m

Nozzle angle 40° (for large flat surfaces)

**twin feed application**

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.89 -1.09 mm (=0.035 - 0.043 in)

Nozzle pressure

24 MPa (= approx. 240 bar; 3481 p.s.i.)

– twin feed spray equipment utilising a minimum 10 inch king air motor is recommended

– base and hardener need to be pre-heated to a minimum of 60°C while circulating through the unit

– suitable insulated and/or heated hoses should be used

Nozzle angle 40° (for large flat surfaces)

**TROWEL**

Recommended thinner

(recommended for small areas and touch up only)

no thinner should be added

**CLEANING SOLVENT**

Thinner 90-53

# PITT-CHAR® XP

July 2013

**Curing  
ADDITIONAL DATA**

**Curing table (for solvent free application)**

substrate temperature	Time to outdoor exposure	Dry to walk on
5°C / 41°F	70 hours	30 hours
10°C / 50°F	45 hours	26 hours
20°C / 68°F	18 hours	18 hours
30°C / 86°F	7 hours	10 hours
40°C / 104°F	5 hours	4 hours

- curing times may vary depending on substrate, ambient and material temperature
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

substrate temperature	dry to handle	full cure
5°C / 41°F	80 hours	52 days
10°C / 50°F	52 hours	36 days
20°C / 68°F	18 hours	15 days
30°C / 86°F	10 hours	10 days
40°C / 104°F	7 hours	7 days

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Conversion tables	see information sheet 1410
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes

# PITT-CHAR® XP

July 2013

## WARRANTY

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281999

grey  
PDS300002504  
7589



# PSX 700

4 pages

October 2012  
Revision of November 2011

## Description

two component engineered siloxane coating

## PRINCIPAL CHARACTERISTICS

- unique, high gloss, engineered siloxane
- can be applied directly over inorganic zinc
- excellent colour and gloss retention
- high solids, VOC compliant
- applied by brush, roller or spray, without thinning
- good resistance to splash and spillage of chemicals

## COLOURS AND GLOSS

full colour range – gloss

## BASIC DATA AT 20 °C

(data for mixed product)

Mass density	1.36 g/cm <sup>3</sup>
Volume solids	90% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 119 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 164 g/l (approx. 1.4 lb/gal)
VOC (EPA Method 24)	84 g/ltr (0.7 lb/gal) (by EPA Method 24)
Recommended dry film thickness	75 - 175 µm per coat

Theoretical spreading rate	7.2 m <sup>2</sup> /l for 125 µm
Touch dry after	2 hours at 20 °C *
	* see additional data

Overcoating interval	min. 3 hours *
	* see additional data

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- previous suitable coat; dry and free from any contamination
- aged suitable coatings; dry and free from any contamination and sufficiently roughened
- prepare damaged areas to original surface preparation specifications, feathering edges of intact coating
- for touch-up and repair; apply additional material after removing dirt, contaminants and old loose coatings or antifoulings
- substrate temperature should be above 0°C and at least 3°C above dew point during application and curing
- relative humidity should be at least 40% to obtain optimal curing properties
- below 40% curing will continue, but time is extended

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

Induction time	- use power mixer powered by an air- or an explosion proof electric motor
Pot life	none
	4 hours at 20 °C *
	* see additional data

# PSX 700

October 2012

## AIRLESS SPRAY

Recommended thinner  
Volume of thinner

Thinner 60-12/ Thinner 21-06  
0 - 10%, depending on required thickness and application conditions

## BRUSH/ROLLER

- the recommended dft cannot be reached in one coat
- Natural bristle.
- Maintain a wet edge.
- Level any air bubbles with bristle brush.

## CLEANING SOLVENT

Thinner 90-58

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	12	7.2	5.1
dft in µm	75	125	175

### Overcoating table for PSX 700 for dft up to 175 µm at RH 40% or above

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	12 hours	7 hours	3 hours	2 hours

## Curing

### Curing table for dft up to 175 µm

substrate temperature	touch dry	dry to handle
5°C	7 hours	16 hours
10°C	4.5 hours	8.5 hours
20°C	2 hours	4.5 hours
30°C	1 hour	3 hours

### Pot life (at application viscosity)

10 °C	6.5 hours
20 °C	4 hours
30 °C	1.5 hour

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

## PSX 700

October 2012

**REFERENCES**

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Surface preparation of concrete (floors)	see information sheet 1496
Relative humidity - substrate temperature - air temperature	see information sheet 1650

**SAFETY PRECAUTIONS**

- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes
- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets

## PSX 700

October 2012

**WARRANTY**

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Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

**LIMITATIONS OF LIABILITY**

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.**

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The English text of this data sheet shall prevail over any translation thereof.

PDS

7546

# SIGMA ALPHAGEN 230

5 pages

June 2012  
Revision of August 2010

**Description** high performance TBT-free selfpolishing antifouling based on cuprous oxide and organic biocides

**PRINCIPAL CHARACTERISTICS**

- TBT-free selfpolishing antifouling with good weathering properties for atmospheric resistance during vessel construction and in-service
- designed as the antifouling system suitable for high- and medium-activity vessels engaged on deep sea trades (tankers, bulkers, general cargo, container ships, etc.)
- controlled polishing rate to give effective protection in accordance with the specified dry film thickness
- controls settlement of shell and weed fouling for prolonged periods depending on sailing pattern and routes
- complies with IMO Antifouling Systems Convention

**COLOURS AND GLOSS** redbrown, brown – flat

**BASIC DATA AT 20 °C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density

1.8 g/cm<sup>3</sup>

Volume solids

56% ± 2%

VOC (Directive 1999/13/EC, SED)

max. 239 g/kg (Directive 1999/13/EC, SED)

VOC (UK PG 6/23(92) appendix 3)

max. 425 g/l (approx. 3.5 lb/gal)  
(UK PG 6/23(92) Appendix 3)

Recommended dry film thickness

75 - 150 µm depending on system

Theoretical spreading rate

7.5 m<sup>2</sup>/l for 75 µm

5.6 m<sup>2</sup>/l for 100 µm

3.7 m<sup>2</sup>/l for 150 µm

Touch dry after

1 hour at 20 °C

Overcoating interval

min. 6 hours \*

Shelf life (cool and dry place)

at least 12 months

\* see additional data

Refloating time

min. 8 hours \*

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- previous coat; dry and free from any contamination
- suitable high performance anticorrosive (coal tar epoxy, epoxy and vinyl tar)
- for the epoxy anticorrosive system, SigmaCover 525 or SigmaCover 555 should be used as a tiecoat
- substrate temperature should be at least 3°C above dew point
- the paint should be stirred well before use, preferably by means of a mechanical mixer, to ensure homogeneity



# SIGMAALPHAGEN 230

June 2012

## AIRLESS SPRAY

Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)  
 Nozzle pressure 12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

## BRUSH/ROLLER

only for touch up and repair  
 Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%

## CLEANING SOLVENT

– Thinner 21-06

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	7.5	5.6	3.7
dft in µm	75	100	150

in exceptional cases Sigma Alphagen 230 may be applied at lower substrate temperatures (down to -15°C) provided that the surface is free from ice and other contamination. In such cases special care must be taken to avoid thick film application as this may lead to checking/crazing or solvent entrapment. It should be clear that application at lower temperatures will require additional thinning to obtain application viscosity, however this will affect the sag resistance of the applied coating and can induce solvent retention. Optimal curing and designed product properties will only be achieved when minimum required substrate temperature is reached.

### Overcoating table for Sigma AlphaGen 230 with itself for dft up to 150 µm

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	12 hours	10 hours	6 hours	4 hours
Refloating – minimum interval	24 hours	12 hours	8 hours	6 hours

- for systems with more than two layers of antifouling minimum drying time before overcoating and minimum time before refloating should be increased
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions
- the above data are a fair indication for normal application conditions

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# SIGMA ALPHAGEN 230

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June 2012

<b>Worldwide availability</b>	Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.
<b>Reference</b>	Explanation to product data sheets      see information sheet 1411 Safety indications                              see information sheet 1430 Safety in confined spaces and health safety Explosion hazard - toxic hazard              see information sheet 1431
<b>SAFETY PRECAUTIONS</b>	<ul style="list-style-type: none"><li>– for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets</li><li>– this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes</li></ul>

# SIGMAALPHAGEN 230

June 2012

## WARRANTY

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# SIGMAALPHAGEN 230

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June 2012

	PDS	7273
252636	brown	2000002200
329264	brown	2000002150
252633	redbrown	2008002200
329365	redbrown	2008002150
284760	EU brown	2000002200
284759	EU redbrown	2008002200

# SIGMA ALPHAGEN 240

4 pages

September 2012  
Revision of May 2012

**Description** high performance TBT-free selfpolishing antifouling based on cuprous oxide and organic biocides

**PRINCIPAL CHARACTERISTICS**

- medium polishing rate TBT-free selfpolishing antifouling with good weathering properties for atmospheric resistance during vessel construction and in-service
- designed as the antifouling system suitable for high- and medium-activity vessels engaged on deep sea trades (tankers, bulkers, general cargo, container ships, etc.)
- controlled polishing rate to give effective protection in accordance with the specified dry film thickness
- controls settlement of shell and weed fouling for prolonged periods depending on sailing pattern and routes
- complies with IMO Antifouling Systems Convention

**COLOURS AND GLOSS** redbrown, brown – flat

**BASIC DATA AT 20 °C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density 1.7 g/cm<sup>3</sup>

Volume solids 58% ± 2%

VOC (Directive 1999/13/EC, SED) max. 207 g/kg (Directive 1999/13/EC, SED)

VOC (UK PG 6/23(92) appendix 3) max. 414 g/l (approx. 3.5 lb/gal)  
(UK PG 6/23(92) Appendix 3)

Recommended dry film thickness 75 - 175 µm depending on system

Theoretical spreading rate  
7.7 m<sup>2</sup>/l for 75 µm  
5.8 m<sup>2</sup>/l for 100 µm  
3.9 m<sup>2</sup>/l for 150 µm  
3.3 m<sup>2</sup>/l for 175 µm

Touch dry after 1 hour at 20 °C

Overcoating interval min. 6 hours at 20°C

Shelf life (cool and dry place) at least 12 months  
\* see additional data

Refloating time 12 hours at 20 °C \*

**RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**

- previous coat; dry and free from any contamination
- suitable high performance anticorrosive (epoxy)
- for the epoxy anticorrosive system, SigmaCover 525 or SigmaCover 555 should be used as a tiecoat
- substrate temperature should be at least 3°C above dew point

**INSTRUCTIONS FOR USE** the paint should be stirred well before use, preferably by means of a mechanical mixer, to ensure homogeneity

# SIGMA ALPHAGEN 240

September 2012

## AIRLESS SPRAY

Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)  
 Nozzle pressure 12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

## BRUSH/ROLLER

only for touch up and repair  
 Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%

## CLEANING SOLVENT

Thinner 21-06

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	7.7	5.8	3.9	3.3
dft in µm	75	100	150	175

### Overcoating table for Sigma AlphaGen 240 with itself for dft up to 175 µm

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	12 hours	10 hours	6 hours	4 hours
Refloating minimum interval	24 hours	18 hours	12 hours	9 hours

- for systems with more than two layers of antifouling minimum drying time before overcoating and minimum time before refloating should be increased
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions
- the above data are a fair indication for normal application conditions

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.  
 Under these circumstances an alternative product data sheet is used.

## REFERENCES

Explanation to product data sheets see information sheet 1411  
 Safety indications see information sheet 1430  
 Safety in confined spaces and health safety  
 Explosion hazard - toxic hazard see information sheet 1431

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA ALPHAGEN 240

September 2012

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product.

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## SIGMA ALPHAGEN 240

September 2012

	PDS	7270
249279	brown	2000002150
249277	brown	2000002200
249278	redbrown	2008002150
249273	redbrown	2008002200
328228	brown	2000002150
328236	brown	2000002200
328229	redbrown	2008002150
328235	redbrown	2008002200



# SIGMA ALPHAGEN 650

3 pages

May 2013  
Revision of April 2009

**Description** high performance TBT-free self-polishing antifouling for coastal operating ships with cuprous oxide and organic biocides for aggressive fouling conditions

**PRINCIPAL CHARACTERISTICS**

- high activity TBT-free self-polishing antifouling for coastal operating vessels
- TBT-free self-polishing antifouling for new building and maintenance
- controls common types of shell and weed fouling for long service periods depending on sailing pattern and routes
- controlled polishing rate to give effective protection in accordance with the specified dry film thickness
- complies with IMO Antifouling Systems Convention

**COLOURS AND GLOSS** redbrown, brown, black – flat

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density	2.0 g/cm <sup>3</sup>
Volume solids	57 ± 2%
VOC (Supplied)	max. 173 g/kg (Directive 1999/13/EC, SED) max. 340 g/l (approx. 2.8 lb/gal)
Recommended dry film thickness	75 - 150 µm depending on system
Theoretical spreading rate	7.6 m <sup>2</sup> /l for 75 µm 5.7 m <sup>2</sup> /l for 100 µm 3.8 m <sup>2</sup> /l for 150 µm
Touch dry after	1 hours at 20°C
Overcoating interval	min. 6 hours at 20°C *
Shelf life (cool and dry place)	at least 12 months * see additional data
Refloating time	min. 8 hours * at 20°C

**RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**

- previous coat; dry and free from any contamination
- suitable high performance anticorrosive
- for the epoxy anticorrosive system, SigmaCover 525 or SigmaCover 555 should be used as a tiecoat
- substrate temperature should be at least 3°C above dew point

**INSTRUCTIONS FOR USE**

- stir well before use
- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity
- too much solvent results in reduced sag resistance

## AIRLESS SPRAY

Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)
Nozzle pressure	12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

# SIGMA ALPHAGEN 650

May 2013

**BRUSH/ROLLER** only for touch up and repair  
 Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%

**CLEANING SOLVENT** Thinner 21-06

**ADDITIONAL DATA**

**Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	7.6	5.7	3.8
dft in µm	75	100	150

**Overcoating table for Sigma AlphaGen 650 with itself for dft up to 150 µm**

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	18 hours	12 hours	6 hours	4 hours
Refloating minimum interval	24 hours	12 hours	6 hours	4 hours

- the above data are a fair indication for normal dry dockings
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Explanation to product data sheets see information sheet 1411  
 Safety indications see information sheet 1430  
 Safety in confined spaces and health safety  
 Explosion hazard - toxic hazard see information sheet 1431

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA ALPHAGEN 650

May 2013

## WARRANTY

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## LIMITATIONS OF LIABILITY

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	PDS	7262
225899	redbrown	2008002200
230247	brown	2000002200
234164	black	8000002200

# SIGMA AQUACOVER 25

4 pages

May 2013  
Revision of May 2011

## Description

one component water borne acrylic zinc phosphate primer

## PRINCIPAL CHARACTERISTICS

- primer for interior accommodation, machinery spaces and superstructure
- particularly suitable when solvents are not permitted because of health and safety reasons
- excellent adhesion to various types of old or weathered paints
- good adhesion to steel
- good anticorrosive properties
- fast drying and recoatable
- can be overcoated with most dispersion paints and alkyd paints
- allows safer working during hull outfitting of new buildings
- certificate for low flame spread: see sheet 1883

## COLOURS AND GLOSS

buff, offwhite – flat

## BASIC DATA AT 20 °C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density

1.3 g/cm<sup>3</sup>

Volume solids

44% ± 2%

VOC (Supplied)

max. 24 g/kg (Directive 1999/13/EC/SED)

max. 31 g/l (approx. 0.3 lb/gal)

Recommended dry film thickness

50 - 75 µm per coat

Theoretical spreading rate

8.8 m<sup>2</sup>/l for 50 µm6.6 m<sup>2</sup>/l for 75 µm

Touch dry after

4 hours at 5°C

2 hours at 10°C

45 - 60 minutes at 20°C

Overcoating interval

min. 4 hours

max. unlimited

Shelf life (cool and dry place)

at least 12 months, keep above 0°C

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to min. ISO-St3
- steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt2
- previous suitable coat; dry and free from any contamination
- substrate temperature should be at least 5°C and at least 3°C above dew point during application and curing
- maximum relative humidity during application and curing is 75%

## SYSTEM SPECIFICATION

marine

system sheets: 3104, 3105

# SIGMA AQUACOVER 25

May 2013

## INSTRUCTIONS FOR USE

- stir well before use
- the temperature of the paint should preferably be above 15°C, otherwise extra tap water may be required to obtain application viscosity
- too much tap water results in reduced sag resistance
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- must be protected from freezing at all times during storage and/or transport

## AIRLESS SPRAY

Recommended thinner tap water  
 Volume of thinner 0 - 5%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.48 - 0.58 mm (= 0.019 - 0.023 in)  
 Nozzle pressure 12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner long haired brush or polyester roller with rounded edges  
 Volume of thinner tap water  
 0 - 5%

## CLEANING SOLVENT

tap water and Thinner 70-05

- Cleaning Procedures of the spray equipment:
- pulsator filter and tip filter must be taken out of the equipment and cleaned properly
- following tables illustrate the cleaning procedure of the spray equipment when changing spraying from solvent borne paint to water borne paints (table 1) and from water borne paints to solvent borne paints (table 2)

## CLEANING PROCEDURE

**Table 1: from solvent borne to water borne paints**

1st cleaning	With Thinner 90-53
2nd cleaning	With Thinner 70-05
3rd cleaning	With warm tap water (30 - 35°C) after which water borne paints can be sprayed

**Table 2: from water borne to solvent borne paints**

1st cleaning	With warm tap water (30 - 35°C)
2nd cleaning	With Thinner 70-05
3rd cleaning	With Thinner 90-53

Thinner 70-05 can be re-used

# SIGMA AQUACOVER 25

May 2013

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.8	6.6
dft in µm	50	75

Maximum dft when brushing: 50 µm

### Overcoating table for Sigma Aquacover 25 for dft up to 75 µm

with itself

substrate temperature	5°C	10°C	20°C
minimum interval	8 hours	6 hours	4 hours
maximum interval	unlimited	unlimited	unlimited

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

### REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490

### SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a water borne paint, care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA AQUACOVER 25

May 2013

## WARRANTY

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## LIMITATIONS OF LIABILITY

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	PDS	7150
146106	offwhite	7001002200
173148	buff	3147052200

# SIGMA AQUACOVER 45

4 pages

February 2013  
Revision of September 2009

<b>Description</b>	one component water borne acrylic dispersion finish
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– finish for interior accommodation, machinery spaces and superstructure</li> <li>– particularly suitable when solvents are not permitted because of health and safety reasons</li> <li>– fast drying and recoatable</li> <li>– good weather resistance</li> <li>– good colour retention</li> <li>– allows safer working during hull outfitting of new buildings</li> <li>– certificate for low flame spread: see sheet 1883</li> </ul>
<b>COLOURS AND GLOSS</b>	white (other colours on request) – gloss
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.2 g/cm <sup>3</sup>
Volume solids	34% ± 2%, depending on colour
VOC (Directive 1999/13/EC, SED)	max. 9 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 10 g/l (approx. 0.1 lb/gal) (UK PG 6/23(92) Appendix 3)
Recommended dry film thickness	50 µm per coat
Theoretical spreading rate	6.8 m <sup>2</sup> /l for 50 µm
Touch dry after	6 hours at 5 °C 3 hours at 10 °C 1 hour at 20 °C
Overcoating interval	min. 6 hours * max. unlimited *
Shelf life (cool and dry place)	at least 12 months, keep above 0°C
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous suitable coat; (e.g. Sigma Aquacover 25) dry and free from any contamination</li> <li>– substrate temperature should be at least 5°C and at least 3°C above dew point during application and curing</li> <li>– maximum relative humidity during application and curing is 75%</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheets: 3104, 3105</span>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>– stir well before use</li> <li>– the temperature of the paint should preferably be above 15°C, otherwise extra tap water may be required to obtain application viscosity</li> <li>– too much tap water results in reduced sag resistance</li> <li>– adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)</li> <li>– must be protected from freezing at all times during storage and/or transport</li> </ul>



# SIGMA AQUACOVER 45

February 2013

## AIR SPRAY

Recommended thinner tap water  
 Volume of thinner 5 - 10%, depending on required thickness and application conditions  
 Nozzle orifice 1.8 - 2.0 mm  
 Nozzle pressure 0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner tap water  
 Volume of thinner 0 - 5%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.46 - 0.53 mm (= 0.018 - 0.021 in)  
 Nozzle pressure 12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner long haired brush or polyether roller with rounded edges  
 tap water  
 Volume of thinner 0 - 5%  
 \* for localised areas of difficult access only

## CLEANING SOLVENT

tap water and Thinner 70-05  
 – Cleaning Procedures of the spray equipment:  
 – pulsator filter and tip filter must be taken out of the equipment and cleaned properly  
 – following tables illustrate the cleaning procedure of the spray equipment when changing spraying from solvent borne paint to water borne paints (table 1) and from water borne paints to solvent borne paints (table 2)

## CLEANING PROCEDURE

**Table 1: from solvent borne- to water borne paints**

1st cleaning	With Thinner 90-53
2nd cleaning	With Thinner 70-05
3rd cleaning	With warm tap water (30 - 35°C) after which water borne paints can be sprayed

**Table 2: from water borne- to solvent borne paints**

1st cleaning	With warm tap water (30 - 35°C)
2nd cleaning	With Thinner 70-05
3rd cleaning	With Thinner 90-53

Thinner 70-05 can be re-used

# SIGMA AQUACOVER 45

February 2013

**ADDITIONAL DATA**

**Overcoating table for Sigma Aquacover 45 for dft up to 50 µm**

with itself

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	16 hours	6 hours	4 hours	3 hours
maximum interval- interior	unlimited			

- surface should be dry and free from any contamination

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes

# SIGMA AQUACOVER 45

February 2013

## WARRANTY

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	PDS	7250
146103	white	7000002200
146104	white	7000001400

# SIGMA ECOFLEET 238 A

(ABC 4)

3 pages

April 2013  
Revision of May 2011

## Description

TBT-free self-polishing antifouling

## PRINCIPAL CHARACTERISTICS

- economical antifouling for commercial marine use
- contains a specially balanced level of cuprous oxide for prevention of fouling
- compatible with a wide range of anticorrosive underwater hull system
- suitable on coated steel hulls on seagoing vessels, workboats and barges

## COLOURS AND GLOSS

redbrown, brown – flat

## BASIC DATA AT 20°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density

1.8 g/cm<sup>3</sup>

Volume solids

64% ± 2%

VOC

max. 183 g/kg (Directive 1999/13/EC, SED)

max. 333 g/l (approx. 2.8 lb/gal)

VOC (EPA Method 24)

312 g/ltr (2.6 lb/gal)

Recommended dry film thickness

75 - 125 µm per coat depending on system

Theoretical spreading rate

6.4 m<sup>2</sup>/l for 100 µm \*

Overcoating interval

min. 4 hours \*

max. see tables \*

Shelf life (cool and dry place)

at least 12 months

\* see additional data

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- substrate temperature should be at least 3°C above dew point
- dependent upon condition of hull and existing antifouling, surface cleaning will vary from high pressure water cleaning to abrasive blasting
- **existing fouled surfaces:**
  - remove fouling by scraping and/or sweep blast
  - loose paint should be removed by high pressure water wash
  - tightly adhering anticorrosive and antifouling coating may remain
- for touch-up and repair; apply additional material after removing dirt, contaminants and old loose coatings or antifouling

## INSTRUCTIONS FOR USE

- stir well before use
- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity
- too much solvent results in reduced sag resistance

## AIR SPRAY

Recommended thinner

Thinner 21-06

Volume of thinner

0 - 10%, depending on required thickness and application conditions

## AIRLESS SPRAY

Recommended thinner

Thinner 21-06

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.63 mm (= 0.021 - 0.025 in)

Nozzle pressure

12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

**SIGMA ECOFLEET 238 A**  
(ABC 4)

April 2013

**CLEANING SOLVENT** Thinner 21-06

**ADDITIONAL DATA** **Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	8.5	6.4	5.1
dft in µm	75	100	125

**Overcoating table for Sigma EcoFleet 238 A with itself for dft up to 125 µm**

substrate temperature	0°C	10°C	20°C	30°C	50°C
minimum interval	12 hours	8 hours	4 hours	2 hours	1 hour
Refloating minimum interval	24 hours	10 hours	6 hours	4 hours	2 hours

- the above data are a fair indication for normal application conditions
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions

**Worldwide availability** It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA ECOFLEET 238 A

(ABC 4)

April 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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	PDS	7293
294697	brown	2000002200
294696	redbrown	7200AM2200

# SIGMA ECOFLEET 290

3 pages

June 2014  
Revision of March 2014

<b>Description</b>	TBT-free selfpolishing antifouling with cuprous oxide and organic biocides as active ingredients
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– TBT-free self-polishing antifouling for new-building and maintenance</li> <li>– controls shell and weed fouling for service periods up to 60 months, depending on vessel type, operation characteristics and system applied</li> <li>– controlled polishing rate to give effective protection in accordance with the specified film thickness and smoothing of the surface</li> <li>– complies with IMO Antifouling Systems Convention</li> </ul>
<b>COLOURS AND GLOSS</b>	redbrown, brown, black – flat
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.8 g/cm <sup>3</sup>
Volume solids	55 ± 2%
VOC (Supplied)	max. 233 g/kg max. 420 g/l (approx. 3.5 lb/gal)
Recommended dry film thickness	75 - 150 µm depending on system
Theoretical spreading rate	7.3 m <sup>2</sup> /l for 75 µm 5.5 m <sup>2</sup> /l for 100 µm 3.7 m <sup>2</sup> /l for 150 µm
Touch dry after	1 hour at 20°C
Overcoating interval	min. 6 hours at 20°C
Shelf life (cool and dry place)	at least 12 months * see additional data
Refloating time	– min. 8 hours *
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; dry and free from any contamination</li> <li>– suitable high performance anticorrosive</li> <li>– substrate temperature should be at least 3°C above dew point</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>– stir well before use</li> <li>– the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance</li> </ul>
<b>AIRLESS SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)
Nozzle pressure	12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

# SIGMA ECOFLEET 290

June 2014

- BRUSH/ROLLER**
- only for touch up and repair
  - multicoat roller or brush application is not recommended
  - max. dft achievable by brush or roller is 50 µm

Recommended thinner Thinner 21-06  
Volume of thinner 0 - 3%

**CLEANING SOLVENT** Thinner 21-06

**ADDITIONAL DATA** **Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	7.3	5.5	3.7
dft in µm	75	100	150

**Overcoating table for Sigma EcoFleet 290 with itself for dft up to 150 µm**

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	18 hours	12 hours	6 hours	4 hours
Refloating minimum interval	24 hours	12 hours	8 hours	6 hours

- maximum overcoating time for SigmaCover 510 with Sigma EcoFleet 290 is 48 hours at 20°C
- the above data are a fair indication for normal dry dockings
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions

**REFERENCES**

Explanation to product data sheets see information sheet 1411  
 Safety indications see information sheet 1430  
 Safety in confined spaces and health safety  
 Explosion hazard - toxic hazard see information sheet 1431

- SAFETY PRECAUTIONS**
- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
  - this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes



# SIGMA ECOFLEET 290

June 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

Depending on specific country of application the following versions of the SIGMA ECOFLEET 290 are available:

	PDS	7297
139362	redbrown	2008002200
139363	brown	2000002200
146036	black	8000002200
238458	EU redbrown	2008002200
239069	EU brown	2000002200
218998	A redbrown	2008002200
269704	A brown	2000002200
249481	S redbrown	2008002200
249482	S brown	2000002200

# SIGMA ECOFLEET 530

3 pages

October 2012  
Revision of July 2011

<b>Description</b>	high activity TBT-free selfpolishing antifouling with cuprous oxide and organic biocides for aggressive fouling conditions
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- TBT-free selfpolishing antifouling for new building and maintenance</li> <li>- controls shell and weed fouling for service periods up to 60 months, depending on vessel type, operation characteristics and system applied</li> <li>- controlled polishing rate to give effective protection in accordance with the specified film thickness and smoothing of the surface</li> <li>- complies with IMO Antifouling Systems Convention</li> </ul>
<b>COLOURS AND GLOSS</b>	redbrown, brown, black, blue, spruce – flat
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	2.0 g/cm <sup>3</sup>
Volume solids	60% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 173 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 339 g/l (approx. 2.8 lb/gal) (UK PG 6/23(92) Appendix 3)
Recommended dry film thickness	75 - 150 µm depending on system
Theoretical spreading rate	8.0 m <sup>2</sup> /l for 75 µm 6.0 m <sup>2</sup> /l for 100 µm 4.0 m <sup>2</sup> /l for 150 µm
Touch dry after	1 hour at 20 °C
Overcoating interval	min. 6 hours at 20°C
Shelf life (cool and dry place)	at least 12 months * see additional data
Refloating time	min. 8 hours *
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- previous coat; dry and free from any contamination</li> <li>- suitable high performance anticorrosive (coaltar epoxy, epoxy and vinyl tar)</li> <li>- substrate temperature should be at least 3°C above dew point</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>- stir well before use</li> <li>- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>- too much solvent results in reduced sag resistance</li> </ul>
<b>AIRLESS SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)
Nozzle pressure	12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)
<b>BRUSH/ROLLER</b>	only for touch up and repair
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%

# SIGMA ECOFLEET 530

October 2012

**CLEANING SOLVENT** Thinner 21-06

**ADDITIONAL DATA** **Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	8.0	6.0	4.0
dft in µm	75	100	150

**Overcoating table for Sigma EcoFleet 530 with itself for dft up to 150 µm**

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	18 hours	12 hours	6 hours	4 hours
Refloating minimum interval	24 hours	12 hours	8 hours	6 hours

- maximum overcoating time for SigmaCover 510 with Sigma EcoFleet 530 is 48 hours at 20°C
- the above data are a fair indication for normal drydockings
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions

**Worldwide availability** Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA ECOFLEET 530

October 2012

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product.

THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG.

Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.**

The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com).

The English text of this data sheet shall prevail over any translation thereof.

	PDS	7385
146095	redbrown	2008002200
146096	brown	2000002200
180438	black	8000002200
230906	blue	1000002200
164865	spruce	1645302200

# SIGMA ECOFLEET 690

3 pages

November 2012  
Revision of March 2010

<b>Description</b>	high activity selfpolishing antifouling for extreme and aggressive fouling conditions
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- TBT-free selfpolishing antifouling for maintenance and repair market</li> <li>- specifically designed for coastal and low activity vessels</li> <li>- controls shell and weed fouling for service periods up to 60 months, depending on vessel type, operation characteristics and system applied</li> <li>- controlled polishing rate to give effective protection in accordance with the specified film thickness</li> <li>- complies with IMO Antifouling Systems Convention</li> </ul>
<b>COLOURS AND GLOSS</b>	redbrown, brown – flat
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.9 g/cm <sup>3</sup>
Volume solids	70% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 141 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 267 g/l (approx. 2.2 lb/gal)
Recommended dry film thickness	75 - 210 µm depending on system
Theoretical spreading rate	9.3 m <sup>2</sup> /l for 75 µm 7.0 m <sup>2</sup> /l for 100 µm 4.7 m <sup>2</sup> /l for 150 µm 3.5 m <sup>2</sup> /l for 200 µm
Touch dry after	1 hour at 20 °C
Overcoating interval	min. 6 hours at 20°C
Shelf life (cool and dry place)	at least 12 months * see additional data
Refloating time	min.8 hours
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- previous coat; dry and free from any contamination</li> <li>- suitable high performance anticorrosive</li> <li>- substrate temperature should be at least 3°C above dew point</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>- stir well before use</li> <li>- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>- too much solvent results in reduced sag resistance</li> </ul>
<b>AIRLESS SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)
Nozzle pressure	12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

# SIGMA ECOFLEET 690

November 2012

**BRUSH/ROLLER** only for touch up and repair  
 Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%

**CLEANING SOLVENT** Thinner 21-06

**ADDITIONAL DATA** **Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	9.3	7.0	4.7	3.5
dft in µm	75	100	150	200

**Overcoating table for Sigma EcoFleet 690 with itself for dft up to 150 µm**

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	18 hours	12 hours	6 hours	4 hours
Refloating minimum interval	24 hours	12 hours	8 hours	6 hours

- maximum overcoating time for SigmaCover 510 with Sigma EcoFleet 690 is 48 hours at 20°C
- the above data are a fair indication for normal drydockings
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions

**Worldwide availability** Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA ECOFLEET 690

November 2012

## WARRANTY

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	PDS	7221
296988	redbrown	2008002200
296989	brown	2000002200

# SIGMA NEXEON 710

3 pages

October 2012  
Revision of May 2011

<b>Description</b>	high performance tin-free and copper free self polishing antifouling
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- designed as the anti fouling system suitable for high- and medium-activity vessels (tankers, bulkers, general cargo, container ships etc.)</li> <li>- TBT-free self polishing antifouling with good weathering properties for atmospheric resistance during vessel construction and in-service</li> <li>- controlled polishing rate to give effective protection in accordance with the specified dry film thickness</li> <li>- complies with IMO Antifouling Systems Convention</li> </ul>
<b>COLOURS AND GLOSS</b>	redbrown, brown – flat
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.4 g/cm <sup>3</sup>
Volume solids	50% ± 2%
VOC (UK PG 6/23(92) appendix 3)	max. 467 g/l (3.9 lb/gal)
Recommended dry film thickness	75 - 150 µm depending on system
Theoretical spreading rate	6.7 m <sup>2</sup> /l for 75 µm 5.0 m <sup>2</sup> /l for 100 µm 3.3 m <sup>2</sup> /l for 150 µm
Touch dry after	1 hour at 20 °C
Overcoating interval	min. 6 hours at 20°C
Shelf life (cool and dry place)	at least 12 months * see additional data
Refloating time	min. 12 hours ** see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- previous coat; dry and free from any contamination</li> <li>- suitable high performance anticorrosive</li> <li>- substrate temperature should be at least 3°C above dew point</li> <li>- for the epoxy anticorrosive system SigmaCover 555 is advised</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>- the paint should be stirred well before use, preferably by means of a mechanical mixer, to ensure homogeneity</li> </ul>
<b>AIRLESS SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)
Nozzle pressure	12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)
<b>BRUSH/ROLLER</b>	only for touch up and repair
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%
<b>CLEANING SOLVENT</b>	Thinner 21-06



# SIGMA NEXEON 710

October 2012

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	6.7	5.0	3.3
dft in µm	75	100	150

### Overcoating table for Sigma Nexeon 710 for dft up to 150 µm

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	12 hours	10 hours	6 hours	4 hours
Refloating minimum interval	24 hours	18 hours	12 hours	9 hours

- for systems with more than two layers of antifouling minimum drying time before overcoating and minimum time before refloating should be increased
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions
- the above data are a fair indication for normal application conditions

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA NEXEON 710

October 2012

## WARRANTY

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The English text of this data sheet shall prevail over any translation thereof.

	PDS	7219
343920	brown	2000002150
343921	redbrown	2008002150

# SIGMA NEXEON 750

3 pages

April 2013  
Revision of February 2011

<b>Description</b>	high activity tin-free and copper free self polishing antifouling, specially designed for hull protection during long stationary periods
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– superior antifouling performance during outfitting</li> <li>– excellent aesthetics at vessel delivery</li> <li>– excellent polishing characteristics and hull roughness reduction</li> <li>– suitable for static, low speed and low activity vessels</li> <li>– can be applied as the final coat for all Sigma Coatings antifouling systems</li> <li>– complies with IMO Antifouling Systems Convention</li> </ul>
<b>COLOURS AND GLOSS</b>	redbrown, brown – flat
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.4 g/cm <sup>3</sup>
Volume solids	52 ± 2%
VOC (Supplied)	max. 307 g/kg (Directive 1999/13/EC, SED) max. 430 g/l (approx. 3.6 lb/gal)
Recommended dry film thickness	100 - 150 µm depending on system, type of vessel and outfitting time
Theoretical spreading rate	5.0 m <sup>2</sup> /l for 100 µm 4.0 m <sup>2</sup> /l for 125 µm 3.3 m <sup>2</sup> /l for 150 µm
Touch dry after	2 hours
Overcoating interval	not applicable
Shelf life (cool and dry place)	at least 12 months
Refloating time	min. 12 hours * * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; dry and free from any contamination</li> <li>– suitable approved high performance (tar free) anticorrosive</li> <li>– substrate temperature should be at least 3°C above dew point</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>– stir well before use</li> <li>– the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance</li> </ul>
<b>AIRLESS SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)
Nozzle pressure	12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)
<b>BRUSH/ROLLER</b>	only for touch up and repair
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%
<b>CLEANING SOLVENT</b>	Thinner 21-06

# SIGMA NEXEON 750

April 2013

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	5.0	4.0	3.3
dft in µm	100	125	150

### Overcoating table for Sigma Nexeon 750 for dft up to 150 µm

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	18 hours	12 hours	8 hours	4 hours
maximum interval	unlimited	unlimited	unlimited	unlimited
Refloating minimum interval	24 hours	18 hours	12 hours	9 hours

on top of approved antifouling system and itself

- the above data are a fair indication for normal application conditions

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets see information sheet 1411  
 Safety indications see information sheet 1430  
 Safety in confined spaces and health safety  
 Explosion hazard - toxic hazard see information sheet 1431

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA NEXEON 750

April 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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293798	PDS redbrown	7296 2008002200
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# SIGMA SYLADVANCE 700

3 pages

November 2013  
Revision of November 2012

<b>Description</b>	high performance selfpolishing and selfsmoothing antifouling based on hydrolyzing, pure Silyl Acrylate Technology
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– designed as the antifouling system suitable for high- and medium-activity vessels</li> <li>– controlled polishing rate to give effective protection in accordance with the specified dry film thickness</li> <li>– selfsmoothing capabilities to give optimal hull roughness reduction</li> <li>– controls settlement of shell and weed fouling for prolonged periods depending on sailing pattern and routes</li> <li>– complies with IMO Antifouling Systems Convention</li> </ul>
<b>COLOURS AND GLOSS</b>	redbrown, brown – flat
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.8 g/cm <sup>3</sup>
Volume solids	56 ± 2%
VOC (Supplied)	max. 239 g/kg (Directive 1999/13/EC, SED) max. 425 g/l (approx. 3.5 lb/gal)
Recommended dry film thickness	75 - 165 µm per coat depending on system
Theoretical spreading rate	3.7 m <sup>2</sup> /l for 150 µm *
Touch dry after	2 hours
Overcoating interval	min. 6 hours *
Shelf life (cool and dry place)	at least 12 months * see additional data
Refloating time	min. 12 hours at 20°C
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; dry and free from any contamination</li> <li>– suitable high performance (tar free) anticorrosive</li> <li>– substrate temperature should be at least 3°C above dew point</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>– stir well before use</li> <li>– the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance</li> </ul>
<b>AIRLESS SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)
Nozzle pressure	12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)
<b>BRUSH/ROLLER</b>	only for touch up and spot repair
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 3%
<b>CLEANING SOLVENT</b>	Thinner 21-06

# SIGMA SYLADVANCE 700

November 2013

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	7.5	5.6	3.7	3.4
dft in µm	75	100	150	165

### Overcoating table for Sigma SylAdvance 700 for dft up to 165 µm

with itself

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	18 hours	12 hours	6 hours	4 hours
Refloating minimum interval	36 hours	18 hours	12 hours	9 hours

- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions
- the above data are a fair indication for normal application conditions

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

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# SIGMA SYLADVANCE 700

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November 2013

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## LIMITATIONS OF LIABILITY

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	PDS	7222
332207	redbrown	2008002200
332208	brown	2000002200



# SIGMA SYLADVANCE 800

3 pages

November 2013  
Revision of February 2012

**Description** high performance TBT-free selfpolishing and selfsmoothing antifouling, based on a hydrolyzing organosilyl polymer as binder

**PRINCIPAL CHARACTERISTICS**

- designed as the antifouling system suitable for a range of vessel activities
- TBT-free self-polishing antifouling with good weathering properties for atmospheric resistance during vessel construction and in-service
- controlled polishing rate to give effective protection in accordance with the specified dry film thickness
- enhances self-smoothing capabilities to give optimal hull roughness reduction
- controls settlement of shell and weed fouling for prolonged periods depending on sailing pattern and routes
- complies with IMO Antifouling Systems Convention

**COLOURS AND GLOSS** redbrown, brown – flat

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density 1.8 g/cm<sup>3</sup>  
 Volume solids 54 ± 2%  
 VOC (Supplied) max. 219 g/kg (Directive 1999/13/EC, SED)  
 max. 398 g/l (approx. 3.3 lb/gal)

Recommended dry film thickness 75 - 165 µm per coat depending on system  
 Theoretical spreading rate 7.2 m<sup>2</sup>/l for 75 µm  
 5.4 m<sup>2</sup>/l for 100 µm  
 3.6 m<sup>2</sup>/l for 150 µm  
 3.3 m<sup>2</sup>/l for 165 µm

Touch dry after min. 2 hours \*  
 Overcoating interval min. 6 hours \*  
 Shelf life (cool and dry place) at least 12 months  
 \* see additional data

**RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**

- previous coat; dry and free from any contamination
- suitable high performance (tar free) anticorrosive
- substrate temperature should be at least 3°C above dew point

**INSTRUCTIONS FOR USE**

- stir well before use
- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity
- too much solvent results in reduced sag resistance

## AIRLESS SPRAY

Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)  
 Nozzle pressure 12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

# SIGMA SYLADVANCE 800

November 2013

**BRUSH/ROLLER** only for touch up and repair  
 Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%

**CLEANING SOLVENT** Thinner 21-06

**ADDITIONAL DATA** **Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	7.2	5.4	3.6	3.3
dft in µm	75	100	150	165

**Overcoating table for Sigma SylAdvance 800 for dft up to 165 µm**

with itself

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	18 hours	12 hours	6 hours	4 hours
Refloating minimum interval	36 hours	18 hours	12 hours	9 hours

- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions
- the above data are a fair indication for normal application conditions

**Worldwide availability** It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA SYLADVANCE 800

November 2013

## WARRANTY

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	PDS	7294
241030	redbrown	2008002200
241032	brown	2000002200
323604	N redbrown	2008001500
323229	N brown	2000001500

# SIGMA VIKOTE 18

3 pages

 March 2013  
 Revision of July 2009

<b>Description</b>	high build aluminium pigmented chlorinated rubber primer/sealer
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- anticorrosive primer/sealer</li> <li>- excellent water resistance</li> <li>- unsaponifiable</li> <li>- resistant to well designed/controlled cathodic protection</li> <li>- fast drying</li> <li>- can be applied at low temperatures, down to -10°C</li> <li>- tolerates a dft up to 150 µm at overlaps without sagging</li> <li>- compatible with antifoulings</li> </ul>
<b>COLOURS AND GLOSS</b>	grey, reddish grey – flat
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.2 g/cm <sup>3</sup>
Volume solids	42 ± 2%
VOC (Supplied)	max. 409 g/kg (Directive 1999/13/EC, SED) max. 502 g/l (approx. 4.2 lb/gal)
Recommended dry film thickness	75 µm per coat
Theoretical spreading rate	5.6 m <sup>2</sup> /l for 75 µm
Touch dry after	4 hours at 5 - 10°C 1 hour at 20°C
Overcoating interval	min. 6 hours * max. unlimited
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, welds, rusty and damaged areas blast cleaned to ISO-Sa2½</li> <li>- steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm</li> <li>- primed steel or previous coat; dry and free from any contamination</li> <li>- galvanised steel; dry and free from any contamination and zinc salts</li> <li>- substrate temperature should be at least 3°C above dew point</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheets: 3101, 3102, 3103, 3104</span>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>- stir well before use</li> <li>- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>- too much solvent results in reduced sag resistance</li> </ul>
<b>AIR SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	6 - 10%, depending on required thickness and application conditions
Nozzle orifice	1.8 - 2 mm
Nozzle pressure	0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

# SIGMA VIKOTE 18

March 2013

## AIRLESS SPRAY

Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.45 mm (= 0.018 in)  
 Nozzle pressure 15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

the recommended dft cannot be reached in one coat  
 Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%

## CLEANING SOLVENT

Thinner 21-06

## ADDITIONAL DATA

### Overcoating table for Sigma Vikote 18 for dft up to 75 µm

substrate temperature	-10°C	5°C	10°C	20°C	30°C
with itself	24 hours	10 hours	8 hours	6 hours	4 hours
with antifoulings	36 hours	18 hours	12 hours	6 hours	4 hours
maximum interval	unlimited				

- surface should be dry and free from any contamination
- the above data are a fair indication for normal application conditions
- longer drying times may be necessary at higher dft and under unfavourable atmospheric conditions

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets see information sheet 1411  
 Safety indications see information sheet 1430  
 Safety in confined spaces and health safety  
 Explosion hazard - toxic hazard see information sheet 1431  
 Cleaning of steel and removal of rust see information sheet 1490

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMA VIKOTE 18

March 2013

## WARRANTY

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	PDS	7318
136557	dark	0100002200
136558	light	0200002200

# SIGMA VIKOTE 56

3 pages

March 2013  
Revision of July 2009

<b>Description</b>	modified acrylic finish
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- finish coat for above water areas</li> <li>- good gloss and colour retention</li> <li>- resistant to water and splash of mild chemicals</li> <li>- fast drying</li> <li>- can be applied at low temperatures, down to -10°C</li> </ul>
<b>COLOURS AND GLOSS</b>	white and various other colours (see also the SigmaCare Shade Card of PPG Protective & Marine Coatings) – gloss
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.1 g/cm <sup>3</sup>
Volume solids	35 ± 2%
VOC (Supplied)	max. 538 g/kg (Directive 1999/13/EC, SED) max. 569 g/l (approx. 4.7 lb/gal)
Recommended dry film thickness	35 µm
Theoretical spreading rate	10 m <sup>2</sup> /l for 35 µm
Touch dry after	1 hour at 5°C 30 min. at 20°C
Overcoating interval	min. 8 hours at 5°C, 4 hours at 20°C max. unlimited
Shelf life (cool and dry place)	at least 24 months
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- previous coat; chlorinated rubber, vinyl or acrylic coatings, dry and free from any contamination</li> <li>- substrate temperature should be at least 3°C above dew point</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheets: 3102, 3103, 3104</span>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>- stir well before use</li> <li>- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>- too much solvent results in reduced sag resistance</li> <li>- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)</li> </ul>
<b>AIR SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	0 - 5%, depending on required thickness and application conditions
Nozzle orifice	1.8 - 2 mm
Nozzle pressure	0.2 - 0.3 MPa (= approx. 2 - 3 bar; 29 - 44 p.s.i.)

# SIGMA VIKOTE 56

March 2013

## AIRLESS SPRAY

Recommended thinner Thinner 21-06  
 Volume of thinner 5 - 10%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.28 - 0.33 mm (= 0.011 - 0.013 in)  
 Nozzle pressure 12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%

## CLEANING SOLVENT

Thinner 21-06

## ADDITIONAL DATA

**Colour scheme:**  
**Sigma Vikote 56 colours to be applied on top of Sigma Vikote 46 colours**

Sigma Vikote 56 colours	Sigma Vikote 46 colours
7003, 7000, 1188, 3138, 3142	Offwhite
3179, 3149, 4150, 4171, 5163	Offwhite
1188, 1199, 5163, 5177, 6188	Light grey
5177, 5198, 8000	Dark grey
4199	Green
2182, 6179	Redbrown
8000	Black

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.

Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes



# SIGMA VIKOTE 56

March 2013

## WARRANTY

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154022	PDS white	7355 7000002200
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# SIGMACOVER 280

6 pages

March 2014  
Revision of October 2012

**Description** Universal epoxy anticorrosive primer based upon pure epoxy technology

- PRINCIPAL CHARACTERISTICS**
- Universal epoxy primer suitable for Ballast Tanks, Decks, Topside, Superstructure, Hull and Cargo Oil Tanks
  - general purpose epoxy primer in protective coating systems for steel and non ferrous metals
  - good adhesion to steel and galvanised steel
  - good adhesion to non-ferrous metals
  - good flow and wetting properties
  - good water and corrosion resistance
  - cures at temperatures down to +5°C
  - suitable for touching up of weld seams and damages of epoxy coatings during construction
  - excellent recoatability
  - can be overcoated with most alkyd-, chlorinated rubber-, vinyl-, epoxy- and two component polyurethane coatings
  - suitable on wet blast cleaned substrates (damp or dry)
  - compatible with well designed cathodic protection systems

**COLOURS AND GLOSS** yellow/green (redbrown on request) – eggshell

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.3 g/cm <sup>3</sup>
Volume solids	57 ± 2%
VOC (Supplied)	max. 327 g/kg (Directive 1999/13/EC, SED) max. 432 g/l (approx. 3.6 lb/gal) (UK PG 6/23(92) Appendix 3)
Recommended dry film thickness	50 - 100 µm depending on system
Theoretical spreading rate	11.4 m <sup>2</sup> /l for 50 µm 5.7 m <sup>2</sup> /l for 100 µm *
Touch dry after	1.5 hour at 20°C
Overcoating interval	min. see tables * max. see tables *
Full cure after	7 days *
Shelf life (cool and dry place)	(data for components) at least 24 months * see additional data

## SIGMACOVER 280

March 2014

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned (dry or wet) to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
  - coated steel; hydrojetted to VIS WJ2L (blasting profile 30 - 75 µm)
- **IMO-MSC.215(82) Requirements for Water Ballast Tanks:**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
- dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or according to ISO-St3
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanised steel; cleaned from grease, salts, contamination and roughened up
- substrate temperature should be above 5°C and at least 3°C above dew point during application and curing
- maximum relative humidity during application and curing is 85%

**SYSTEM SPECIFICATION**

marine system sheets: 3101, 3102, 3103, 3104, 3105, 3106 (spec. 5,7), 3107, 3108

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

# SIGMACOVER 280

March 2014

Induction time none  
 Pot life 8 hours at 20°C \*  
 \* see additional data

## AIR SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 10%, depending on required thickness and application conditions  
 Nozzle orifice 1.5 - 2 mm  
 Nozzle pressure 0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 10%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.46 mm (= 0.018 in)  
 Nozzle pressure 15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner no extra thinner is necessary  
 Volume of thinner but up to 5% Thinner 91-92 can be added if desired

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	11.4	7.6	5.7
dft in µm	50	75	100

Maximum dft when brushing: 50 µm

### Overcoating table for SigmaCover 280 for dft up to 100 µm

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	36 hours	16 hours	8 hours	6 hours	4 hours
Max interval when exposed to direct sunshine maximum interval	3 months	3 months	3 months	2 months	2 months
Max interval when <b>not</b> exposed to direct sunshine maximum interval	6 months	6 months	6 months	4 months	3 months

with various two pack epoxy- and polyurethane coatings

– surface should be dry and free from any contamination

# SIGMACOVER 280

March 2014

### Overcoating table for SigmaCover 280 for dft up to 100 µm

with other types of paint like: most chlorinated rubber-, vinyl-, alkyd coatings

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	16 hours	10 hours	5 hours	3 hours	2 hours
maximum interval	21 days	21 days	10 days	7 days	4 days

- surface should be dry and free from any contamination
- glossy finishes require a corresponding undercoat

### Curing

### Curing table for dft up to 100 µm

substrate temperature	touch dry	dry to handle	full cure
5°C	8 hours	13 hours	21 days
10°C	4 hours	6 hours	14 days
20°C	2 hours	2.5 hours	7 days
30°C	1 hour	1.5 hour	5 days
40°C	45 min.	1 hour	3 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

15°C	10 hours
20°C	8 hours
30°C	5 hours
35°C	4 hours

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

# SIGMACOVER 280

March 2014

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMACOVER 280

March 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

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	PDS	7417
179083	yellow/green	4009002200 (144497 base, 142014 hardener)
179085	redbrown	6137002200 (144493 base, 142014 hardener)

# SIGMACOVER 350

6 pages

May 2013  
Revision of December 2010

## DESCRIPTION

two component high build polyamine cured epoxy primer/coating

## PRINCIPAL CHARACTERISTICS

- surface tolerant primer/coating for topsides, decks, superstructures, cargo holds and protective coating systems
- good impact and abrasion resistance
- fast curing
- smooth film, easy to clean
- compatible with various aged coatings
- excellent corrosion resistance
- resistant to splash and spillage of a wide range of chemicals

## COLOURS AND GLOSS

various colours (in line with the SigmaCare Shade Card of PPG Protective & Marine Coatings), aluminum and RAL colours - semigloss  
Note: For cargo holds grey ( 5177 ) and redbrown ( 6179 ) only

## BASIC DATA AT 20°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.4 g/cm <sup>3</sup>
Volume solids	72 ± 2%
VOC (supplied)	max. 263 g/kg (Directive 1999/13/EC, SED) max. 361 g/l (approx. 3.0 lb/gal)
Recommended dry film thickness	50 - 100 µm for brush/ roller 125 - 150 µm for airless spray
Theoretical spreading rate	5.8 m <sup>2</sup> /l for 125 µm, 4.8 m <sup>2</sup> /l for 150 µm.
Touch dry after	2 hours
Overcoating interval	min. 6 hours; max. see overcoating tables*
Curing time	7 days

(data for components)

Shelf life (cool and dry place)	at least 12 months * see additional data
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## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2½ for excellent corrosion protection, blasting profile 40 - 70µm
  - steel; blast cleaned to ISO-Sa2, blasting profile 40 - 70 µm or power tool cleaned to ISO-St2 for good corrosion protection
  - existing sound epoxy coating systems and most sound alkyd coating systems; sufficiently roughened, dry and free from any contamination
- substrate temperature should be above 5°C and at least 3°C above dew point



## SIGMACOVER 350

May 2013

<b>SYSTEM SPECIFICATION</b>	2 x 125 µm dft SigmaCover 350
<b>INSTRUCTIONS FOR USE</b>	<p>mixing ratio by volume: base to hardener 80 : 20</p> <ul style="list-style-type: none"> <li>- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity</li> <li>- too much solvent results in reduced sag resistance</li> <li>- thinner should be added after mixing the components</li> </ul>
Induction time	none
Pot life	3 hours at 20°C * * see additional data
<b>AIRLESS SPRAY</b>	
Recommended thinner	Thinner 91-92
Volume of thinner	0 - 5%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.48 - 0.53 mm (= 0.019 - 0.021 in)
Nozzle pressure	15 MPa (= approx. 150 bar; 2130 p.s.i.)
<b>AIR SPRAY</b>	
Recommended thinner	Thinner 91-92
Volume of thinner	5 - 10%, depending on required thickness and application conditions
Nozzle orifice	1.8 - 2 mm
Nozzle pressure	0.3 - 0.4 MPa (= approx. 3 - 4 bar; 43 - 57 p.s.i.)
<b>BRUSH/ROLLER</b>	
Recommended thinner	Thinner 91-92
Volume of thinner	0 - 5%
<b>CLEANING SOLVENT</b>	Thinner 90-53
<b>SAFETY PRECAUTIONS</b>	<p>for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets</p> <p>this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes</p>

**ADDITIONAL DATA****Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	7.2	5.8	4.8
dft in µm	100	125	150

max. dft when brushing:

100 µm

# SIGMACOVER 350

May 2013

**Overcoating table for SigmaCover 350 for dft up to 150 µm**

**Application Area:** Marine Cargo Holds and areas exposed to water immersion

with itself	substrate temperature	5°C	10°C	20°C	30°C	40°C
	minimum interval	16 hours	9 hours	6 hours	4 hours	3 hours
	maximum interval	1 month	1 month	21 days	14 days	7 days

**Overcoating table for SigmaCover 350 for dft up to 150 µm**

**Application Area:** Marine - none permanent exposure to splash water, seawater, spillage of chemicals etc.

with itself and various two pack epoxy coatings	substrate temperature	5°C	10°C	20°C	30°C	40°C
	minimum interval	16 hours	9 hours	6 hours	4 hours	3 hours
with polyurethanes	maximum interval	1 month	1 month	21 days	14 days	7 days
	minimum interval	48 hours	30 hours	18 hours	9 hours	5 hours
	maximum interval	1 month	21 days	14 days	7 days	3 days

# SIGMACOVER 350

May 2013

## Overcoating table for SigmaCover 350 for dft up to 150 µm

**Application Area:** Atmospheric exposure & Industrial PC

	substrate temperature	5°C	10°C	20°C	30°C	40°C
with itself and various two pack epoxy coatings	minimum interval	16 hours	9 hours	6 hours	4 hours	3 hours
	maximum interval	unlimited	unlimited	unlimited	unlimited	unlimited
with polyurethanes	minimum interval	48 hours	30 hours	18 hours	9 hours	5 hours
	maximum interval	6 months	6 months	3 months	1 month	1 month
with various single pack coatings (such as alkyds and acrylics)	minimum interval	24 hours	24 hours	16 hours	8 hours	5 hours
	maximum interval	14 days	14 days	7 days	4 days	2 days

Unlimited:

- This product has an unlimited maximum overcoating interval provided the surface is free from chalking and other contamination
- In cases of exposure to direct sunlight or when the surface is contaminated it is recommended that the surface be cleaned and roughened to ensure good adhesion of the subsequent coating

# SIGMACOVER 350

May 2013

### Curing table for SigmaCover 350 for dft up to 150 µm

substrate temperature	touch dry	dry to handle	full cure
5°C	12 hours	16 hours	25 days
10°C	6 hours	9 hours	15 days
20°C	2 hours	6 hours	7 days
30°C	1 hour	4 hours	4 days
40°C	1 hour	3 hours	2 days

- for cargo hold application: for full cure for hard angular cargoes, please contact your nearest PPG Protective & Marine Coatings sales office
- adequate ventilation to remove solvent must be maintained during application and curing (please refer to sheets 1433 and 1434)
- should SigmaCover 350 or the total coating system (2 x 125 µm) be applied in excess of the specified dry film thickness, then the time necessary to reach full cure will be increased

### Pot life (at application viscosity)

15°C	4 hours
20°C	3 hours
30°C	2 hours
40°C	1 hour

### Worldwide availability

Whilst it is always the aim of PPG Protective & Marine Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

### REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

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# SIGMACOVER 350

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May 2013

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## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product.

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	PDS	7970
220296	grey	5177052200
220298	redbrown	6179052200

# SIGMACOVER 350 LT

4 pages

March 2014  
Revision of June 2012

**Description**

two component high build polyamide cured epoxy primer/coating

**PRINCIPAL CHARACTERISTICS**

- surface tolerant primer/coating for topsides, decks, superstructures and cargo holds
- good impact and abrasion resistance
- compatible with various aged coatings
- excellent corrosion resistance
- resistant to splash and spillage of a wide range of chemicals
- cures at temperatures down to -5°C
- smooth film, easy to clean

**COLOURS AND GLOSS**

various colours (in line with the SigmaCare Shade Card of PPG Protective & Marine Coatings) – semi-gloss  
Note: For Cargo holds grey ( 5177 ) and redbrown ( 6179 ) only – semi-gloss

**BASIC DATA AT 10°C**

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.4 g/cm <sup>3</sup>
Volume solids	74 ± 2%
VOC (Supplied)	max. 264 g/kg (Directive 1999/13/EC, SED) max. 361 g/l (approx. 3.0 lb/gal)
Recommended dry film thickness	50 - 100 µm for brush/ roller 125 - 150 µm for airless spray
Theoretical spreading rate	5.9 m <sup>2</sup> /l for 125 µm 4.9 m <sup>2</sup> /l for 150 µm
Touch dry after	4 hours* at 10°C * * see additional data
Overcoating interval	min. 8 hours * max. 14 days *
Full cure after	7 days* at 10°C

	(data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- for atmospheric exposure conditions:
- steel; blast cleaned to ISO-Sa2½ for excellent corrosion protection, blasting profile 40 - 70 µm
- steel; blast cleaned to ISO-Sa2, blasting profile 40 - 70 µm or power tool cleaned to ISO-St2 for good corrosion protection
- existing sound epoxy systems and most sound alkyd coating system; sufficiently roughened, dry and free of any contamination
- substrate temperature should be between -5°C up to 15°C during application and curing and at least 3°C above dew point, dry and free from ice and any contamination

# SIGMACOVER 350 LT

March 2014

**SYSTEM SPECIFICATION** 2 x 125 µm dft SigmaCover 350 LT

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be above 5°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Pot life

3 hours at 10°C \*  
\* see additional data

**AIR SPRAY**

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

1.8 - 2 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

**AIRLESS SPRAY**

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.48 - 0.53 mm (= 0.019 - 0.021 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

**BRUSH/ROLLER**

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%

**CLEANING SOLVENT**

Thinner 91-92

**ADDITIONAL DATA**

**Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	7.3	5.9	4.9
dft in µm	100	125	150

Maximum dft when brushing:

100 µm

**Overcoating table for SigmaCover 350 LT for dft up to 150 µm**

substrate temperature	-5°C	0°C	5°C	10°C	15°C
minimum interval	36 hours	24 hours	12 hours	8 hours	6 hours
maximum interval	28 days	28 days	28 days	14 days	10 days

with epoxy coatings

- surface should be dry and free from any contamination and ice

# SIGMACOVER 350 LT

March 2014

## Curing

### Curing table for dft up to 150 µm

substrate temperature	touch dry	dry to handle	full cure
-5°C	24 hours	32 hours	16 days
0°C	16 hours	20 hours	12 days
5°C	8 hours	10 hours	9 days
10°C	4 hours	6 hours	7 days
15°C	2 hours	4 hours	4 days

- for cargo hold application: for full cure for hard angular cargoes, please contact your nearest PPG Protective & Marine Coatings sales office
- adequate ventilation to remove solvent must be maintained during application and curing (please refer to sheets 1433 and 1434)
- should SigmaCover 350 LT or the total coating system (2 x 125 µm) be applied in excess of the specified dry film thickness, then the time necessary to reach full cure will be increased

### Pot life (at application viscosity)

10°C	3 hours
15°C	2 hours

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes



# SIGMACOVER 350 LT

March 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

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	PDS	7977
246239	grey	5177052200
246240	redbrown	6179052200



# SIGMACOVER 380

5 pages

 March 2014  
 Revision of November 2013

<b>Description</b>	Universal epoxy anticorrosive system based upon pure epoxy technology
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– Universal epoxy primer system suitable for Ballast Tanks, Decks, Topside, Superstructure and Hull</li> <li>– good abrasion resistance for dedicated areas of application</li> <li>– suitable for immersion service (ballast tanks, outside shell)</li> <li>– good anticorrosive properties and water resistance</li> <li>– good flexibility</li> <li>– resistant to well designed cathodic protection</li> <li>– good drying and curing property</li> <li>– suitable for both newbuilding and maintenance applications</li> </ul>
<b>COLOURS AND GLOSS</b>	grey, green – eggshell
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
	(data for mixed product)
Mass density	1.4 g/cm <sup>3</sup>
Volume solids	80 ± 2%
VOC (Supplied)	max. 161 g/kg (Directive 1999/13/EC, SED)
	max. 226 g/l (approx. 1.9 lb/gal)
Recommended dry film thickness	125 - 200 µm depending on system *
Theoretical spreading rate	6.4 m <sup>2</sup> /l for 125 µm *
Touch dry after	3 hours*
Overcoating interval	min. 8 hours *
	max. 28 days *
Full cure after	7 days*
	(data for components)
Shelf life (cool and dry place)	at least 12 months
	* see additional data

## SIGMACOVER 380

March 2014

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
- **IMO-MS-C.215(82) Requirements for Water Ballast Tanks:**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - damages up to 2% of the total area of the tank may be treated to ISO-St3. Damages over 2% of the total area of the tank or contiguous damages over 25 m<sup>2</sup> have to be blast cleaned to ISO-Sa2½.
  - dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or according to ISO-St3
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanised steel; cleaned from grease, salts, contamination and roughened up
- previous coat; (e.g. SigmaCover 380) dry and free from any contamination
- substrate temperature should be above 5°C and at least 3°C above dew point during application and curing
- maximum relative humidity during application and curing is 85 %

**SYSTEM SPECIFICATION**

marine

system sheet: 3106 (spec. 6)

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

# SIGMACOVER 380

March 2014

Induction time none, when substrate temperature above 10°C  
 Pot life 4 hours\* at 20°C  
 \* see additional data

## AIRLESS SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 10%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.46 - 0.53 mm (= 0.018 - 0.021 in)  
 Nozzle pressure 20 - 25 MPa (= 200 - 250 bar; 2901 - 3626 p.s.i.)

## BRUSH/ROLLER

only for spot repair and stripe coating

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	6.4	5.0	4.0
dft in µm	125	160	200

Maximum dft in critical areas, applied in two equal coats: 1500 µm

### Overcoating table for SigmaCover 380 for dft up to 160 µm

with itself

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	48 hours	24 hours	8 hours	4 hours
maximum interval	28 days	28 days	28 days	28 days

– surface should be dry and free from any contamination

## Curing

### Curing table for dft up to 160 µm

substrate temperature	touch dry	dry to handle	full cure
5°C	24 hours	48 hours	20 days
10°C	12 hours	24 hours	14 days
20°C	3 hours	8 hours	7 days
30°C	2 hours	6 hours	4 days
40°C	1 hour	4 hours	3 days

– adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

# SIGMACOVER 380

March 2014

### Pot life (at application viscosity)

15°C	6 hours
20°C	4 hours
30°C	2 hours
40°C	1 hour

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

### REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety - explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

### SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMACOVER 380

March 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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	PDS	7979
250041	green	4100002200 (250040 base, 250044 hardener)
250043	grey	5100002200 (250042 base, 250044 hardener)

# SIGMACOVER 380 LT

5 pages

March 2014  
Revision of November 2013

**Description** Universal epoxy anticorrosive system based upon pure epoxy technology

- PRINCIPAL CHARACTERISTICS**
- Universal epoxy primer system suitable for Ballast Tanks, Decks, Topside, Superstructure and Hull
  - good abrasion resistance for dedicated areas of application
  - suitable for immersion service (ballast tanks, outside shell)
  - good drying and curing properties at low substrate temperature (down to -5°C)
  - good anticorrosive properties and water resistance
  - good flexibility
  - resistant to well designed cathodic protection
  - suitable for both newbuilding and maintenance applications

**COLOURS AND GLOSS** grey, green – eggshell

**BASIC DATA AT 10°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.5 g/cm <sup>3</sup>
Volume solids	80 ± 2%
VOC (Supplied)	max. 153 g/kg (Directive 1999/13/EC, SED) max. 230 g/l (approx. 1.9 lb/gal)
Recommended dry film thickness	125 - 200 µm depending on system *
Theoretical spreading rate	6.4 m <sup>2</sup> /l for 125 µm 4 m <sup>2</sup> /l for 200 µm
Touch dry after	8 hours* min.
Overcoating interval	16 hours * max. 1 month *
Full cure after	5 days*
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data

## SIGMACOVER 380 LT

March 2014

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned (dry or wet) to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
  
- **IMO-MS-C.215(82) Requirements for Water Ballast Tanks:**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding
  - steel or steel with not approved zinc silicate shop primer; blast cleaned (dry or wet) to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - damages up to 2% of the total area of the tank may be treated to ISO-St3. Damages over 2% of the total area of the tank or contiguous damages over 25 m<sup>2</sup> have to be blast cleaned to ISO-Sa2½.
  - dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
  
- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or according to ISO-St3
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanised steel; cleaned from grease, salts, contamination and roughened up
  
- previous coat; (e.g. SigmaCover 380 LT) dry and free from any contamination
- substrate temperature should be between -10°C up to 15°C during application and curing and at least 3°C above dew point and free from ice and any contamination
- during application and curing a substrate temperature down to -10°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases
- maximum relative humidity during application and curing is 85%

**SYSTEM SPECIFICATION**

marine

system sheet: 3106 (spec. 6)



# SIGMACOVER 380 LT

March 2014

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be above 5°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Induction time

30 min. when substrate temperature lower than 10°C

Pot life

5 hours at 10°C \*

\* see additional data

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.46 - 0.53 mm (= 0.018 - 0.021 in)

Nozzle pressure

20 - 25 MPa (= 200 - 250 bar; 2901 - 3626 p.s.i.)

## BRUSH/ROLLER

only for spot repair and stripe coating

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	6.4	5.0	4.0
dft in µm	125	160	200

Maximum dft when brushing:  
two equal coats:

Maximum dft in critical areas, applied in  
1500 µm

### Overcoating table for SigmaCover 380 LT for dft up to 160 µm

substrate temperature	-5°C	0°C	5°C	10°C	15°C
minimum interval	48 hours	36 hours	24 hours	16 hours	12 hours
maximum interval	2 months	2 months	2 months	1 month	1 month

with itself

- surface should be dry and free from any contamination

# SIGMACOVER 380 LT

March 2014

## Curing

### Curing table for dft up to 160 µm

substrate temperature	touch dry	dry to handle	full cure
-5°C	24 hours	48 hours	20 days
0°C	12 hours	24 hours	14 days
5°C	10 hours	20 hours	7 days
10°C	8 hours	16 hours	5 days
15°C	4 hours	12 hours	4 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

\* when the application temperature is over 15°C the standard hardener should be used

### Pot life (at application viscosity)

10°C	5 hours
15°C	3 hours

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety - explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMACOVER 380 LT

March 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

	PDS	7980
266987	green	4100002200 (250040 base, 262195 hardener)
266986	grey	5100002200 (250042 base, 262195 hardener)



# SIGMACOVER 435

5 pages

October 2012  
Revision of April 2012

## Description

two component high build micaceous iron oxide pigmented polyamide cured recoatable epoxy coating

## PRINCIPAL CHARACTERISTICS

- general purpose epoxy build coat or finish in protective coating systems for steel and concrete structures exposed to atmospheric land or marine conditions
- easy application, both by airless spray and brush
- cures even at temperatures down to -10°C
- a high relative humidity max. 95%, during application and curing does not influence the quality of the coating
- good adhesion on most aged, sound alkyd-, chlorinated rubber- and epoxy coatings
- can be recoated with various two component and conventional coatings even after long weathering periods
- resistant to water and splash of mild chemicals
- excellent durability
- tough, with long term flexibility
- resistant to temperatures up to 200°C (see system sheet 4062)

## COLOURS AND GLOSS

light grey (9553-05), dark grey ( 9558-05), green (9441-05), aluminium (9590-05) – eggshell

## BASIC DATA AT 20 °C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density	1.4 g/cm <sup>3</sup>
Volume solids	63% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 241 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 344 g/l (approx. 2.9 lb/gal)
Recommended dry film thickness	75 - 150 µm depending on system
Theoretical spreading rate	6.3 m <sup>2</sup> /l for 100 µm *
Touch dry after	2 hours at 20 °C

Overcoating interval	min. 3 hours *
	max. unlimited
Full cure after	4 days * at 20 °C

(data for components)

Shelf life (cool and dry place)	at least 24 months
	* see additional data

# SIGMACOVER 435

October 2012

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm
- steel with approved zinc silicate shop primer; pretreated according to SPSS or powertool cleaned to SPSS-Pt3
- previous coat; dry and free from any contamination
- during application and curing a substrate temperature down to -10°C is acceptable provided substrate is dry and free from ice
- substrate temperature should be at least 3°C above dew point

## SYSTEM SPECIFICATION

marine

system sheets: 3102, 3103

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 82 : 18

- the temperature of the mixed base and hardener should preferably be above 10°C, otherwise extra solvent may be required to obtain application viscosity
- thinner should be added after mixing the components
- too much solvent results in reduced sag resistance

Induction time

none

Pot life

5 hours at 20 °C

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

10 - 15%, depending on required thickness and application conditions

Nozzle orifice

2 - 3 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.48 - 0.58 mm (= 0.019 - 0.023 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.4	6.3	4.2
dft in µm	75	100	150

Maximum dft when brushing:

75 µm

# SIGMACOVER 435

October 2012

### Overcoating table for dft up to 150 µm

for Sigma Vikote 46,  
SigmaDur 550, SigmaDur 520 and  
Sigmarine 40

for SigmaCover 435,  
SigmaCover 456

substrate temperature	-5°C	5°C	10°C	20°C	30°C	40°C
minimum interval	72 hours	24 hours	16 hours	8 hours	5 hours	3 hours
maximum interval	no limitation					
minimum interval	36 hours	10 hours	4 hours	3 hours	2 hours	2 hours
maximum interval	no limitation					

- surface should be dry and free from chalking and contamination
- SigmaCover 435 should not be overcoated with coal tar epoxy coatings
- finishes require a corresponding undercoat

### Curing

### Curing table for dft up to 150 µm

substrate temperature	dry to handle	full cure
-10°C	24 - 48 hours	20 days
-5°C	24 - 30 hours	14 days
0°C	18 - 24 hours	10 days
5°C	18 hours	8 days
10°C	12 hours	6 days
15°C	8 hours	5 days
20°C	6 hours	4 days
30°C	4 hours	3 days
40°C	3 hours	2 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

In exceptional cases SigmaCover 435 may be applied at lower substrate temperatures (down to -15°C) provided that the surface is free from ice and other contamination. In such cases special care must be taken to avoid thick film application as this may lead to checking/crazing or solvent entrapment. It should be clear that application at lower temperatures will require additional thinning to obtain application viscosity, however this will affect the sag resistance of the applied coating and can induce solvent retention. Optimal curing and designed product properties will only be achieved when minimum required substrate temperature is reached.

## SIGMACOVER 435

October 2012

**Pot life (at application viscosity)**

10 °C	12 hours
20 °C	5 hours
30 °C	4 hours
40 °C	2 hours

**Worldwide availability**

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.  
Under these circumstances an alternative product data sheet is used.

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Conversion tables	see information sheet 1410
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMACOVER 435

October 2012

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product.

THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG.

Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.**

The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com).

The English text of this data sheet shall prevail over any translation thereof.

	PDS	7465
179025	lightgrey	9553052200
179496	darkgrey	9558052200





## SIGMACOVER 456

5 pages

November 2013  
Revision of April 2012**Description**

two component high build polyamide cured recoatable epoxy coating

**PRINCIPAL CHARACTERISTICS**

- general purpose epoxy build coat or finish in protective coating systems for steel and concrete structures exposed to atmospheric land or marine conditions
- easy application, both by airless spray and brush
- cures even at temperatures down to -10°C
- a high relative humidity max. 95%, during application and curing does not influence the quality of the coating
- good adhesion on most aged, sound alkyd-, chlorinated rubber- and epoxy coatings
- can be recoated with various two component and conventional coatings even after long weathering periods
- resistant to water and splash of mild chemicals
- excellent corrosion resistance
- tough, with long term flexibility

**COLOURS AND GLOSS**

white and various other colours (see also the SigmaCare Shade Card of PPG Protective &amp; Marine Coatings) – semi-gloss

*\* Epoxy coatings will chalk and fade with exposure to sunlight***BASIC DATA AT 20°C**(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density	1.4 g/cm <sup>3</sup>
Volume solids	65 ± 2%
VOC (Supplied)	max. 250 g/kg (Directive 1999/13/EC, SED) max. 344 g/l (approx. 2.9 lb/gal)
Recommended dry film thickness	75 - 150 µm depending on system
Theoretical spreading rate	6.5 m <sup>2</sup> /l for 100 µm 8.7 m <sup>2</sup> /l
Touch dry after	2 hours at 20°C
Overcoating interval	min. 3 hours * max. unlimited
Full cure after	4 days * at 20°C

(data for components)

Shelf life (cool and dry place)

at least 24 months  
\* see additional data**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- previous coat; dry and free from any contamination
- during application and curing a substrate temperature down to -10°C is acceptable provided substrate is dry and free from ice
- substrate temperature should be at least 3°C above dew point

**SYSTEM SPECIFICATION**

marine

system sheets: 3102, 3103, 3104, 3105

# SIGMACOVER 456

November 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 82 : 18

- too much solvent results in reduced sag resistance
- the temperature of the mixed base and hardener should preferably be above 10°C, otherwise extra solvent may be required to obtain application viscosity
- thinner should be added after mixing the components

Induction time

none

Pot life

5 hours at 20°C

\*see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

2 - 3 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.48 - 0.58 mm (= 0.019 - 0.023 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.7	6.5	4.3
dft in µm	75	100	150

Maximum dft when brushing:

60 µm

# SIGMACOVER 456

November 2013

## Overcoating table for dft up to 150 µm

for Sigma Vikote 46,  
SigmaDur 550, SigmaDur 520 and  
Sigmarine 40

for SigmaCover 435,  
SigmaCover 456

for Sigma Vikote 56 \*  
and Sigmarine 48 \*

substrate temperature	-5°C	5°C	10°C	20°C	30°C	40°C
minimum interval	72 hours	24 hours	16 hours	8 hours	5 hours	3 hours
maximum interval	no limitation					
minimum interval	36 hours	10 hours	4 hours	3 hours	2 hours	2 hours
maximum interval	no limitation					
maximum interval	17 days	14 days	10 days	7 days	4 days	2 days

- finishes require a corresponding undercoat
- surface should be dry and free from chalking and contamination
- SigmaCover 456 should not be overcoated with coal tar epoxy coatings

\* colour of SigmaCover 456 should be adapted to the colour of Sigma Vikote 56 or Sigmarine 48

## Curing

### Curing table for dft up to 150 µm

substrate temperature	dry to handle	full cure
-10°C	24 - 48 hours	20 days
-5°C	24 - 30 hours	14 days
0°C	18 - 24 hours	10 days
5°C	18 hours	8 days
10°C	12 hours	6 days
15°C	8 hours	5 days
20°C	6 hours	4 days
30°C	4 hours	3 days
40°C	3 hours	2 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

In exceptional cases SigmaCover 456 may be applied at lower substrate temperatures (down to -15°C) provided that the surface is free from ice and other contamination. In such cases special care must be taken to avoid thick film application as this may lead to checking/crazing or solvent entrapment. It should be clear that application at lower temperatures will require additional thinning to obtain application viscosity, however this will affect the sag resistance of the applied coating and can induce solvent retention. Optimal curing and designed product properties will only be achieved when minimum required substrate temperature is reached.

# SIGMACOVER 456

November 2013

### Pot life (at application viscosity)

10°C	12 hours
20°C	5 hours
30°C	4 hours
40°C	2 hours

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

### REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Conversion tables	see information sheet 1410
Surface preparation of concrete (floors)	see information sheet 1496
Relative humidity - substrate temperature - air temperature	see information sheet 1650

### SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

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# SIGMACOVER 456

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November 2013

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## WARRANTY

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179073	PDS white	7466 7000002200
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# SIGMACOVER 525

5 pages

June 2012  
Revision of April 2009

<b>Description</b>	two component polyamine cured epoxy tiecoat
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- final coat in epoxy underwater anticorrosive systems</li> <li>- epoxy tiecoat for use with Sigma antifoulings as specified</li> <li>- excellent water resistance</li> <li>- good abrasion and impact resistance</li> </ul>
<b>COLOURS AND GLOSS</b>	black, grey – flat
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.3 g/cm <sup>3</sup>
Volume solids	61% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 271 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 365 g/l (approx. 3.0 lb/gal)
Recommended dry film thickness	75 - 125 µm
Theoretical spreading rate	8.2 m <sup>2</sup> /l for 75 µm 4.9 m <sup>2</sup> /l for 125 µm
Touch dry after	8 hours at 20 °C
Overcoating interval	min. 12 hours * max. 14 days *
Full cure after	14 days * at 20 °C (data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- previous coat; dry and free from any contamination</li> <li>- substrate temperature should be above -5°C during application and curing and at least 3°C above dew point and free from ice and any contamination</li> <li>- during application and curing a substrate temperature down to -5°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheets: 3101</span>
<b>INSTRUCTIONS FOR USE</b>	mixing ratio by volume: base to hardener 86 : 14
Induction time	<ul style="list-style-type: none"> <li>- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity</li> <li>- thinner should be added after mixing the components</li> <li>- too much solvent results in reduced sag resistance and slower cure</li> </ul> <p>when substrate temperature is below 10°C, allow induction time after mixing of 15 minutes</p>

# SIGMACOVER 525

June 2012

Pot life 18 hours at 20 °C \*  
\* see additional data

## AIR SPRAY

Recommended thinner Thinner 91-92  
Volume of thinner 0 - 5%, depending on required thickness and application conditions  
Nozzle orifice 1.5 - 2 mm  
Nozzle pressure 0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner Thinner 91-92  
Volume of thinner 0 - 5%, depending on required thickness and application conditions  
Nozzle orifice approx. 0.53 - 0.58 mm (= 0.021 - 0.023 in)  
Nozzle pressure 12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner Thinner 91-92  
Volume of thinner 0 - 5% if required

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.2	6.0	4.9
dft in µm	75	100	125

Maximum dft when brushing: 75 µm

### Overcoating table for SigmaCover 525 for dft up to 125 µm

with Sigma antifoulings

substrate temperature	-5°C	5°C	10°C	20°C	30°C	40°C
minimum interval	20 hours	16 hours	14 hours	12 hours	10 hours	8 hours
maximum interval	18 days	18 days	18 days	14 days	7 days	3 days

– surface should be dry and free from chalking and contamination

# SIGMACOVER 525

June 2012

## Curing

### Curing table for dft up to 125 µm

substrate temperature	full cure	Immersion
-5°C	--	120 hours
5°C	--	96 hours
10°C	21 days	48 hours
20°C	14 days	24 hours
30°C	7 days	18 hours

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

15 °C	20 hours
20 °C	16 hours
30 °C	12 hours

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.

Under these circumstances an alternative product data sheet is used.

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes



# SIGMACOVER 525

June 2012

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product.

THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG.

Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.**

The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk.

PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com).

The English text of this data sheet shall prevail over any translation thereof.

# SIGMACOVER 525

June 2012

	PDS	7902
231787	black	8000002200
238738	grey	5000002200
240750	grey	5000002150

# SIGMACOVER 555

4 pages

November 2013  
Revision of January 2013

<b>Description</b>	two component polyamide cured epoxy anticorrosive tiecoat
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– final coat in epoxy underwater anticorrosive systems</li> <li>– excellent water resistance</li> <li>– epoxy anticorrosive with excellent adhesion for antifoulings</li> <li>– good abrasion and impact resistance</li> </ul>
<b>COLOURS AND GLOSS</b>	black, grey – eggshell
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.4 g/cm <sup>3</sup>
Volume solids	56 ± 2%
VOC (Supplied)	max. 276 g/kg (Directive 1999/13/EC, SED) max. 387 g/l (approx. 3.2 lb/gal)
Recommended dry film thickness	75 - 150 µm depending on system
Theoretical spreading rate	8.0 m <sup>2</sup> /l for 75 µm 4.0 m <sup>2</sup> /l for 150 µm
Touch dry after	6 hours at 20°C
Overcoating interval	min. 8 hours * max. 5 days *
Full cure after	7 days * at 20°C
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; dry and free from any contamination</li> <li>– substrate temperature should be above -5°C during application and curing and at least 3°C above dew point and free from ice and any contamination</li> <li>– during application and curing a substrate temperature down to -5°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	mixing ratio by volume: base to hardener 86 : 14
Induction time	<ul style="list-style-type: none"> <li>– the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance and slower cure</li> <li>– thinner should be added after mixing the components</li> </ul> when substrate temperature is below 10°C, allow induction time after mixing of 15 minutes
Pot life	4 hours at 20°C * * see additional data

# SIGMACOVER 555

November 2013

## AIR SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 5%, depending on required thickness and application conditions  
 Nozzle orifice approx. 1.5 - 2.0 mm  
 Nozzle pressure 0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 5%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.53 - 0.58 mm (= 0.021 - 0.023 in)  
 Nozzle pressure 12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 5% if required

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.0	6.0	4.0
dft in µm	75	100	150

Maximum dft when brushing: 75 µm

### Overcoating table for SigmaCover 555 for dft up to 150 µm

substrate temperature	-5°C	0°C	5°C	10°C	20°C	30°C	40°C
minimum interval	24 hours	24 hours	24 hours	12 hours	8 hours	6 hours	4 hours
maximum interval	10 days	5 days	5 days	4 days	3 days	3 days	2 days

with Sigma Coatings antifoulings

– surface should be dry and free from any contamination

# SIGMACOVER 555

November 2013

## Curing

### Curing table for dft up to 150 µm

substrate temperature	Immersion	full cure
-5°C	120 hours	
5°C	96 hours	21 days
10°C	48 hours	15 days
20°C	24 hours	7 days
30°C	18 hours	5 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

in exceptional cases SigmaCover 555 may be applied at lower substrate temperatures (down to -15°C) provided that the surface is free from ice and other contamination. In such cases special care must be taken to avoid thick film application as this may lead to checking/crazing or solvent entrapment. It should be clear that application at lower temperatures will require additional thinning to obtain application viscosity, however this will affect the sag resistance of the applied coating and can induce solvent retention. Optimal curing and designed product properties will only be achieved when minimum required substrate temperature is reached.

### Pot life (at application viscosity)

5°C	8 hours
10°C	6 hours
20°C	4 hours
30°C	2 hours

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMACOVER 555

November 2013

## WARRANTY

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## LIMITATIONS OF LIABILITY

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	PDS	7905
252914	grey	5000002150
267454	grey	5000002200
253345	black	8000002150
275860	black	8000002200

# SIGMACOVER 580

4 pages

June 2013  
Revision of November 2011

**Description** two component epoxy anticorrosive/ antifouling tiecoat for one coat application during under water hull repairs at dry docking

- PRINCIPAL CHARACTERISTICS**
- epoxy under water anticorrosive primer/coating
  - excellent tiecoat providing adhesion for antifoulings
  - one-coat application reduces application time
  - direct antifouling application
  - simplifies dry docking procedures and reduces down time

**COLOURS AND GLOSS** grey, dark grey – eggshell

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density 1.4 g/cm<sup>3</sup>  
 Volume solids 57 ± 2%  
 VOC (Supplied) max. 280 g/kg (Directive 1999/13/EC, SED)  
 max. 390 g/l (approx. 3.3 lb/gal)  
 Recommended dry film thickness min. 250 µm  
 Theoretical spreading rate 2.5 m<sup>2</sup>/l for 250 µm  
 Touch dry after 6 hours  
 Overcoating interval min. 8 hours \*  
 max. 5 days \*  
 Full cure after 7 days\*

(data for components)  
 Shelf life (cool and dry place) at least 12 months  
 \* see additional data

- RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**
- **for immersion in sea water**
    - steel; blast cleaned to ISO Sa2 or ISO-Sa2½, blasting profile 40 - 70 µm, for excellent corrosion protection
    - steel; blast cleaned to ISO-Sa2 , blasting profile 40-70 µm or power tool cleaned to ISO-St3 for good corrosion protection
  - substrate temperature should be above -5°C during application and curing and at least 3°C above dew point and free from ice and any contamination

# SIGMACOVER 580

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 86 : 14

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components
- preferable application temperature above 5°C to ensure good curing, application down to 0°C is possible

Induction time

when substrate temperature is below 10°C, allow induction time after mixing of 15 minutes

Pot life

4 hours at 20°C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%, depending on required thickness and application conditions

Nozzle orifice

approx. 1.5 - 2.0 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.58 mm (= 0.021 - 0.023 in)

Nozzle pressure

12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5% if required

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	2.5	2.1
dft in µm	250	300



# SIGMACOVER 580

June 2013

### Overcoating table for SigmaCover 580 for dft up to 250 µm

with Sigma EcoFleet and Sigma AlphaGen and Sigma SylAdvance antifoulings

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	24 hours	12 hours	8 hours	6 hours	4 hours
maximum interval	5 days	4 days	3 days	3 days	2 days

- surface should be dry and free from any contamination

### Curing

### Curing table for dft up to 250 µm

substrate temperature	full cure	Service - water immersion
10°C	15 days	48 hours
20°C	7 days	24 hours
30°C	5 days	18 hours

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

10°C	6 hours
20°C	4 hours
30°C	2 hours

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

### REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

### SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMACOVER 580

June 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

	PDS	7906
324595	grey	5000002200
326766	darkgrey	5004002200

**SIGMADUR 550****Globally Available**

4 pages

May 2012  
Revision of December 2010**Description**

two component aliphatic acrylic polyurethane finish

**PRINCIPAL CHARACTERISTICS**

- unlimited recoatable
- excellent resistance to atmospheric exposure conditions
- excellent colour and gloss retention
- non-chalking, non-yellowing
- cures at temperatures down to -5°C
- resistant to splash of mineral and vegetable oils, paraffins, aliphatic petroleum products and mild chemicals
- can be recoated even after long atmospheric exposure
- good application properties

**COLOURS AND GLOSS**

white and various other colours (see also the SigmaCare Shade Card of PPG Protective &amp; Marine Coatings) – gloss

**BASIC DATA AT 20 °C**(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density

1.3 g/cm<sup>3</sup>

Volume solids

55% ± 2%

VOC (Directive 1999/13/EC, SED)

max. 334 g/kg (Directive 1999/13/EC, SED)

VOC (UK PG 6/23(92) appendix 3)

max. 430 g/l (approx. 3.6 lb/gal)

Recommended dry film thickness

50 - 60 µm depending on system

Theoretical spreading rate

11.0 m<sup>2</sup>/l for 50 µm \*

Touch dry after

1 hour at 20 °C

Overcoating interval

min. 6 hours \*

max. unlimited

Full cure after

4 days \* at 20 °C

(data for components)

Shelf life (cool and dry place)

at least 24 months

\* see additional data

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- previous coat; (epoxy or polyurethane) dry and free from any contamination and sufficiently roughened if necessary
- during application and curing a substrate temperature down to -5°C is acceptable provided the substrate is dry and free from ice
- substrate temperature should be at least 3°C above dew point
- maximum relative humidity during application and curing is 85%
- premature exposure to early condensation and rain may cause colour and gloss change

# SIGMADUR 550

May 2012

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 88 : 12

- the temperature of the mixed base and hardener should preferably be above 10°C, otherwise extra solvent may be required to obtain application viscosity
- thinner should be added after mixing the components
- too much solvent results in reduced sag resistance

Induction time

none

Pot life

5 hours at 20 °C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 21-06

Volume of thinner

3 - 5%, depending on required thickness and application conditions

Nozzle orifice

1.0 - 1.5 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 21-06

Volume of thinner

3 - 5%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.44 - 0.49 mm (= 0.017 - 0.019 in)

Nozzle pressure

20 MPa (= approx. 200 bar; 2901 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

Thinner 21-06

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	11	9.2
dft in µm	50	60

### Overcoating table for SigmaDur products

substrate temperature	-5°C	0°C	10°C	20°C	30°C	40°C
minimum interval	24 hours	16 hours	8 hours	6 hours	5 hours	3 hours
maximum interval	unlimited					

- surface should be dry and free from any contamination

# SIGMADUR 550

May 2012

## Curing

### Curing table

substrate temperature	dry to handle	full cure
-5°C	24 hours	15 days
0°C	16 hours	11 days
10°C	8 hours	6 days
20°C	6 hours	4 days
30°C	5 hours	3 days
40°C	3 hours	2 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- premature exposure to early condensation and rain may cause colour and gloss change

### Pot life (at application viscosity)

10 °C	7 hours
20 °C	5 hours
30 °C	3 hours
40 °C	2 hours

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.

Under these circumstances an alternative product data sheet is used.

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes
  - contains a toxic polyisocyanate curing agent
  - avoid at all times inhalation of aerosol spraymist

# SIGMADUR 550

May 2012

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product.

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Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.**

The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk.

PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

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The English text of this data sheet shall prevail over any translation thereof.

	PDS	7537
238761	white	7000001400
238763	white	7000002200

# SIGMADUR ONE

3 pages

June 2013  
Revision of January 2011

## Description

One pack urethane polyester finish coat for on board maintenance

## PRINCIPAL CHARACTERISTICS

- easy to apply on topsides, decks and superstructures
- pre-reacted binder, no free isocyanates added
- easy application by brush and roller
- excellent flow and levelling properties
- quick drying
- good adhesion on most aged, sound alkyd-, epoxy- and polyurethane coatings
- high gloss
- good colour and gloss retention

## COLOURS AND GLOSS

white and various other colours (see also the SigmaCare Shade Card of PPG Protective &amp; Marine Coatings) – gloss

## BASIC DATA AT 20°C

Mass density	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Volume solids	1.1 g/cm <sup>3</sup>
VOC (Supplied)	53 ± 2% (colours) - 50 ± 2% (white)
	max. 383 g/kg (Directive 1999/13/EC, SED)
	max. 400 g/l (approx. 3.3 lb/gal)
Recommended dry film thickness	35 - 70 µm depending on system
Theoretical spreading rate	14.0 - 14.3 m <sup>2</sup> /l (colours) - 14.3 m <sup>2</sup> /l (white) for 35 µm
Touch dry after	1 hour at 20°C, 3 hours at 5°C
Overcoating interval	min. 8 hours at 20°C, 12 hours at 10°C
	max. unlimited
Full cure after	4 days
Shelf life (cool and dry place)	at least 24 months

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- previous coat; (alkyd, epoxy or polyurethane) dry and free from any contamination and sufficiently roughened if necessary
- substrate temperature should be at least 3°C above dew point but not above 50°C

## SYSTEM SPECIFICATION

systems for superstructure and deck fitting

system sheet: 3104

## INSTRUCTIONS FOR USE

- stir well before use
- the temperature of the paint should preferably be above 15°C
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

## BRUSH/ROLLER

Recommended thinner ready for use

## CLEANING SOLVENT

Thinner 21-06

## SIGMADUR ONE

June 2013

## ADDITIONAL DATA

## Overcoating table for SigmaDur One (Brush/Roller)

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	20 hours	14 hours	8 hours	6 hours	5 hours
maximum interval	unlimited	unlimited	unlimited	unlimited	unlimited

- surface should be dry and free from any contamination

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes



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# SIGMADUR ONE

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June 2013

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## WARRANTY

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321552	PDS white	7533 7000002200
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# SIGMAGLIDE 790

4 pages

April 2009  
Revision of February 2009

<b>DESCRIPTION</b>	two component silicone based tiecoat for fouling release system
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– adhesion promoting coating for SigmaGlide Finishes to be applied on top of specific systems</li> <li>– for use at newbuilding or maintenance</li> </ul>
<b>COLOURS AND GLOSS</b>	medium grey - semigloss
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.25 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.0 g/cm <sup>3</sup>
Volume solids	79 ± 2%
VOC (supplied)	max. 180 g/kg (Directive 1999/13/EC, SED) max. 184 g/l (approx. 1.5 lb/gal)
Recommended dry film thickness	150 µm
Theoretical spreading rate	5.3 m <sup>2</sup> /l for 150 µm
Touch dry after	30 minutes
Overcoating interval	min. 6 hours *
	(data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat (specific epoxy); dry and free from any contamination and within overcoating time</li> <li>– substrate temperature should be above 10°C and at least 3°C above dew point</li> <li>– maximum relative humidity during application and curing is 85%</li> <li>– relative humidity should be above 40%</li> </ul>
<b>SYSTEM SPECIFICATION</b>	<p>marine <span style="float: right;">system sheet: 3127</span></p> <p>In order to achieve optimal performance from the SigmaGlide system, the individual SigmaGlide products must be applied in strict accordance with the minimum specified dry film thickness and also with the PPG Protective &amp; Marine Coatings SigmaGlide General Working Procedure.</p> <p>Please consult PPG Protective &amp; Marine Coatings for details of the application procedure which has been prepared to the best of our knowledge and in accordance with World-wide application best practices in order to ensure optimal workmanship and application results.</p>

# SIGMAGLIDE 790

April 2009

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 95 : 5

- open drum just before use
- stir base well before use for 5 minutes
- add hardener to the base and stir well again for at least 5 minutes
- no thinner should be added
- all equipment must be thoroughly cleaned prior to use and before re-use with other materials, to prevent contamination
- care must be taken to ensure that overspray of SigmaGlide 790 does not contaminate adjacent areas

Pot life

4 hours at 20°C \*  
\* see additional data

## AIRLESS SPRAY

Recommended thinner

no thinner should be added

Nozzle angle

from 35° to 60°, depending on nozzle orifice

Nozzle orifice

approx. 0.43 - 0.53 mm (= 0.017 - 0.021 in)

Nozzle pressure

13 - 19 MPa (= approx. 130 - 190 bar; 1850 - 2700 p.s.i.)

## BRUSH/ROLLER

for small areas only (touch up and repair)

## CLEANING SOLVENT

- Thinner 90-83 or 50/50 mixture of Thinner 21-06 and Thinner 50-02
- please note that used cleaning solvent must not be allowed to contaminate other paints

## SAFETY PRECAUTIONS

for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets

this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

## ADDITIONAL DATA

### Overcoating table for SigmaShield 610 for dft up to 150 µm

with SigmaGlide 790

substrate temperature	10°C	20°C
minimum interval	16 hours	6 hours
maximum interval	7 days	5 days

# SIGMAGLIDE 790

April 2009

### Overcoating table for SigmaShield 620 for dft up to 150 µm

with SigmaGlide 790

substrate temperature	20°C	30°C	40°C
minimum interval	6 hours	4 hours	2 hours
maximum interval	5 days	3 days	2 days

\* at temperatures between 10°C and 20°C SigmaShield 610 should be specified; at temperatures above 20°C SigmaShield 620 should be specified

### Overcoating table for SigmaGlide 790 for dft up to 150 µm

with SigmaGlide 790

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	30 min.	15 min.	10 min.	10 min.
maximum interval	14 days	5 days	3 days	2 days

- surface should be dry and free from any contamination
- relative humidity should be above 40%

### Overcoating table for SigmaGlide 790 for dft up to 150 µm

with SigmaGlide 890 or SigmaGlide 990

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	24 hours	12 hours	10 hours	8 hours
maximum interval	14 days	5 days	3 days	2 days

- surface should be dry and free from any contamination
- relative humidity should be above 40%

### Pot life (at application viscosity)

10°C	6 hours
20°C	4 hours
30°C	2 hours

# SIGMAGLIDE 790

April 2009

**Worldwide availability**

Whilst it is always the aim of PPG Protective & Marine Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
PPG Protective & Marine Coatings' General working procedure for application of SigmaGlide	

**LIMITATION OF LIABILITY**

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PPG Protective & Marine Coatings has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. PPG Protective & Marine Coatings does therefore not accept any liability arising from loss, injury or damage resulting from such use or the contents of this data sheet (unless there are written agreements stating otherwise).

The data contained herein are liable to modification as a result of practical experience and continuous product development.

This data sheet replaces and annuls all previous issues and it is therefore the user's responsibility to ensure that this sheet is current prior to using the product.

The English text of this document shall prevail over any translation thereof.

	PDS	7386
246865	medium grey	5201052200
253244	medium grey	5201051400

# SIGMAGLIDE 890

4 pages

March 2013  
Revision of March 2010

**Description**

two component silicone based finish for fouling release system

**PRINCIPAL CHARACTERISTICS**

- non-toxic, fouling release coating for ships, installations and sea water intakes under all fouling conditions
- for use at newbuilding or maintenance

**COLOURS AND GLOSS**

redbrown (other colours on request) – gloss

**BASIC DATA AT 20 °C**

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density 1.1 g/cm<sup>3</sup>  
 Volume solids 77% ± 2%  
 VOC (Directive 1999/13/EC, SED) max. 196 g/kg (Directive 1999/13/EC, SED)  
 VOC (UK PG 6/23(92) appendix 3) max. 215 g/l (approx. 1.8 lb/gal)  
 (UK PG 6/23(92) Appendix 3)  
 Recommended dry film thickness 150 µm  
 Theoretical spreading rate 5.1 m<sup>2</sup>/l for 150 µm  
 Touch dry after 1 hour at 20 °C  
 Overcoating interval min. 2 hours \*

(data for components)

Shelf life (cool and dry place) at least 12 months  
 \* see additional data  
 Refloating time min. 8 hours \*

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- for new Buildings or spot/full blast, SigmaGlide 890 should only be applied over SigmaGlide 790
- as a re-refresh coat, SigmaGlide 890 can be applied over itself in line with PPG Protective & Marine Coatings SigmaGlide General Working Procedure
- previous coat; dry and free from any contamination
- substrate temperature should be above 5°C and at least 3°C above dew point
- maximum relative humidity during application and curing is 85%
- relative humidity should be above 40%

# SIGMAGLIDE 890

March 2013

## SYSTEM SPECIFICATION

marine system sheet: 3127  
 In order to achieve optimal performance from the SigmaGlide system, the individual SigmaGlide products must be applied in strict accordance with the minimum specified dry film thickness and also with the PPG Protective & Marine Coatings SigmaGlide General Working Procedure. Please consult PPG Protective & Marine Coatings for details of the application procedure which has been prepared to the best of our knowledge and in accordance with World-wide application best practices in order to ensure optimal workmanship and application results.

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- open drum just before use
- stir base well before use for 5 minutes
- add hardener to the base and stir well again for at least 5 minutes
- no thinner should be added
- all equipment must be thoroughly cleaned prior to use and before re-use with other materials, to prevent contamination
- overspray on paint which will not be recoated with the SigmaGlide 890 should be avoided as much as possible

Induction time

none

Pot life

4 hours at 20 °C \*

\* see additional data

## AIRLESS SPRAY

Recommended thinner

no thinner should be added

Nozzle angle

from 35° to 60°, depending on nozzle orifice

Nozzle orifice

approx. 0.43 - 0.53 mm (= 0.017 - 0.021 in)

Nozzle pressure

15 - 20 MPa (= approx. 150 - 200 bar; 2176 - 2901 p.s.i.)

## BRUSH/ROLLER

for small areas only (touch up and repair)

## CLEANING SOLVENT

- Thinner 90-83 or 50/50 mixture of Thinner 21-06 and Thinner 50-02
- please note that used cleaning solvent must not be allowed to contaminate other paints

## ADDITIONAL DATA

### Overcoating table for SigmaGlide 890 with itself at a dft up to 150 µm

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	3 hours	2 hours	1 hour	1 hour
maximum interval	8 hours	8 hours	8 hours	8 hours

- surface should be dry and free from any contamination
- relative humidity should be above 40%

## SIGMAGLIDE 890

March 2013

**Pot life (at application viscosity)**

10 °C	6 hours
20 °C	4 hours
30 °C	2 hours

**Worldwide availability**

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**REFERENCES**

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Safety indications see information sheet 1430  
Safety in confined spaces and health safety  
Explosion hazard - toxic hazard see information sheet 1431  
PPG Protective & Marine Coatings' General working procedure for application of SigmaGlide

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes



# SIGMAGLIDE 890

March 2013

## WARRANTY

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## LIMITATIONS OF LIABILITY

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	PDS	7399
236471	redbrown	2008002200
240643	white	7000001250

# SIGMAGLIDE 990

4 pages

July 2013  
Revision of March 2010

<b>Description</b>	two component high solids pure silicone finish for high performance fouling release system
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– non toxic fouling release coating</li> <li>– reduces the vessel's fuel consumption</li> <li>– wider application window and enhanced smoothness</li> <li>– contributes to minimize the environmental footprint</li> <li>– for use at newbuilding or maintenance</li> </ul>
<b>COLOURS AND GLOSS</b>	darkred, darkblue (other colours on request) – gloss
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.1 g/cm <sup>3</sup>
Volume solids	80 ± 2%
VOC (Supplied)	max. 229 g/kg max. 248 g/l (approx. 2.1 lb/gal)
Recommended dry film thickness	180 µm
Theoretical spreading rate	4.4 m <sup>2</sup> /l for 180 µm
Touch dry after	1 hour at 20°C
Overcoating interval	min. 2 hours *
Refloating time	min.20 hours*
	(data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– for New Buildings or spot/full blast, SigmaGlide 990 should only be applied over SigmaGlide 790</li> <li>– as a re-refresh coat, SigmaGlide 990 can be applied over itself or SigmaGlide 890 in line with PPG Protective &amp; Marine Coatings SigmaGlide General Working Procedure</li> <li>– previous coat; dry and free from any contamination</li> <li>– substrate temperature should be above 5°C and at least 3°C above dew point</li> <li>– maximum relative humidity during application and curing is 85%</li> <li>– relative humidity should be above 40%</li> </ul>

## SIGMAGLIDE 990

July 2013

**SYSTEM SPECIFICATION**

marine

system sheet: 3127

In order to achieve optimal performance from the SigmaGlide system, the individual SigmaGlide products must be applied in strict accordance with the minimum specified dry film thickness and also with the PPG Protective & Marine Coatings SigmaGlide General Working Procedure.

Please consult PPG Protective & Marine Coatings for details of the application procedure which has been prepared to the best of our knowledge and in accordance with World-wide application best practices in order to ensure optimal workmanship and application results.

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 80 : 20

- open drum just before use
- stir base well before use for 5 minutes
- add hardener to the base and stir well again for at least 5 minutes
- no thinner should be added
- all equipment must be thoroughly cleaned prior to use and before re-use with other materials, to prevent contamination
- overspray on paint which will not be recoated with the SigmaGlide 990 should be avoided as much as possible

Induction time

none

Pot life

4 hours at 20°C \*

\* see additional data

**AIRLESS SPRAY**

Recommended thinner

no thinner should be added

Nozzle angle

from 35° to 60°, depending on nozzle orifice

Nozzle orifice

approx. 0.43 - 0.53 mm (= 0.017 - 0.021 in)

Nozzle pressure

15 - 20 MPa (= approx. 150 - 200 bar; 2176 - 2901 p.s.i.)

**BRUSH/ROLLER**

for small areas only (touch up and repair)

**CLEANING SOLVENT**

- Thinner 90-83 or 50/50 mixture of Thinner 21-06 and Thinner 50-02
- please note that used cleaning solvent must not be allowed to contaminate other paints

# SIGMAGLIDE 990

July 2013

## ADDITIONAL DATA

### Overcoating table for SigmaGlide 990 with itself at a dft up to 180 µm

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	3 hours	2 hours	1 hour	1 hour
Refloating minimum interval	24 hours	20 hours	16 hours	12 hours

- surface should be dry and free from any contamination
- relative humidity should be above 40%

### Pot life

10°C	6 hours
20°C	4 hours
30°C	2 hours

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets see information sheet 1411  
 Safety indications see information sheet 1430  
 Safety in confined spaces and health safety  
 Explosion hazard - toxic hazard see information sheet 1431  
 PPG Protective & Marine Coatings' General working procedure for application of SigmaGlide

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAGLIDE 990

July 2013

## WARRANTY

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	PDS	7397
287084	darkred	6137002200
287085	darkblue	1000002200

# SIGMAGUARD 225

6 pages

June 2013  
Revision of February 2008

## Description

two component solvent free polyamine cured epoxy primer

## PRINCIPAL CHARACTERISTICS

- primer in coating system for long term protection of ballast tanks and steel structures
- excellent resistance against corrosion and sea water
- reduces explosion risk and fire hazard in confined spaces
- good flow and wetting properties
- can be applied by single feed airless spray equipment
- compatible with well designed cathodic protection systems

## COLOURS AND GLOSS

yellow/green – gloss

## BASIC DATA AT 20°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density	1.4 g/cm <sup>3</sup>
Volume solids	98 ± 2%
VOC (Supplied)	max. 60 g/kg (Directive 1999/13/EC, SED) max. 83 g/l (approx. 0.7 lb/gal) see information sheet 1411
Recommended dry film thickness	100 µm
Theoretical spreading rate	9.8 m <sup>2</sup> /l for 100 µm
Touch dry after	12 hours *
Overcoating interval	min. see tables * max. see tables *
Full cure after	7 days *
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data

## SIGMAGUARD 225

June 2013

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned (dry or wet) to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
- **IMO-MS.C.215(82) Requirements for Water Ballast Tanks:**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - dust quantity rating "1 for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
- substrate temperature should be above 5°C and at least 3°C above dew point during application and curing
- maximum relative humidity during application and curing is 80%

**SYSTEM SPECIFICATION**

marine

system sheet: 3106 (spec. 7)

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 80 : 20

- when mixing the temperature of the base and hardener should be at least 20°C
- at lower temperature the viscosity will be too high for spray application
- no thinner should be added

Induction time

none

Pot life

approx. 1 hour at 20 °C \*

\* see additional data

**AIRLESS SPRAY**

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.43 mm (= 0.017 in)

Nozzle pressure

at 20°C (paint temperature) min. 15 MPa (= approx. 150 bar; 2176 p.s.i.)

- use heavy duty single feed airless spray equipment preferably 60:1 pump ratio and suitable high pressure hoses
- in-line heating or insulated hoses may be necessary to avoid cooling down of paint in hoses at low air temperature
- the paint lines should be as short as possible

# SIGMAGUARD 225

June 2013

**BRUSH/ROLLER**  
Recommended thinner

for stripe coating and spot repair only  
no thinner should be added

**CLEANING SOLVENT**

Thinner 90-83 (preferred) or Thinner 90-53

- all equipment used for application must be cleaned immediately after use
- paint inside the spraying equipment must be removed before the pot life time has been expired

**ADDITIONAL DATA**

**Film thickness and spreading rate**

Maximum dft when brushing: 100 µm

**measuring wet film thickness**

- a difference is often obtained between the measured apparent wft and the real applied wft
- this is due to the thixotropy and the surface tension of the paint which retards the release of air trapped in the paint film for some time
- a practical recommendation is to apply a wft which is equal to the specified dft plus 20 µm

**measuring dry film thickness**

- because of low initial hardness the dft cannot be measured for some days (depending on ambient temperature) after application due to the penetration of the measuring device into the paint film
- the dft should be measured using a calibration foil of known thickness placed in between the coating and the measuring device



# SIGMAGUARD 225

June 2013

## Overcoating table for SigmaGuard 225 for dft up to 100 µm

	substrate temperature	5°C	10°C	20°C	30°C	40°C
with two pack solvent free epoxy coatings	minimum interval	3 days	48 hours	24 hours	16 hours	12 hours
	Max interval when exposed to direct sunshine maximum interval	11 days	9 days	7 days	5 days	3 days
	Max interval when <b>not</b> exposed to direct sunshine maximum interval	1 month	1 month	1 month	1 month	1 month
with various two pack solvent borne epoxy coatings	minimum interval	7 days	5 days	36 hours	24 hours	16 hours
	Max interval when exposed to direct sunshine maximum interval	14 days	12 days	9 days	7 days	5 days
	Max interval when <b>not</b> exposed to direct sunshine maximum interval	1 month	1 month	1 month	1 month	1 month

– surface should be dry and free from any contamination

## Curing

### Curing table for dft up to 100 µm

substrate temperature	touch dry	dry to handle	full cure
5°C	48 hours	3 days	21 days
10°C	24 hours	2 days	14 days
20°C	12 hours	24 hours	7 days
30°C	8 hours	16 hours	3 days
40°C	6 hours	12 hours	2 days

– adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

# SIGMAGUARD 225

June 2013

### Pot life (at application viscosity)

20°C	60 min.
30°C	30 min.

- due to exothermic reaction, temperature during pot life may increase up to 60°C at gel point

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

### REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

### SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
  - spray mist is not harmless, a fresh air mask and gloves should be used during spraying
  - ventilation should be provided in confined spaces to maintain good visibility

# SIGMAGUARD 225

June 2013

## WARRANTY

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189011      PDS      7921  
yellow/green      4009002200 (189012 base, 189013 hardener)

# SIGMAGUARD 425

5 pages

June 2013  
Revision of January 2008

<b>Description</b>	two component solvent free polyamine cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– provides long term protection for ballast tanks and steel structures, with excellent resistance against corrosion and sea water</li> <li>– suitable for block stage application</li> <li>– good edge covering capacity</li> <li>– reduces explosion risk and fire hazard in confined spaces</li> <li>– can be applied by single feed airless spray equipment</li> </ul>
<b>COLOURS AND GLOSS</b>	grey, green – gloss
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.4 g/cm <sup>3</sup>
Volume solids	98 ± 2%
VOC (Supplied)	max. 47 g/kg (Directive 1999/13/EC, SED) max. 66 g/l (approx. 0.6 lb/gal) *See information sheet 1411
Recommended dry film thickness	250 µm
Theoretical spreading rate	3.9 m <sup>2</sup> /l for 250 µm *
Touch dry after	12 hours *
Overcoating interval	min. 24 hours * max. 7 days *
	(Data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; dry and free from any contamination</li> <li>– substrate temperature should be above 5°C and at least 3°C above dew point</li> <li>– maximum relative humidity during application and curing is 80%</li> <li>– dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheet: 3106 (spec. 7)</span>

# SIGMAGUARD 425

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- when mixing the temperature of the base and hardener should be at least 20°C
- at lower temperature the viscosity will be too high for spray application
- no thinner should be added

Induction time

none

Pot life

approx. 1 hour at 20 °C \*

\* see additional data

## AIRLESS SPRAY

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.53 mm (=0.021 in)

Nozzle pressure

at 20°C (paint temperature) min. 28 MPa (= approx. 280 bar; 4061 p.s.i.)  
at 30°C (paint temperature) min. 22Mpa (=approx. 220 bar: 3000 p.s.i.)

- use heavy duty single feed airless spray equipment preferably 60:1 pump ratio and suitable high pressure hoses
- in -line heating or insulated hoses may be necessary to avoid cooling down of paint in hoses at low air temperature
- the paint lines should be as short as possible

## BRUSH/ROLLER

Recommended thinner

for stripe coating and spot repair only

no thinner should be added

## CLEANING SOLVENT

Thinner 90-83 (preferred) or Thinner 90-53

- all equipment used for application must be cleaned immediately after use
- paint inside the spraying equipment must be removed before the pot life time has been expired

# SIGMAGUARD 425

June 2013

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	3.9	3.3
dft in µm	250	300

Maximum dft when brushing: 100 µm

### measuring wet film thickness

- a difference is often obtained between the measured apparent wft and the real applied wft
- this is due to the thixotropy and the surface tension of the paint which retards the release of air trapped in the paint film for some time
- a practical recommendation is to apply a wft which is equal to the specified dft plus 60 µm

### measuring dry film thickness

- because of low initial hardness the dft cannot be measured for some days (depending on ambient temperature) after application due to the penetration of the measuring device into the paint film
- the dft should be measured using a calibration foil of known thickness placed in between the coating and the measuring device

### Overcoating table for SigmaGuard 425 for dft up to 250 µm (for spot repair and stripe coating only)

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	3 days	48 hours	24 hours	16 hours	12 hours
maximum interval	11 days	9 days	7 days	5 days	3 days

with itself

- surface should be dry and free from any contamination

# SIGMAGUARD 425

June 2013

## Curing

### Curing table for dft up to 250 µm

substrate temperature	touch dry	dry to handle	full cure
5°C	48 hours	3 days	21 days
10°C	24 hours	2 days	14 days
20°C	12 hours	24 hours	7 days
30°C	8 hours	16 hours	3 days
40°C	6 hours	12 hours	2 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

20°C	60 min.
30°C	30 min.

- due to exothermic reaction, temperature during pot life may increase up to 60°C at gel point

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- spray mist is not harmless, a fresh air mask and gloves should be used during spraying
- ventilation should be provided in confined spaces to maintain good visibility

# SIGMAGUARD 425

June 2013

## WARRANTY

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187701	PDS grey	7953 5163052200 (187702 base, 189013 hardener)
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# SIGMAGUARD 603

5 pages

August 2013  
Revision of July 2011

<b>Description</b>	two component solvent free amine cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– one coat protection for maintenance or major refurbishment of ballast water tanks and crude oil tanks</li> <li>– tolerant to marginal surface preparation</li> <li>– good corrosion resistance</li> <li>– can be applied by heavy duty single feed airless spray equipment (60:1)</li> <li>– reduced explosion risk and fire hazard</li> <li>– good visibility due to light colour</li> </ul>
<b>COLOURS AND GLOSS</b>	offwhite, light grey – gloss
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
	(data for mixed product)
Mass density	1.3 g/cm <sup>3</sup>
Volume solids	100%
VOC (Supplied)	max. 111 g/kg (Directive 1999/13/EC, SED) max. 144 g/l (approx. 1.2 lb/gal) *See information sheet 1411
Recommended dry film thickness	300 µm
Theoretical spreading rate	3.3 m <sup>2</sup> /l for 300 µm
Touch dry after	8 hours
Overcoating interval	min. 24 hours * max. 20 days *
Full cure after	5 days * (data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– steel; blast cleaned to ISO-Sa2½, blasting profile 50 - 100 µm</li> <li>– steel; blast cleaned to ISO-Sa2 or power tool cleaned to ISO-St2 for good corrosion protection</li> <li>– coated steel; hydrojetted to VIS WJ2/3 L (blasting profile 50 - 100 µm)</li> <li>– previous epoxy coat; in sound condition, dry and free from any contamination and sufficiently roughened if necessary</li> <li>– pitted steel; blast cleaned to ISO-Sa2½ is recommended</li> <li>– suitable primer; SigmaCover 280</li> <li>– substrate temperature must be above 5°C during application and curing</li> <li>– There are no restrictions regarding dew point temperature and relative humidity.</li> <li>– suitable for damp surfaces</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">1 x 300 µm SigmaGuard 603</span>

## SIGMAGUARD 603

August 2013

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be at least 20°C
- at lower temperature the viscosity will be too high for spray application
- no thinner should be added

Induction time

none

Pot life

1 hour at 20°C\*

\* see additional data

**AIRLESS SPRAY**

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.53 - 0.64 mm (= 0.021 - 0.025 in)

Nozzle pressure

at 20°C (paint temperature) min. 28 MPa (= approx. 280 bar; 4061 p.s.i.)

at 30°C (paint temperature) min. 22 MPa (= approx. 220 bar; 3000 p.s.i.)

- use heavy duty single feed airless spray equipment preferably 60:1 pump ratio and suitable high pressure hoses/in-line heating or insulated hoses may be necessary to avoid cooling down of paint in hoses at low air temperature
- in-line heating or insulated hoses may necessary to avoid cooling down of paint in hoses at low air temperature
- application with 45: 1 spray equipment possible provided in-line heated high pressure hoses are used
- in case of using 45:1 airless spray equipment the paint must be heated to approx. 30°C in order to obtain the right application viscosity
- length of hoses should be as short as possible

**BRUSH/ROLLER**

Recommended thinner

for stripe coating and spot repair only

no thinner should be added

**CLEANING SOLVENT**

Thinner 90-83 (preferred) or Thinner 90-53

- all equipment used for application must be cleaned immediately after use
- paint inside the spraying equipment must be removed before the pot life time has been expired

# SIGMAGUARD 603

August 2013

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	3.3	2.5
dft in µm	300	400

Maximum dft when brushing: 150 - 200 µm

### measuring wet film thickness

- a deviation is often obtained between the measured apparent wft and the real applied wft
- this is due to the thixotropy and the surface tension of the paint which retards the release of air trapped in the paint film for some time
- recommended is to apply a wft which is equal to the specified dft plus 60 µm

### measuring dry film thickness

- because of low initial hardness the dft cannot be measured within some days due to the penetration of the measuring device into the soft paint film
- the dft should be measured using a calibration foil of known thickness placed in between the coating and the measuring device

### Overcoating with SigmaGuard 603 (spot repair and stripe coating)

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	80 hours	36 hours	24 hours	16 hours
maximum interval	20 days	20 days	20 days	14 days

- surface should be dry and free from any contamination

## Curing

### Curing table for dft up to 150 µm

substrate temperature	dry to handle	full cure	Service - water immersion
5°C	60 hours	15 days	10 days
10°C	30 hours	7 days	5 days
20°C	16 hours	5 days	4 days
30°C	10 hours	3 days	2 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

## SIGMAGUARD 603

August 2013

**Pot life (at application viscosity)**

20°C	60 min.
30°C	45 min.

- due to exothermic reaction, temperature during and after mixing may increase

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes
  - no solvent present; however, spray mist is not harmless, a fresh air mask should be used during spraying
  - ventilation should be provided in confined spaces to maintain good visibility

# SIGMAGUARD 603

August 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

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**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

	PDS	7985
268333	offwhite	7001002200
267450	lightgrey	5163052200

## SIGMAGUARD 720



5 pages

March 2013  
Revision of April 2009

<b>Description</b>	two component reinforced high solids polyamine adduct cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– tank coating with good chemical resistance against a wide range of chemicals</li> <li>– short curing periods</li> <li>– good low temperature curing</li> <li>– easy to clean</li> <li>– recognized corrosion control coating (Lloyd's Register)</li> </ul>
<b>COLOURS AND GLOSS</b>	light green, grey – gloss
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.4 g/cm <sup>3</sup>
Volume solids	78% ± 2%
VOC (Supplied)	max. 163 g/kg (Directive 1999/13/EC, SED) max. 233 g/l (approx. 1.9 lb/gal)
Recommended dry film thickness	125 - 160 µm depending on system
Theoretical spreading rate	6.2 m <sup>2</sup> /l for 125 µm *
Touch dry after	7 - 8 hours at 5 °C 5 - 6 hours at 10 °C 2 - 3 hours at 20 °C
Overcoating interval	min. 8 hours * max. 28 days *
Full cure after	see curing table *
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– steel; blast cleaned to a minimum of ISO-Sa2½, blasting profile 40 - 70 µm</li> <li>– previous coat; dry, free from any contamination and sufficiently roughened if necessary</li> <li>– substrate temperature must be above 5°C and at least 3°C above dew point during application and curing</li> <li>– <b>IMO-MSA 288(87) Requirements for Cargo Tanks of Crude Oil Tankers</b> <ul style="list-style-type: none"> <li>• steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding</li> <li>• steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm</li> <li>• dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)</li> </ul> </li> </ul>

# SIGMAGUARD 720

March 2013

**SYSTEM SPECIFICATION** tankcoatings system sheet: 3320

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 75 : 25

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Induction time allow induction time before use  
 15°C - 15 min.  
 20°C - 10 min.  
 25°C - 5 min.

Pot life 1.5 hour at 20 °C \*  
 \*see additional data

**AIR SPRAY**

Recommended thinner Thinner 91-92  
 Volume of thinner 5 - 15% for a one coat application of 125 µm dft  
 Nozzle orifice 1.8 - 2 mm  
 Nozzle pressure 0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

**AIRLESS SPRAY**

Recommended thinner Thinner 91-92  
 Volume of thinner up to 10% for a one coat application of 125 µm dft  
 Nozzle orifice approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)  
 Nozzle pressure 15 MPa (= approx. 150 bar; 2176 p.s.i.)

**BRUSH/ROLLER**

not recommended, only for spot repair and stripe coating

**CLEANING SOLVENT**

Thinner 90-53

**ADDITIONAL DATA**

**Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	7.8	6.2	4.9
dft in µm	100	125	160

Maximum dft when brushing: 100 µm

# SIGMAGUARD 720

March 2013

### Overcoating table for SigmaGuard 720 for dft up to 125 µm

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	32 hours	24 hours	8 hours	4 hours	3 hours
maximum interval	28 days	28 days	28 days	14 days	7 days

- surface should be dry and free from any contamination

### Curing

### Curing table for dft up to 125 µm for SigmaGuard 720 tankcoating system before transport of

substrate temperature	aliphatic petroleum products and ballast water and tanktest with sea water	cargoes without note 4,7,8 or 11
5°C	10 days	17 days
10°C	7 days	14 days
15°C	5 days	8 days
20°C	3 days	5 days
30°C	2.5 days	4 days
40°C	1.5 day	3 days

- minimum curing time of SigmaGuard 720 tankcoating system before transport of cargoes with note 4, 7, 8 or 11: 3 months
- for detailed information on resistance and resistance notes, please refer to the latest issue of the Tank coating Resistance List (TRIS)
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

15 °C	3 hours
20 °C	1.5 hour
25 °C	1 hour
30 °C	30 min.

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used



# SIGMAGUARD 720

March 2013

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAGUARD 720

March 2013

## WARRANTY

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## LIMITATIONS OF LIABILITY

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	PDS	7433
179122	grey	5000002200 (171570 base, 171569 hardener)
180730	green	4000002200 (171568 base, 171569 hardener)
191734	grey	5000002150 (191733 base, 191732 hardener)
191736	green	4000002150 (191735 base, 191732 hardener)

# SIGMAGUARD 750

7 pages

June 2012  
Revision of April 2009

<b>Description</b>	two component moisture curing zinc rich (ethyl) silicate coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- tankcoating with excellent solvent and chemical resistance</li> <li>- to be used as tankcoating or as a system primer in various paint systems based on unsaponifiable binders</li> <li>- can withstand substrate temperatures from -90°C up to +400°C, under normal atmospheric exposure conditions</li> <li>- high zinc content resulting in excellent corrosion protection</li> <li>- good impact and abrasion resistance</li> <li>- certificate for ASTM A-490 class 'B' for slip co-efficient</li> <li>- recognized corrosion control coating (Lloyd's register), see sheet 1886</li> <li>- must not be used for immersion in alkaline (more than pH 9) or acidic (less than pH 5.5) liquids</li> </ul>
<b>COLOURS AND GLOSS</b>	grey – flat
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	2.7 g/cm <sup>3</sup>
Volume solids	65% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 167 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 452 g/l (approx. 3.8 lb/gal)
Recommended dry film thickness	<ul style="list-style-type: none"> <li>- average dft 75 µm to 100 µm with a minimum of 75 µm on smooth non-pitted blast cleaned steel</li> <li>- average dft 100 µm with a minimum of 75 µm on rough or light pitted, blast cleaned steel</li> <li>- heavy pitted steel substrate is not acceptable</li> </ul>
Theoretical spreading rate	8.7 m <sup>2</sup> /l for 75 µm 6.5 m <sup>2</sup> /l for 100 µm *
Touch dry after	30 min. at 20 °C
Overcoating interval	min. 12 hours * max. unlimited, zinc salts must be removed
Full cure after	12 hours * (data for components)
Shelf life (cool and dry place)	binder: at least 9 months pigment: at least 24 months (store pigment moisture free) * see additional data

# SIGMAGUARD 750

June 2012

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- steel; blast cleaned in-situ to at least ISO-Sa2½, completely free from rust, scale, shop primer and contaminations, blasting profile 40 - 70 µm
- galvanised steel; sweep blasted to roughen the surface and to remove any zinc salts which might be present
- a heavy pitted steel substrate is not acceptable
- substrate temperatures ranging from -5°C up to +40°C during application are acceptable
- substrate temperature must be at least 3°C above dew point during application and curing
- relative humidity during curing should be above 50%

## SYSTEM SPECIFICATION

marine

system sheet: 3323

## INSTRUCTIONS FOR USE

mixing ratio by volume: binder to zinc powder 74 : 26

Many of Sigma's zinc silicates are supplied as 2 pack materials consisting of a jerrycan with pigmented binder and a drum containing a bag of zinc powder.

To ensure proper mixing of both components the instructions given below must be followed.

**To avoid lumps in the paint do not add the binder to the zinc powder.**

- 1) Take the bag with zinc powder out of the drum.
- 2) Shake the binder in the jerrycan a few times to reach a certain degree of homogenisation.
- 3) Pour about 2/3 of the binder in the empty drum.
- 4) With the jerrycan now reduced in weight and containing more free space, shake it vigorously to obtain a homogeneous mix with no deposits left on the bottom, and add this to the drum.
- 5) Add the zinc powder gradually to the pigmented binder in the drum and at the same time continuously stir the mixture by using a mechanical mixer (keep the speed low).
- 6) Stir the zinc dust powder thoroughly through the binder (high speed) and keep stirring till, a homogeneous mixture is obtained.
- 7) Strain mixture through a 30 - 60 mesh screen.
- 8) Agitate continuously during application (low speed).  
The use of a dedicated pump with a constant agitation for a zinc silicate coating is recommended.

**Note: At application temperature above 30°C addition of max 10% by volume of Thinner 90-53 may be necessary.**

Induction time

none

Pot life

12 hours at 20 °C \*

\* see additional data

# SIGMAGUARD 750

June 2012

## AIR SPRAY

Recommended thinner Thinner 90-53  
 Volume of thinner 0 - 10%, depending on required thickness and application conditions  
 Nozzle orifice 2 mm  
 Nozzle pressure 0.3 MPa (= approx. 3 bar; 44 p.s.i.)

**a dedicated pump for a zinc silicate coating with constant agitation must be used**

## AIRLESS SPRAY

Recommended thinner Thinner 90-53  
 Volume of thinner 0 - 10%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.48 - 0.64 mm (= 0.019 - 0.025 in)  
 Nozzle pressure 9 - 12 MPa (= approx. 90 - 120 bar; 1305 - 1740 p.s.i.)

**a dedicated pump for a zinc silicate coating with constant agitation must be used**

## BRUSH/ROLLER

Recommended thinner Thinner 90-53  
 Volume of thinner 5 - 15%  
 only for touch up and spot repair  
 apply a visible wet coat with a max. dft of 25 µm  
 same for subsequent coats in order to obtain the required dft

## CLEANING SOLVENT

Thinner 90-53

## Upgrading Dft

- when for some reason the dft is below specification and an extra coat of SigmaGuard 750 has to be applied, SigmaGuard 750 should be thinned down with 25 - 50% Thinner 90-53, in order to obtain a visible wet coat that remains wet for some time
- this is only valid for spray application

## ADDITIONAL DATA

very highly pigmented zinc silicate primers produce dry films with void spaces in between the particles

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.7	6.5
dft in µm	75	100

Maximum dft when brushing: 35 µm  
 above 150 µm mudcracking can occur

## SIGMAGUARD 750

June 2012

**Overcoating table for SigmaGuard 750 for dft up to 75 µm  
(50% RH and higher)**

substrate temperature	-5°C	0°C	10°C	20°C	30°C	40°C
minimum interval	24 hours	24 hours	18 hours	12 hours	6 hours	4 hours
maximum interval	unlimited, provided the surface is dry and cleaned from contamination and zinc salts					

- a relative humidity below 50% requires a much longer overcoating time
- if part of a coating system and in order to avoid possible popping effects (pinholes) SigmaGuard 750 should be sealed with approved coatings
- SigmaGuard 750 is a moisture curing zinc silicate, this means that it only cures after sufficient take up of water (from the atmosphere or immersion) during and after application; it is recommended that relative humidity and temperature are measured during the curing time
- before entering service or overcoating, a sufficient degree of cure should be obtained
- when curing conditions are unfavourable or when reduced overcoat times are desired, curing can be accelerated 4 hours after application by:
  - wetting or soaking with water, keeping the surface wet for the next 2 hours, followed by drying
  - wetting or soaking with a 0.5% ammonia solution, followed by drying
- before overcoating with topcoats, SigmaGuard 750 should always be visibly dry and checked on sufficient curing
- for measuring of the curing, the MEK rub test according to ASTM 4752 is a suitable method: after 50 double rubs with a cloth soaked in MEK (or alternatively Thinner 90-53) no dissolving of the coating should be observed

# SIGMAGUARD 750

June 2012

## Curing

### Curing table for dft up to 75 µm (50% RH and higher)

substrate temperature	full cure	Service - water immersion
0°C	4 days	24 hours
10°C	4 days	18 hours
20°C	2 days	12 hours
30°C	2 days	6 hours
40°C	2 days	4 hours

- SigmaGuard 750 is a moisture curing zinc silicate, this means that it only cures after sufficient take up of water (from the atmosphere or immersion) during and after application;
- it is recommended that relative humidity and temperature are measured during the curing time
- relative humidity during curing recommended to be above 50%
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

0 °C	24 hours
10 °C	16 hours
20 °C	12 hours
30 °C	6 hours

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.

Under these circumstances an alternative product data sheet is used.

# SIGMAGUARD 750

June 2012

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes
- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets



# SIGMAGUARD 750

June 2012

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295032	PDS grey	7551 0000002135
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# SIGMAGUARD 795

4 pages

May 2013  
Revision of April 2009

## Description

two component high build amine adduct cured phenolic epoxy coating

## PRINCIPAL CHARACTERISTICS

- to repair and maintain chemical resistant epoxy amine cured tanklinings like SigmaGuard 720 and Phenguard
- designed for spot repair
- excellent adhesion to abraded steel and coating surface
- well applicable at high dfts by brush/roller
- good chemical resistance
- easy to handle
- fast curing

## COLOURS AND GLOSS

grey, green – eggshell

## BASIC DATA AT 20°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density

1.8 g/cm<sup>3</sup>

Volume solids

75 ± 2%

VOC (Supplied)

max. 155 g/kg (Directive 1999/13/EC, SED)

max. 273 g/l (approx. 2.3 lb/gal)

Recommended dry film thickness

100 - 150 µm (one full coat by brush/roller)

Theoretical spreading rate

7.5 m<sup>2</sup>/l for 100 µm5.0 m<sup>2</sup>/l for 150 µm

Touch dry after

2 hours (150µm)

Overcoating interval

min. 14 hours \*

Shelf life (cool and dry place)

at least 12 months

\* see additional data

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- cargo tank should be in a clean, dry, gas free condition prior to repairs
- previous coat; dry and free from any contamination
- protection of applied coating in way of tread areas in the tank to be provided by mats; all personnel entering tanks to wear soft footwear
- minor rust areas and coating defects to be prepared by rotating disc or power tool cleaned to SPSS-Pt3 standard or by vacuum blasting to ISO-Sa2½ standard
- overlap areas of repair to be roughened by means of rough pads
- solvent wiping of prepared areas necessary to remove any cargo trace prior to application of the SigmaGuard 795
- substrate must be perfectly dry before and during application of SigmaGuard 795
- substrate temperature must be above 10°C and at least 3°C above dew point during application and curing
- after repair carriage of aggressive cargoes, with notes 4, 7, 8 or 11 will require a full cure i.e. 3 months service with non aggressive cargoes or a hot cure

# SIGMAGUARD 795

May 2013

**SYSTEM SPECIFICATION** application of SigmaGuard 795 must be done in two coats by brush/roller to a total minimum dft of 200 µm

**INSTRUCTIONS FOR USE** mixing ratio by volume: base to hardener 85 : 15

- the temperature of the mixed base and hardener should preferably be above 10°C, otherwise extra solvent may be required to obtain application viscosity
- thinner is not recommended after mixing components

Induction time none  
 Pot life 4 hours at 20°C \*  
 \*see additional data

**BRUSH/ROLLER**  
 Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 3% (if necessary)

**CLEANING SOLVENT** Thinner 90-53 or Freitag thinner Nr. 1

**ADDITIONAL DATA** **Overcoating table for SigmaGuard 795 for dft up to 150 µm**

substrate temperature	10°C	15°C	20°C	25°C	30°C	40°C
minimum interval	28 hours	20 hours	14 hours	8 hours	6 hours	4 hours
maximum interval	28 days	25 days	21 days	17 days	14 days	7 days

Subsequent coating

- cargoes should not be transported between the application of the subsequent coatings

# SIGMAGUARD 795

May 2013

## Curing

### Curing table for dft up to 150 µm

substrate temperature	min. curing time before transport of cargoes without note 4, 7, 8 or 11 and balast water or tank test with sea water
10°C	10 days
15°C	6 days
20°C	5 days
30°C	3 days
40°C	2 days

- minimum curing time before transport of cargoes with note 4,7,8 or 11: 3 months
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- contact with water, within the curing period, will decrease the performance of the SigmaGuard 795 coating

### Pot life (at application viscosity)

10°C	6 hours
20°C	4 hours
30°C	1.5 hour
40°C	0.5 hour

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Specification for mineral abrasives	see information sheet 1491

## SAFETY PRECAUTIONS

- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes
- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets

# SIGMAGUARD 795

May 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

	PDS	7455
179113	green	4000001250
179114	grey	5000001250

## SIGMAGUARD CSF 585



Globally Available

7 pages

October 2012  
Revision of May 2011

<b>Description</b>	two component solvent free amine cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- tankcoating for drinking water</li> <li>- can be applied by single feed airless spray equipment</li> <li>- reduced explosion risk and fire hazard</li> <li>- good visibility in confined spaces due to light colour</li> <li>- approved for drinking water by: KIWA Holland</li> <li>- for other approvals see sheet 1882</li> </ul>
<b>COLOURS AND GLOSS</b>	blue, white – gloss
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
	(data for mixed product)
Mass density	1.3 g/cm <sup>3</sup>
Volume solids	100%
VOC (Directive 1999/13/EC, SED)	max. 5 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 6 g/l (approx. 0.1 lb/gal)
Recommended dry film thickness	250 - 400 µm depending on system
Theoretical spreading rate	3.3 m <sup>2</sup> /l for 300 µm *
Touch dry after	5 hours at 20 °C
Overcoating interval	min. 24 hours * max. 20 days *
Full cure after	12 days * at 20 °C
	(data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- steel; blast cleaned to ISO-Sa2½, blasting profile 50 - 100 µm</li> <li>- substrate temperature must be above 10°C and at least 3°C above dew point during application and curing</li> <li>- if a holding primer is required SigmaGuard 215, SigmaCover 280 or SigmaPrime 200 can be used</li> <li>- for KIWA only SigmaGuard 215 is approved as a holding primer</li> </ul>

## SIGMAGUARD CSF 585

October 2012

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 77.5 : 22.5

- at lower temperature the viscosity will be too high for spray application
- the temperature of the mixed base and hardener should preferably be at least 20°C
- no thinner should be added
- for recommended application instructions: see working procedure

Induction time

allow induction time before use  
10°C - 15 min.

Pot life

approx. 90 minutes at 20 °C \*

\* see additional data

**AIRLESS SPRAY**

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.53 mm (=0.021 in)

Nozzle pressure

at 20°C (paint temperature) min. 28 MPa (= approx. 280 bar; 4061 p.s.i.)  
at 30°C (paint temperature) min. 22 MPa (= approx. 220 bar; 3000 p.s.i.)

- use heavy duty single feed airless spray equipment preferably 60:1 pump ratio and suitable high pressure hoses
- in -line heating or insulated hoses may be necessary to avoid cooling down of paint in hoses at low air temperature
- application with 45: 1 spray equipment possible provided in-line heated high pressure hoses are used
- in case of using 45: 1 airless spray equipment the paint must be heated to approx. 30°C in order to obtain the right application viscosity
- length of hoses should be as short as possible.

**BRUSH/ROLLER**

Recommended thinner

for stripe coating and spot repair only

no thinner should be added

**CLEANING SOLVENT**

Thinner 90-83 (preferred) or Thinner 90-53

- all application equipment must be cleaned immediately after use
- paint inside the spraying equipment must be removed before the pot life time has been expired

## SIGMAGUARD CSF 585

October 2012

## ADDITIONAL DATA

## Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	4	3.3	2.5
dft in $\mu\text{m}$	250	300	400

Maximum dft when brushing: 100  $\mu\text{m}$

**measuring wet film thickness**

- a deviation is often obtained between the measured apparent wft and the real applied wft
- this is due to the thixotropy and the surface tension of the paint which retards the release of air trapped in the paint film for some time
- a practical recommendation is to apply a wft which is equal to the specified dft plus 60  $\mu\text{m}$

**measuring dry film thickness**

- because of low initial hardness the dft cannot be measured within some days due to the penetration of the measuring device into the soft paint film
- the dft should be measured using a calibration foil of known thickness placed in between the coating and the measuring device

**Overcoating table for SigmaGuard CSF 585 for dft up to 300  $\mu\text{m}$   
(for spot repair and stripe coating only)**

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	4 days	24 hours	16 hours	10 hours
maximum interval	28 days	20 days	14 days	14 days

- surface should be dry and free from any contamination



## SIGMAGUARD CSF 585

October 2012

## Curing

## Curing table for dft up to 300 µm

substrate temperature	dry to handle	full cure
10°C *	4 days	20 days
20°C	1 day	12 days
30°C	16 hours	7 days
40°C	10 hours	5 days

\* for the first 24 hours the maximum RH must be 50% or lower

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- SigmaGuard CSF 585 must not be applied at temperatures below 10°C
- for drinking water tanks, a tankwash should be carried out after full cure and before the tank goes into service
- for storage and transport of drinking water the recommended working procedure should be followed

**WASHING PROCEDURE**

The recommended washing procedure must be applied after completion of the application.

Sufficient time for full-curing and ventilation must be allowed in accordance with the recommendations as stated in the latest Product Data Sheets and working procedure.

Always an adequate washing procedure should be followed.

Several adequate washing procedures are available and may be used (see e.g. washing procedure described in relevant certificate).

**Example of adequate washing procedures:**

- 1.- after full curing of the system as per the latest PDS, the tank should be filled completely with fresh tap water
  - the fresh tap water should remain in the tanks at least 4 full days
  - afterwards all tank compartments such as inner hull sides, bottom and deck-heads etc. should be thoroughly washed using high pressure water
  - after washing, the tanks should be thoroughly drained
  - after this procedure the tanks will be fit to carry drinking water

## SIGMAGUARD CSF 585

October 2012

- 2.- all personnel should wear watertight suits, boots and gloves properly cleaned with a sodium hypochlorite solution (1% active chlorine per liter)
- all tank sides, bottom and deckheads etc. should be brush cleaned or high-pressure spray cleaned with 1% active chlorine solution as above  
note: this can also be done by butterworth washing
  - all parts should be high pressure cleaned with tap water and tanks drained
  - concentrated active chlorine solution should be sprinkled on bottom; approx. 1 ltr/10 m<sup>2</sup>
  - tanks should be filled with tap water to a depth of approx. 20 cm and the water should remain in the tank for at least 2 hours (max. 24 hours)
  - tanks should be thoroughly flushed out with tap water
  - depending upon local regulations it may be necessary to take water samples, after filling tank completely, to check on bacteria
  - after this procedure the tanks will be fit to carry drinking water

**Pot life (at application viscosity)**

20 °C	90 min.
30 °C	60 min.

- due to exothermic reaction, temperature during and after mixing may increase

**DISCLAIMER**

- SigmaGuard CSF 585 is especially developed for the storage and transport of drinking water and is approved for purpose in accordance with the requirements of the relevant certificate (See sheet 1882).
- In order to fulfill the requirements it is important that the coating is well ventilated during application and curing and that the coating has received full curing.
- Furthermore the recommended washing procedure should be followed before exposure to drinking water, in line with our latest datasheet and working procedure. After the washing procedure PPG Protective & Marine Coatings does not accept any responsibility or liability for any odour, taste or contamination imparted to the drinking water from the washing products retained in the coating.

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# SIGMAGUARD CSF 585

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October 2012

**Worldwide availability**

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.  
Under these circumstances an alternative product data sheet is used.

**REFERENCES**

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes
  - no solvent present; however, spray mist is not harmless, a fresh air mask should be used during spraying
  - ventilation should be provided in confined spaces to maintain good visibility

# SIGMAGUARD CSF 585

October 2012

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product.

THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG.

Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.**

The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com).

The English text of this data sheet shall prevail over any translation thereof.

	PDS	7785
219191	blue	1000002200
219190	white	7000002200

# SIGMAGUARD CSF 650

6 pages

June 2013  
Revision of May 2012

## Description

two component solvent free amine cured epoxy coating

## PRINCIPAL CHARACTERISTICS

- tank coating for crude oil/ballast and aliphatic petroleum products
- also suitable as coating system for storage and transport of drinking water
- good resistance to various chemicals
- one coat protection for steel structures, ships and storage tanks with excellent corrosion resistance
- can be applied by heavy duty single feed airless spray equipment (60:1)
- reduced explosion risk and fire hazard
- good visibility due to light colour
- also a conductive version is available, see sheet 7753
- can be reinforced with chopped glassfibre or mat
- clear version for glassmat reinforced solvent free tank bottom system (see system sheet 4144)
- meets the requirements of Mil-C-4556E concerning resistance against aircraft fuel and fuel degradation
- excellent resistance to crude oil up to 60°C

## COLOURS AND GLOSS

green, offwhite, clear – gloss

## BASIC DATA AT 20°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density	1.3 g/cm <sup>3</sup>
Volume solids	100%
VOC (Supplied)	max. 109 g/kg (Directive 1999/13/EC, SED) max. 143 g/l (approx. 1.2 lb/gal)
Recommended dry film thickness	300 - 600 µm depending on system
Theoretical spreading rate	3.3 m <sup>2</sup> /l for 300 µm *
Touch dry after	8 hours at 20°C
Overcoating interval	min. 24 hours * max. 20 days *
Full cure after	5 days * at 20°C

Shelf life (cool and dry place)

(data for components)  
at least 12 months  
\* see additional data

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- steel; blast cleaned to ISO-Sa2½, blasting profile 50 - 100 µm
- suitable primer; SigmaGuard 260, SigmaCover 280, SigmaPrime series or SigmaCover 522, depending on system requirements
- substrate temperature must be above 5°C and at least 3°C above dew point during application and curing
- Steel; power tooling to ISO-St3 for small and isolated areas (like repairs and joint welds) in fresh water and potable water tanks where spot blasting might be impractical

# SIGMAGUARD CSF 650

June 2013

<b>SYSTEM SPECIFICATION</b>	marine or suitable primer (min. dft of 50 µm) +	1 x 300 µm SigmaGuard CSF 650 1 x 250 µm SigmaGuard CSF 650
<b>INSTRUCTIONS FOR USE</b>	mixing ratio by volume: base to hardener 80 : 20 – at lower temperature the viscosity will be too high for spray application – for recommended application instructions: see working procedure – the temperature of the mixed base and hardener should preferably be above 20°C – no thinner should be added	
Induction time	none	
Pot life	approx. 1 hour at 20°C *	
	*see additional data	
<b>AIRLESS SPRAY</b>		
Recommended thinner	no thinner should be added	
Nozzle orifice	approx. 0.64 mm (= 0.025 in)	
Nozzle pressure	at 20°C (paint temperature) min. 28 MPa (= approx. 280 bar; 4061 p.s.i.) at 30°C (paint temperature) min. 22 MPa (+ approx. 220 bar; 3000 p.s.i.)	
	– use heavy duty single feed airless spray equipment preferably 60:1 pump ratio and suitable high pressure hoses/in-line heating or insulated hoses may be necessary to avoid cooling down of paint in hoses at low air temperature – application with 45: 1 spray equipment possible provided in-line heated high pressure hoses are used – in case of using 45: 1 airless spray equipment the paint must be heated to approx. 30°C in order to obtain the right application viscosity – length of hoses should be as short as possible	
<b>BRUSH/ROLLER</b>		
Recommended thinner	for stripe coating and spot repair only/no thinner should be added	
<b>CLEANING SOLVENT</b>	Thinner 90-83 (preferred) or Thinner 90-53	
	– all equipment used for application must be cleaned immediately after use – paint inside the spraying equipment must be removed before the pot life time has been expired	

# SIGMAGUARD CSF 650

June 2013

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	4	3.3	1.7
dft in µm	250	300	600

Maximum dft when brushing: 150 - 200 µm

### measuring wet film thickness

- a deviation is often obtained between the measured apparent wft and the real applied wft
- this is due to the thixotropy and the surface tension of the paint which retards the release of air trapped in the paint film for some time
- recommendation is to apply a wft which is equal to the specified dft plus 60 µm

### measuring dry film thickness

- because of low initial hardness the dft cannot be measured within some days due to the penetration of the measuring device into the soft paint film
- the dft should be measured using a calibration foil of known thickness placed in between the coating and the measuring device

### Overcoating table for SigmaGuard CSF 650 for dft up to 300 µm

with itself

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	80 hours	36 hours	24 hours	16 hours	12 hours
maximum interval	20 days	20 days	20 days	14 days	7 days

- surface should be dry and free from any contamination

## Curing

### Curing table for dft up to 300 µm

substrate temperature	dry to handle	full cure
5°C	60 hours	15 days
10°C	30 hours	7 days
20°C	16 hours	5 days
30°C	10 hours	3 days
40°C	8 hours	2 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- for drinking water tanks, a tankwash should be carried out after full cure and before the tank goes into service
- when used as coating system for storage and transport of drinking water the recommended working and washing procedure should be followed

# SIGMAGUARD CSF 650

June 2013

## WASHING PROCEDURE

The recommended washing procedure must be applied after completion of the application.

Sufficient time for full-curing and ventilation must be allowed in accordance with the recommendations as stated in the latest Product Data Sheets and working procedure.

Always an adequate washing procedure should be followed.

Several adequate washing procedures are available and may be used (see e.g. washing procedure described in relevant certificate).

### Example of adequate washing procedures:

- 1.- after full curing of the system as per the latest PDS, the tank should be filled completely with fresh tap water
  - the fresh tap water should remain in the tanks at least 4 full days
  - afterwards all tank compartments such as inner hull sides, bottom and deck-heads etc. should be thoroughly washed using high pressure water
  - after washing, the tanks should be thoroughly drained
  - after this procedure the tanks will be fit to carry drinking water
- 2.- all personnel should wear watertight suits, boots and gloves properly cleaned with a sodium hypochlorite solution (1% active chlorine per liter)
  - all tank sides, bottom and deckheads etc. should be brush cleaned or high-pressure spray cleaned with 1% active chlorine solution as above  
note: this can also be done by butterworth washing
  - all parts should be high pressure cleaned with tap water and tanks drained
  - concentrated active chlorine solution should be sprinkled on bottom;  
approx. 1 ltr/10 m<sup>2</sup>
  - tanks should be filled with tap water to a depth of approx. 20 cm and the water should remain in the tank for at least 2 hours (max. 24 hours)
  - tanks should be thoroughly flushed out with tap water
  - depending upon local regulations it may be necessary to take water samples, after filling tank completely, to check on bacteria
  - after this procedure the tanks will be fit to carry drinking water



# SIGMAGUARD CSF 650

June 2013

### Pot life (at application viscosity)

20°C	60 min.
30°C	45 min.
40°C	25 min.

- due to exothermic reaction, temperature during and after mixing may increase

### Disclaimer for storage and transport of drinking water:

- SigmaGuard CSF 650 is approved for purpose in accordance with the requirements of the relevant certificate (see sheet 1882)
- PPG Protective & Marine Coatings does not accept any responsibility or liability for any odour, taste or contamination imparted to the drinking water from the coatings or products retained in the coating.

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

### REFERENCES

Conversion tables	see information sheet 1410
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Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

### SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes
  - ventilation should be provided in confined spaces to maintain good visibility
  - no solvent present; however, spray mist is not harmless, a fresh air mask should be used during spraying

# SIGMAGUARD CSF 650

June 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

	PDS	7443
179131	green	4000002200
179511	clear	0000002200



# SIGMAPRIME 200 SERIES

6 pages

March 2014  
Revision of April 2013

<b>Description</b>	Universal epoxy anticorrosive system based upon pure epoxy technology	
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– Universal epoxy primer system suitable for Ballast Tanks, Decks, Topside, Superstructure, Hull, Cargo Oil Tanks and Cargo Holds</li> <li>– excellent anticorrosive properties and water resistance</li> <li>– surface tolerant primer</li> <li>– good chemical resistance</li> <li>– good abrasion resistance for dedicated areas of application</li> <li>– excellent adhesion to steel, shop primer, galvanised steel and non-ferrous metals</li> <li>– excellent recoatability</li> <li>– suitable for application and curing in a wide range of climatic conditions</li> <li>– suitable for bulk supply and twin feed application</li> <li>– suitable on wet blast cleaned substrates (damp or dry)</li> </ul>	
<b>COLOURS AND GLOSS</b>	alu light, alu yellow, grey, yellow/green, redbrown – eggshell	
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)	
	(data for mixed product)	
Mass density	SigmaPrime 200: 1.3 g/cm <sup>3</sup>	SigmaPrime 200 K: 1.4 g/cm <sup>3</sup>
Volume solids	57 ± 2%	60 ± 2%
VOC (Supplied)	max. 326 g/kg max. 430 g/l (approx. 3.6 lb/gal)	max. 287 g/kg max. 392 g/l (approx. 3.3 lb/gal)
Recommended dry film thickness	75 - 200 µm depending on system	100 - 200 µm depending on system
Theoretical spreading rate	7.6 m <sup>2</sup> /l for 75 µm, 2.9 m <sup>2</sup> /l for 200 µm	6 m <sup>2</sup> /l for 100 µm, 3 m <sup>2</sup> /l for 200 µm
Touch dry after	1.5 hour at 20°C	
Overcoating interval	min. see tables * max. see tables *	
Full cure after	7 days * (data for components)	
Shelf life (cool and dry place)	at least 24 months * see additional data	

# SIGMAPRIME 200 SERIES

March 2014

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer: blast cleaned (dry or wet ) to ISO-SA2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
  - coated steel; hydrojetted to VIS WJ2L (blasting profile 30 - 75 µm)
  
- **IMO-MSC.215(82) Requirements for Water Ballast Tanks and IMO-MSC.288(87) for Cargo tanks of Crude Oil Tankers (specified areas only):**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding or at least equivalent process before paintings
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
  
- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or according to ISO-St3
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanized steel; cleaned from grease, salts. contamination and roughened up
  
- previous coat; (e.g. SigmaPrime 200) dry and free from any contamination
- substrate temperature should be above 5°C and at least 3°C above dew point during application and curing
- maximum relative humidity during application and curing is 85%

## SYSTEM SPECIFICATION

marine      system sheets: 3101, 3102, 3103, 3104, 3105, 3106 (spec. 2), 3107, 3108

# SIGMAPRIME 200 SERIES

March 2014

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Induction time

none

Pot life

7 hours at 20°C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 15%, depending on required thickness and application conditions

Nozzle orifice

1.5 - 2 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 15%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.74 mm (= 0.021 - 0.029 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

no extra thinner necessary

Volume of thinner

up to 5% Thinner 91-92 can be added if desired

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate for SigmaPrime 200

theoretical spreading rate m <sup>2</sup> /l	7.6	4.6	3.6	2.9
dft in µm	75	125	160	200

### Film thickness and spreading rate for SigmaPrime 200 K

theoretical spreading rate m <sup>2</sup> /l	6.0	4.8	3.8	3.0
dft in µm	100	125	160	200

max. dft:

Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG must be consulted in case of DFT readings fall outside this recommendation.

# SIGMAPRIME 200 SERIES

March 2014

### Overcoating table for SigmaPrime 200 or 200 K for dft up to 160 µm

with various two pack epoxy coatings

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	13 hours	6 hours	2.5 hours	1.5 hour	1 hour
Max interval when exposed to direct sunshine maximum interval	3 months	3 months	3 months	2 months	2 months
Max interval when <b>not</b> exposed to direct sunshine maximum interval	6 months	6 months	6 months	4 months	3 months

- surface should be dry and free from any contamination

### Curing

#### Curing table for dft up to 160 µm

substrate temperature	touch dry	dry to handle	full cure
5°C	5 hours	14 hours	21 days
10°C	3 hours	8 hours	14 days
20°C	1.5 hour	4 hours	7 days
30°C	45 min.	2.5 hours	5 days
40°C	30 min.	1.5 hour	4 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

#### Pot life (at application viscosity)

15°C	10 hours
20°C	7 hours
30°C	4 hours

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

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## SIGMAPRIME 200 SERIES

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March 2014

### REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety - explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

### SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAPRIME 200 SERIES

March 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

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	PDS	7416
202391	SigmaPrime 200 yellow/green	4009002200 (202390 base, 202389 hardener)
211291	SigmaPrime 200 grey	9515052200 (211282 base, 202389 hardener)
244820	SigmaPrime 200 K grey	9515052150 (243529 base, 240992 hardener)
244832	SigmaPrime 200 K redbrown	2008002150 (243540 base, 240992 hardener)
330749	SigmaPrime 200 K alu light	9000002150 (330748 base, 240992 hardener)
330752	SigmaPrime 200 K alu yellow	9300002150 (330751 base, 240992 hardener)



## SIGMAPRIME 200 LT SERIES



6 pages

March 2014  
Revision of April 2013

<b>Description</b>	Universal epoxy anticorrosive system based upon pure epoxy technology	
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– Universal epoxy primer system suitable for Ballast Tanks, Decks, Topside, Superstructure, Hull, Cargo Oil Tanks and Cargo Holds</li> <li>– excellent anticorrosive properties and water resistance</li> <li>– surface tolerant primer</li> <li>– good chemical resistance</li> <li>– good abrasion resistance for dedicated areas of application</li> <li>– excellent adhesion to steel, shop primer, galvanised steel and non ferrous metals</li> <li>– excellent recoatability</li> <li>– suitable for application and curing in a wide range of climatic conditions</li> <li>– suitable for bulk supply and twin feed application</li> </ul>	
<b>COLOURS AND GLOSS</b>	alu light, alu yellow, grey, yellow/green, redbrown – eggshell	
<b>BASIC DATA AT 10°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)	
	(data for mixed product)	
Mass density	SigmaPrime 200 LT: 1.3 g/cm <sup>3</sup>	SigmaPrime 200 LT K: 1.4 g/cm <sup>3</sup>
Volume solids	57 ± 2%	60 ± 2%
VOC (Supplied)	max. 331 g/kg	max. 291 g/kg
	max. 437 g/l (approx. 3.6 lb/gal)	max. 437 g/l (approx. 3.6 lb/gal)
Recommended dry film thickness	75 - 200 µm depending on system	100 - 200 µm depending on system
Theoretical spreading rate	7.6 m <sup>2</sup> /l for 75 µm, 2.9 m <sup>2</sup> /l for 200 µm	6 m <sup>2</sup> /l for 100 µm, 3 m <sup>2</sup> /l for 200 µm
Touch dry after	3 hours *	
Overcoating interval	min. see tables *	
	max. see tables *	
Full cure after	7 days *	
	(data for components)	
Shelf life (cool and dry place)	at least 12 months	
	* see additional data	

# SIGMAPRIME 200 LT SERIES

March 2014

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned (dry or wet) to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
- **IMO-MSC.215(82) Requirements for Water Ballast Tanks and IMO-MSC.288(87) for Cargo tanks of Crude Oil Tankers (specified areas only):**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding or at least equivalent process before painting
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or according to ISO-St3
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanized steel; cleaned from grease, salts. contamination and roughened up
- previous coat; (e.g. SigmaPrime 200 LT) dry and free from any contamination
- substrate temperature should be between -10°C up to 15°C during application and curing and at least 3°C above dew point and free from ice and any contamination
- during application and curing a substrate temperature down to -10°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases
- maximum relative humidity during application and curing is 85%

## SYSTEM SPECIFICATION

marine

system sheets: 3101, 3102, 3103, 3104, 3106 (spec. 2), 3107

# SIGMAPRIME 200 LT SERIES

March 2014

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be above 5°C, otherwise extra solvent may be required to obtain application viscosity
- thinner should be added after mixing the components
- too much solvent results in reduced sag resistance

Induction time

none

Pot life

7 hours at 10°C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 15%, depending on required thickness and application conditions

Nozzle orifice

1.5 - 2 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 15%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.74 mm (= 0.021 - 0.029 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

no extra thinner is necessary

Volume of thinner

up to 5% Thinner 91-92 can be added

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate of SigmaPrime 200 LT

theoretical spreading rate m <sup>2</sup> /l	7.6	4.6	3.6	2.9
dft in µm	75	125	160	200

### Film thickness and spreading rate of SigmaPrime 200 LT K

theoretical spreading rate m <sup>2</sup> /l	6.0	4.8	3.8	3.0
dft in µm	100	125	160	200

max. dft:

Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG must be consulted in case of DFT readings fall outside this recommendation.

# SIGMAPRIME 200 LT SERIES

March 2014

### Overcoating table for SigmaPrime 200 LT or 200 LT K for dft up to 160 µm

with various two pack epoxy coatings

substrate temperature	-10°C	-5°C	0°C	10°C	15°C
minimum interval	48 hours	24 hours	16 hours	6 hours	4 hours
Max interval when exposed to direct sunshine maximum interval	2 months	2 months	2 months	1 month	1 month
Max interval when <b>not</b> exposed to direct sunshine maximum interval	3 months	3 months	3 months	2 months	1 month

- surface should be dry and free from any contamination

### Curing

### Curing table for dft up to 160 µm

substrate temperature	touch dry	dry to handle	full cure
-10°C	20 hours	48 hours	21 days
-5°C	10 hours	21 hours	14 days
5°C	5 hours	10 hours	9 days
10°C	3 hours	6 hours	7 days
15°C	2 hours	4 hours	5 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

5°C	10 hours
10°C	7 hours

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

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# SIGMAPRIME 200 LT SERIES

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March 2014

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety - explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

## SAFETY PRECAUTIONS

- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes
- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets

# SIGMAPRIME 200 LT SERIES

March 2014

## WARRANTY

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	PDS	7931
204702	SigmaPrime 200 LT yellow/green	4009002200 (202390 base, 215871 hardener)
211283	SigmaPrime 200 LT grey	9515052200 (211282 base, 215871 hardener)
244824	SigmaPrime 200 LT K grey	9515052150 (243529 base, 242356 hardener)
244827	SigmaPrime 200 LT K redbrown	2008002150 (243540 base, 242356 hardener)
330750	SigmaPrime 200 LT K alu light	9000002150 (330748 base, 242356 hardener)
330753	SigmaPrime 200 LT K alu yellow	9300002150 (330751 base, 242356 hardener)



# SIGMAPRIME 700

6 pages

March 2014  
Revision of April 2013

## Description

Universal epoxy anticorrosive system based upon pure epoxy technology

## PRINCIPAL CHARACTERISTICS

- Universal epoxy primer system suitable for Ballast Tanks, Decks, Topside, Superstructure, Hull, Cargo Oil Tanks and Cargo Holds
- good abrasion resistance for dedication areas of application
- good adhesion to steel and galvanised steel
- good adhesion to non-ferrous metals
- good flow and wetting properties
- good water and corrosion resistance
- cures at temperatures down to +5°C
- suitable for touching up of weld seams and damages of epoxy coatings during construction
- excellent recoatability
- can be overcoated with most alkyd-, chlorinated rubber-, vinyl-, epoxy- and two component polyurethane coatings
- compatible with well designed cathodic protection systems
- suitable on wet blast cleaned substrates (damp or dry)

## COLOURS AND GLOSS

grey, redbrown, yellow/green, green – eggshell

## BASIC DATA AT 20°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density	1.4 g/cm <sup>3</sup>
Volume solids	70 ± 2%
VOC (Supplied)	max. 227 g/kg (Directive 1999/13/EC, SED) max. 313 g/l (approx. 2.6 lb/gal)
Recommended dry film thickness	100 - 200 µm depending on system *
Theoretical spreading rate	7.0 m <sup>2</sup> /l for 100 µm 3.5 m <sup>2</sup> /l for 200 µm
Touch dry after	2 hours *
Overcoating interval	min. see tables * max. see tables *
Full cure after	7 days *
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data

## SIGMAPRIME 700

March 2014

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
  - coated steel; hydrojetted to VIS WJ2L (blasting profile 30 - 75 µm)
  
- **IMO-MSC.215(82) Requirements for Water Ballast Tanks and IMO-MSC.288(87) for Cargo tanks of Crude Oil Tankers (specified areas only):**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding or at least equivalent process before painting
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
  
- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or according to ISO-St3
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanised steel; cleaned from grease, salts, contamination and roughened up
  
- previous coat; (e.g. SigmaPrime 700) dry and free from any contamination
- substrate temperature should be above 5°C and at least 3°C above dew point during application and curing
- maximum relative humidity during application and curing is 85%

**SYSTEM SPECIFICATION**

marine      system sheets: 3101, 3102, 3103, 3104,3105, 3106 (spec. 1), 3107, 3108



# SIGMAPRIME 700

March 2014

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Induction time

none

Pot life

8 hours at 20°C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

1.5 - 2 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 15%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.74 mm (= 0.021 - 0.029 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

no extra thinner is necessary

Volume of thinner

but up to 5% Thinner 91-92 can be added if desired

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	7.0	5.6	4.4	3.5
dft in µm	100	125	160	200

max. dft:

Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG must be consulted in case of DFT readings fall outside this recommendation.

# SIGMAPRIME 700

March 2014

### Overcoating table for SigmaPrime 700 for dft up to 160 µm

with various two pack epoxy coatings

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	15 hours	9 hours	4 hours	2.5 hours	1.5 hour
Max interval when exposed to direct sunshine maximum interval	3 months	3 months	2 months	2 months	2 months
Max interval when <b>not</b> exposed to direct sunshine maximum interval	6 months	6 months	6 months	4 months	3 months

- surface should be dry and free from any contamination

### Curing

### Curing table for dft up to 160 µm

substrate temperature	touch dry	dry to handle	full cure
5°C	6 hours	18 hours	21 days
10°C	4 hours	12 hours	14 days
15°C	3 hours	9 hours	7 days
20°C	2 hours	6 hours	5 days
30°C	1 hour	3 hours	5 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

15°C	10 hours
20°C	8 hours
30°C	4 hours

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

# SIGMAPRIME 700

March 2014

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety - explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAPRIME 700

March 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

	PDS	7930
245824	grey	9515052150 (245344 base, 245346 hardener)
245825	redbrown	2008002150 (245345 base, 245346 hardener)
321760	green	4000002150 (321758 base, 245346 hardener )
267441	grey	5000002200 (267438 base, 267440 hardener)
267442	redbrown	2008002200 (267439 base, 267440 hardener)
269714	yellow/green	4009002200 (321758 base, 267440 hardener)
317126	redbrown	2008002200 (317121 base, 317124 hardener)
317127	grey	5000002200 (317122 base, 317124 hardener)
317128	yellow/green	4009002200 (317123 base, 317124 hardener)

# SIGMAPRIME 700 LT

6 pages

 March 2014  
 Revision of April 2013

<b>Description</b>	Universal epoxy anticorrosive system based upon pure epoxy technology
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– Universal epoxy primer system suitable for Ballast Tanks, Decks, Topside, Superstructure, Hull, Cargo Oil Tanks and Cargo Holds</li> <li>– good abrasion resistance for dedication areas of application</li> <li>– good adhesion to steel and galvanised steel</li> <li>– good adhesion to non-ferrous metals</li> <li>– good flow and wetting properties</li> <li>– good water and corrosion resistance</li> <li>– cures even at temperatures down to -10°C</li> <li>– suitable for touching up of weld seams and damages of epoxy coatings during construction</li> <li>– excellent recoatability</li> <li>– can be overcoated with most alkyd-, chlorinated rubber-, vinyl-, epoxy- and two component polyurethane coatings</li> <li>– compatible with well designed cathodic protection systems</li> </ul>
<b>COLOURS AND GLOSS</b>	grey, redbrown, yellow/green, green – eggshell
<b>BASIC DATA AT 10°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.4 g/cm <sup>3</sup>
Volume solids	70 ± 2%
VOC (Supplied)	max. 233 g/kg (Directive 1999/13/EC, SED) max. 317 g/l (approx. 2.6 lb/gal)
Recommended dry film thickness	100 - 200 µm depending on system *
Theoretical spreading rate	7.0 m <sup>2</sup> /l for 100 µm 3.5 m <sup>2</sup> /l for 200 µm
Touch dry after	4 hours at 10°C
Overcoating interval	min. see tables * max. see tables *
Full cure after	7 days at 10°C
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data

## SIGMAPRIME 700 LT

March 2014

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned (dry or wet) to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
- **IMO-MSC.215(82) Requirements for Water Ballast Tanks and IMO-MSC.288(87) for Cargo tanks of Crude Oil Tankers (specified areas only):**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding or at least equivalent process before painting
  - steel or steel with not approved zinc silicate shop primer: blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or break down should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or according to ISO-St3
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanised steel; cleaned from grease, salts, contamination and roughened up
- previous coat; (e.g. SigmaPrime 700 LT) dry and free from any contamination
- substrate temperature should be above -10°C during application and curing and at least 3°C above dew point and free from ice and any contamination
- during application and curing a substrate temperature down to -10°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases
- maximum relative humidity during application and curing is 85%

**SYSTEM SPECIFICATION**

marine

system sheets: 3101, 3102, 3103, 3104, 3106 (spec. 1), 3107

# SIGMAPRIME 700 LT

March 2014

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- the temperature of the mixed base and hardener should preferably be above 5°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance
- thinner should be added after mixing the components

Induction time

none

Pot life

7 hours at 10°C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 1.5 - 2.0 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 15%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.74 mm (= 0.021 - 0.029 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

no extra thinner is necessary

Volume of thinner

but up to 5% Thinner 91-92 can be added if desired

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	7.0	5.6	4.4	3.5
dft in µm	100	125	160	200

max. dft:

Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG must be consulted in case of DFT readings fall outside this recommendation.

# SIGMAPRIME 700 LT

March 2014

### Overcoating table for SigmaPrime 700 LT for dft up to 160 µm

with various two pack epoxy coatings

substrate temperature	-10°C	-5°C	0°C	5°C	15°C
minimum interval	48 hours	28 hours	21 hours	12 hours	6 hours
Max interval when exposed to direct sunshine maximum interval	2 months	2 months	2 months	1 month	1 month
Max interval when <b>not</b> exposed to direct sunshine maximum interval	3 months	3 months	3 months	2 months	1 month

- surface should be dry and free from any contamination

### Curing

### Curing table for dft up to 160 µm

substrate temperature	touch dry	dry to handle	full cure
-10°C	24 hours	48 hours	21 days
-5°C	12 hours	36 hours	14 days
0°C	8 hours	24 hours	12 days
5°C	6 hours	15 hours	9 days
10°C	4 hours	10 hours	7 days
15°C	3 hours	8 hours	5 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

In exceptional cases SigmaPrime 700 LT may be applied at lower substrate temperatures (down to -15°C) provided that the surface is free from ice and other contamination. In such cases special care must be taken to avoid thick film application as this may lead to checking/crazing or solvent entrapment. It should be clear that application at lower temperatures will require additional thinning to obtain application viscosity, however this will affect the sag resistance of the applied coating and can induce solvent retention. Optimal curing an designed product properties will only be achieved when minimum required substrate temperature is reached.

### Pot life (at application viscosity)

5°C	10 hours
10°C	7 hours



# SIGMAPRIME 700 LT

March 2014

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety - explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAPRIME 700 LT

March 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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	PDS	7946
247334	redbrown	2008002150 (245345 base, 245360 hardener)
250190	grey	9515052150 (245344 base, 245360 hardener)
321761	green	4000002150 (321758 base, 245360 hardener)
267770	redbrown	2008002200 (267439 base, 267768 hardener)
267769	grey	5000002200 (267438 base, 267768 hardener)
322682	yellow/green	4009002200 (269713 base, 267768 hardener)
317129	redbrown	2008002200 (317121 base, 317125 hardener)
317130	grey	5000002200 (317122 base, 317125 hardener)
317131	yellow/green	4009002200 (317123 base, 317125 hardener)



# SIGMAPRIME 800

5 pages

March 2014  
Revision of April 2013

<b>Description</b>	Universal epoxy anticorrosive system based upon pure epoxy technology
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– Universal epoxy primer system suitable for Ballast Tanks, Decks, Topside, Superstructure, Hull and Cargo Oil Tanks</li> <li>– good abrasion resistance for dedication areas of application</li> <li>– excellent anticorrosive properties and water resistance</li> <li>– good chemical resistance</li> <li>– excellent crack resistance</li> <li>– suitable for use on a wide range of substrates</li> <li>– suitable for application and curing in a wide range of climatic conditions</li> <li>– user friendly fitting shipyard block stage practices</li> <li>– suitable for bulk supply and twin feed application</li> </ul>
<b>COLOURS AND GLOSS</b>	grey, green – gloss
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.3 g/cm <sup>3</sup>
Volume solids	80 ± 2%
VOC (Supplied)	max. 181 g/kg (Directive 1999/13/EC, SED) max. 257 g/l (approx. 2.1 lb/gal)
Recommended dry film thickness	100 - 250 µm depending on system *
Theoretical spreading rate	8.0 m <sup>2</sup> /l for 100 µm 3.2 m <sup>2</sup> /l for 250 µm
Touch dry after	6 hours at 20°C
Overcoating interval	min. 5 hours * max. 14 days *
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data

## SIGMAPRIME 800

March 2014

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
- **IMO-MSC.215(82) Requirements for Water Ballast Tanks:**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding or at least equivalent process before painting
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
- **for atmospheric exposure conditions:**
  - steel blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or according to ISO-St3
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanised steel; cleaned from grease, salts, contamination and roughened up
- previous coat; (e.g. SigmaPrime 800) dry and free from any contamination
- substrate temperature should be above 5°C and at least 3°C above dew point during application and curing
- maximum relative humidity during application and curing is 85%

**SYSTEM SPECIFICATION**

marine

system sheet: 3106 (spec. 3)

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 75 : 25

- the temperature of the mixed base and hardener should preferably be above 10°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance
- thinner should be added after mixing the components
- see also attached application instructions

# SIGMAPRIME 800

March 2014

Pot life 2 hours at 20°C \*  
\* see additional data

## AIR SPRAY

Recommended thinner Thinner 91-92  
Volume of thinner 5 - 10%, depending on required thickness and application conditions  
Nozzle orifice 1.7 - 2 mm  
Nozzle pressure 0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner Thinner 91-92  
Volume of thinner 0 - 10%, depending on required thickness and application conditions  
Nozzle orifice approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)  
Nozzle pressure 15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner Thinner 91-92  
Volume of thinner 0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.0	5.0	3.2
dft in µm	100	160	250

max. dft:

Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG must be consulted in case of DFT readings fall outside this recommendation.

### Overcoating table for SigmaPrime 800 for dft up to 160 µm

substrate temperature	5°C	10°C	20°C	30°C
minimum interval	14 hours	11 hours	5 hours	2.5 hours
maximum interval	28 days	21 days	14 days	7 days

with itself

– surface should be dry and free from any contamination

# SIGMAPRIME 800

March 2014

## Curing

### Curing table for dft up to 160 µm

substrate temperature	touch dry	dry to handle	full cure
5°C	20 hours	30 hours	25 days
10°C	14 hours	20 hours	15 days
20°C	6 hours	9 hours	7 days
30°C	4 hours	5 hours	4 days
40°C	2 hours	3 hours	2 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

15°C	3 hours
20°C	2 hours
30°C	1 hour

## Worldwide availability

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## REFERENCES

Conversion tables	see information sheet 1410
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Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAPRIME 800

March 2014

## WARRANTY

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## LIMITATIONS OF LIABILITY

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	PDS	7938
271141	green	4009002150 (271140 base, 271152 hardener)
271143	green	4009002700 (271142 base, 271153 hardener)
272740	grey	9515052150 (272736 base, 271152 hardener)
272741	grey	9515052700 (272737 base, 271153 hardener)

# SIGMAPRIME 800 LT

6 pages

 March 2014  
 Revision of April 2013

**Description** Universal epoxy anticorrosive system based upon pure epoxy technology

**PRINCIPAL CHARACTERISTICS**

- Universal epoxy primer system suitable for WBT, Deck, Topside, Superstructure, Hull and COT
- good abrasion resistance for dedication areas of application
- good adhesion to steel and galvanised steel and non ferrous metal
- excellent anticorrosive properties and water resistance
- good chemical resistance
- excellent crack resistance
- suitable for use on a wide range of substrates
- suitable for application and curing in a wide range of climatic conditions
- user friendly fitting shipyard block stage practices
- suitable for bulk supply and twin feed application
- compatible with well designed cathodic protection systems

**COLOURS AND GLOSS** grey, green – gloss

**BASIC DATA AT 10°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.3 g/cm <sup>3</sup>
Volume solids	80 ± 2%
VOC (Supplied)	max. 181 g/kg (Directive 1999/13/EC, SED) max. 257 g/l (approx. 2.1 lb/gal)
Recommended dry film thickness	100 - 250 µm depending on system *
Theoretical spreading rate	8.0 m <sup>2</sup> /l for 100 µm 3.2 m <sup>2</sup> /l for 250 µm *
Touch dry after	4 hours *
Overcoating interval	min. 11 hours * max. 21 days *
Shelf life (cool and dry place)	at least 12 months * see additional data



## SIGMAPRIME 800 LT

March 2014

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- **for immersion exposure:**
  - steel or steel with not approved zinc silicate shop primer; blast cleaned (dry or wet) to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm or power tool cleaned to SPSS-Pt3
- **IMO-MSC.215(82) Requirements for Water Ballast Tanks:**
  - steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding
  - steel or steel with not approved zinc silicate shop primer; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
  - steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
    - for shop primer with IMO type approval; no additional requirements
    - for shop primer without IMO type approval; blast cleaned to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 - 75 µm
  - dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)
- **for atmospheric exposure conditions:**
  - steel blast cleaned (dry or wet) to ISO-Sa2½, blasting profile 30 - 75 µm
  - shop primed steel; pretreated to SPSS-Pt3
  - galvanised steel; cleaned from grease, salts, contamination and roughened up
- previous coat; (e.g. SigmaPrime 800 LT) dry and free from any contamination
- substrate temperature should be between -10°C up to 15°C during application and curing and at least 3°C above dew point and free from ice and any contamination
- during application and curing a substrate temperature down to -10°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases
- maximum relative humidity during application and curing is 85%

**SYSTEM SPECIFICATION**

marine

system sheet: 3106 (spec. 3)

# SIGMAPRIME 800 LT

March 2014

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 75 : 25

- the temperature of the mixed base and hardener should preferably be above 10°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance
- thinner should be added after mixing the components
- see also attached application instructions

Pot life

2 hours at 10°C \*  
\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

1.7 - 2 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.0	5.0	3.2
dft in µm	100	160	250

Max. dft:

Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG must be consulted in case of DFT readings fall outside this recommendation.

# SIGMAPRIME 800 LT

March 2014

### Overcoating table for SigmaPrime 800 LT for dft up to 160 µm

with itself

substrate temperature	-10°C	-5°C	0°C	5°C	10°C	15°C
minimum interval	48 hours	28 hours	20 hours	14 hours	11 hours	8 hours
maximum interval	21 days	21 days	21 days	21 days	14 days	14 days

– surface should be dry and free from any contamination

Curing

### Curing table for dft up to 160 µm

substrate temperature	touch dry	dry to handle	full cure
-10°C	24 hours	96 hours	21 days
-5°C	12 hours	48 hours	14 days
0°C	8 hours	30 hours	12 days
5°C	6 hours	20 hours	9 days
10°C	4 hours	16 hours	7 days
15°C	3 hours	12 hours	5 days

– adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

10°C	2 hours
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Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

### REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety - explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
PPG Protective & Marine Coatings Ballast Tank Working Procedure New Building	

## SIGMAPRIME 800 LT

March 2014

### SAFETY PRECAUTIONS

- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes
- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets

# SIGMAPRIME 800 LT

March 2014

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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	PDS	7940
272738	green	4009002150 (271140 base, 272734 hardener)
272739	green	4009002700 (271142 base, 272735 hardener)
272742	grey	9515052150 (272736 base, 272734 hardener)
272743	grey	9515052700 (272737 base, 272735 hardener)

# SIGMARINE 28

3 pages

January 2013  
Revision of July 2009

<b>Description</b>	one component quick drying high build multi purpose zinc phosphate primer
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- on board maintenance primer for above water areas</li> <li>- easy application</li> <li>- quick drying</li> <li>- recoatable with various one and two component products</li> <li>- surface tolerant</li> <li>- good anticorrosive properties</li> </ul>
<b>COLOURS AND GLOSS</b>	grey, redbrown, offwhite – flat
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
Mass density	1.5 g/cm <sup>3</sup>
Volume solids	55 ± 2%
VOC (Supplied)	max. 266 g/kg (Directive 1999/13/EC, SED) max. 392 g/l (approx. 3.3 lb/gal)
Recommended dry film thickness	75 µm per coat
Theoretical spreading rate	7.3 m <sup>2</sup> /l for 75 µm
Touch dry after	30 minutes at 20°C 2 hours at 5°C
Overcoating interval	min. 4 hours * max. unlimited
Shelf life (cool and dry place)	at least 12 months *See additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm</li> <li>- steel; power tool cleaned to min. ISO-St2</li> <li>- substrate temperature should be above 5°C and at least 3°C above dew point</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheets: 3102, 3103, 3104, 3105, 3107</span>
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>- stir well before use</li> <li>- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>- too much solvent results in reduced sag resistance</li> <li>- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)</li> </ul>
<b>AIR SPRAY</b>	
Recommended thinner	Thinner 21-06
Volume of thinner	5 - 10%, depending on required thickness and application conditions
Nozzle orifice	approx. 1.7 - 2.0 mm
Nozzle pressure	0.2 - 0.3 MPa (= approx. 2 - 3 bar; 29 - 44 p.s.i.)

# SIGMARINE 28

January 2013

## AIRLESS SPRAY

Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 5%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.38 - 0.48 mm (= 0.015 - 0.019 in)  
 Nozzle pressure 12 - 16 MPa (= approx. 120 - 160 bar; 1740 - 2321 p.s.i.)

## BRUSH/ROLLER

Recommended thinner Thinner 21-06  
 Volume of thinner 0 - 3%

## CLEANING SOLVENT

Thinner 21-06

## ADDITIONAL DATA

### Overcoating table for Sigmarine 28 for dft up to 75 µm

Sigmarine 28, Sigmarine 48,  
 Sigma Vikote 56 and  
 Sigma Vikote 46

Sigma Vikote 18

SigmaCover 456 and  
 SigmaDur 550

substrate temperature	5°C	20°C	35°C
minimum interval	8 hours	4 hours	3 hours
minimum interval	12 hours	4 hours	3 hours
minimum interval	16 hours	8 hours	4 hours
maximum interval	unlimited	unlimited	unlimited

– surface should be dry and free from any contamination

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Explanation to product data sheets see information sheet 1411  
 Safety indications see information sheet 1430  
 Safety in confined spaces and health safety  
 Explosion hazard - toxic hazard see information sheet 1431  
 Safe working in confined spaces see information sheet 1433  
 Directives for ventilation practice see information sheet 1434  
 Cleaning of steel and removal of rust see information sheet 1490

## SAFETY PRECAUTIONS

– for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets  
 – this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

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# SIGMARINE 28

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January 2013

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## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

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## LIMITATIONS OF LIABILITY

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	PDS	7117
195038	grey	5000002200
195037	offwhite	7001002200
210339	redbrown	2008002200



# SIGMARINE 42

3 pages

June 2013  
Revision of February 2009

**Description** clear varnish based on wood oil phenolic resin for interior and exterior use

**PRINCIPAL CHARACTERISTICS**

- a high quality weather resistant clear varnish with excellent gloss retention
- good resistance to salt water and fresh water
- good scratch and abrasion resistance

**COLOURS AND GLOSS** transparent – gloss

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density

0.9 g/cm<sup>3</sup>

Volume solids

49 ± 2%

VOC (Supplied)

max. 428 g/kg (Directive 1999/13/EC, SED)

max. 395 g/l (approx. 3.3 lb/gal)

Recommended dry film thickness

30 µm per coat

Theoretical spreading rate

16.3 m<sup>2</sup>/l for 30 µm

Touch dry after

3 hours

Overcoating interval

min. 16 hours

max. unlimited

Shelf life (cool and dry place)

at least 24 months, keep above 0°C

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES  
SYSTEM SPECIFICATION**

- dry clean wood
- previous coat; dry and free from any contamination
- when used on new tropical timber such as teak etc. the surface should be sealed with a coat of polyurethane clear varnish ( SigmaDur Clearcoat).; this is required to seal aggressive products in the wood
- when coating open grain woods:
  - 1) one coat of Sigmarine 42 diluted 100% followed by sand papering
  - 2) one coat of Sigmarine 42 diluted 50% followed by sand papering
  - 3) two coats of Sigmarine 42 undiluted
- oil seals ( linseed etc) should not be used under Sigmarine 42
- the varnish should be applied directly to the bare wood or over a polyurethane sealer
- in general a four coat system is sufficient

**INSTRUCTIONS FOR USE**

- stir well before use
- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity
- too much solvent results in reduced sag resistance
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

**BRUSH/ROLLER**

Recommended thinner

Thinner 20-05

Volume of thinner

see system specification

# SIGMARINE 42

June 2013

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMARINE 42

June 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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136848      PDS      8103  
transparent      0000001500

# SIGMARINE 48

3 pages

February 2013  
Revision of July 2009

<b>Description</b>	general purpose gloss paint based on a modified alkyd resin	
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– particularly suitable as a finish for boottop, topside, deck and deck equipment</li> <li>– a quick drying, hard, tough, water- and weather resistant coating with moderate gloss retention</li> <li>– can be applied over most intact alkyd paints</li> <li>– this coating is particularly suitable for areas intermittently exposed to water-immersion and atmospheric conditions</li> <li>– also available with non-skid material (supplied separately) for use on deck surfaces</li> <li>– certificate for low flame spread: see sheet 1883</li> </ul>	
<b>COLOURS AND GLOSS</b>	white and various other colours (see also the SigmaCare Shade Card of PPG Protective & Marine Coatings) – gloss	
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)	
Mass density	1.2 g/cm <sup>3</sup>	
Volume solids	45-49% ± 2% (colours) - 48% ± 2% (white)	
VOC (Supplied)	max. 345 g/kg (Directive 1999/13/EC, SED) max. 402 g/l (approx. 3.4 lb/gal)	
Recommended dry film thickness	35 µm per coat	
Theoretical spreading rate	12.8 - 14.0 m <sup>2</sup> /l (colours) - 13.7 m <sup>2</sup> /l (white) for 35 µm	
Touch dry after	1 hour at 20°C 3 hours at 5°C	
Overcoating interval	min. 16 hours at 20°C, 24 hours at 5°C max. unlimited	
Shelf life (cool and dry place)	at least 24 months	
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous suitable coat; dry and free from any contamination and sufficiently roughened if necessary</li> <li>– substrate temperature should be at least 3°C above dew point but not above 50°C</li> </ul>	
<b>SYSTEM SPECIFICATION</b>	systems for boottop and topside systems for superstructure and deck fitting	system sheet: 3102 system sheet: 3104
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>– stir well before use</li> <li>– the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance</li> <li>– adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)</li> </ul>	

# SIGMARINE 48

February 2013

## AIR SPRAY

Recommended thinner	Thinner 20-05
Volume of thinner	10 - 15%, depending on required thickness and application conditions
Nozzle orifice	2 - 3 mm
Nozzle pressure	0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner	Thinner 20-05
Volume of thinner	0 - 2%, depending on required thickness and application conditions
Nozzle orifice	approx. 0.48 mm (= 0.019 in)
Nozzle pressure	8 - 12 MPa (= approx. 80 - 120 bar; 1160 - 1740 p.s.i.)

## BRUSH/ROLLER

Recommended thinner	Thinner 20-05
Volume of thinner	0 - 2%

## CLEANING SOLVENT

Thinner 20-05

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMARINE 48

February 2013

## WARRANTY

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## LIMITATIONS OF LIABILITY

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136828	PDS white	7238 7000002200
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# SIGMARINE 80

3 pages

February 2013  
Revision of August 2009

**Description** finishing coat based on an alkyd modified petroleum resin pigmented with aluminium

**PRINCIPAL CHARACTERISTICS**

- for use in dry cargo holds
- brilliant appearance and good protective properties
- good impact resistance

**COLOURS AND GLOSS** aluminium – gloss

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density	1.0 g/cm <sup>3</sup>
Volume solids	47% ± 2%
VOC (Supplied)	max. 422 g/kg (Directive 1999/13/EC, SED) max. 413 g/l (approx. 3.4 lb/gal)
Recommended dry film thickness	25 µm per coat
Theoretical spreading rate	18.8 m <sup>2</sup> /l for 25 µm
Touch dry after	45 min. at 20°C 90 min. at 5 - 10°C
Overcoating interval	min. 6 hours at 20°C, 8 hours at 5 - 10°C max. unlimited
Shelf life (cool and dry place)	at least 12 months, longer storage period may affect the brilliancy

**RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**

- previous suitable coat; alkyd based (e.g. Sigmarine 40, Sigmarine 21, Sigmarine 24), dry and free from any contamination and sufficiently roughened if necessary
- substrate temperature should be at least 3°C above dew point

**SYSTEM SPECIFICATION** marine system sheet: 3107

**INSTRUCTIONS FOR USE**

- stir well before use
- the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity
- too much solvent results in reduced sag resistance
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

**AIR SPRAY**

Recommended thinner	no extra thinner needed
Nozzle orifice	2 - 3 mm
Nozzle pressure	0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

**AIRLESS SPRAY**

Recommended thinner	no extra thinner needed
Nozzle orifice	approx. 0.38 mm (= 0.015 in)
Nozzle pressure	8 - 12 MPa (= approx. 80 - 120 bar; 1160 - 1740 p.s.i.)

# SIGMARINE 80

February 2013

**BRUSH/ROLLER**

Recommended thinner no extra thinner needed

**CLEANING SOLVENT**

Thinner 20-05

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

**REFERENCES**

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes



# SIGMARINE 80

February 2013

## WARRANTY

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136777      PDS      7263  
aluminium      9000002200

# SIGMASHIELD 220

5 pages

June 2013  
Revision of October 2009

**Description** two component reinforced high solids polyamine adduct cured epoxy primer

- PRINCIPAL CHARACTERISTICS**
- general purpose primer for coating systems for steel
  - good abrasion resistance
  - outstanding sea water resistance
  - excellent corrosion resistance
  - good resistance against chemically polluted water
  - resistant to well designed/controlled cathodic protection

**COLOURS AND GLOSS** yellow/green – gloss

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density 1.5 g/cm<sup>3</sup>  
Volume solids 78 ± 2%  
VOC (Supplied) max. 176 g/kg (Directive 1999/13/EC, SED)  
max. 262 g/l (approx. 2.2 lb/gal)

Recommended dry film thickness 125 µm  
Theoretical spreading rate 6.2 m<sup>2</sup>/l for 125 µm \*  
Touch dry after 4 hours  
Overcoating interval min. 3.5 hours \*  
max. 14 days \*

Full cure after 5 days \*

Shelf life (cool and dry place) (data for components)  
at least 12 months  
\* see additional data

- RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**
- **for immersion exposure:**
    - steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm
    - steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or powertool cleaned to SPSS-Pt3
  - **for atmospheric exposure conditions:**
    - steel; blast cleaned to ISO-Sa2 or ISO-Sa2½, blasting profile 40 - 70 µm
    - steel; hydrojetted to VIS WJ2/3L
    - steel with approved shop primer; power tool cleaned to SPSS-Pt2
  - maximum relative humidity during application and curing is 85%
  - substrate temperature should be at least 5°C and at least 3°C above dew point during application and curing

**SYSTEM SPECIFICATION** marine system sheets: 3101, 3102, 3103, 3107

# SIGMASHIELD 220

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 75 : 25

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Induction time

none

Pot life

2 hours at 20°C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

1.5 - 3 mm

Nozzle pressure

0.2 - 0.4 MPa (= approx. 2 - 4 bar; 29 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

only for touch up and spot repair

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	7.8	6.2
dft in µm	100	125

Maximum dft when brushing:

80 µm

# SIGMASHIELD 220

June 2013

### Overcoating table for SigmaShield 220 for dft up to 150 µm

with epoxy coatings  
with polyurethanes

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	14 hours	7 hours	3.5 hours	2 hours	1.5 hour
minimum interval	22 hours	14 hours	10 hours	6 hours	4 hours
maximum interval	28 days	28 days	14 days	7 days	4 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)
- surface should be dry and free from any contamination

### Curing

### Curing table for dft up to 150 µm

substrate temperature	dry to handle	full cure	Service - water immersion
5°C	14 hours	17 days	10 days
10°C	7 hours	14 days	7 days
20°C	3.5 hours	7 days	5 days
30°C	2 hours	5 days	4 days
40°C	1.5 hour	3 days	3 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

10°C	3 hours
20°C	2 hours
30°C	1 hour

### Worldwide availability

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# SIGMASHIELD 220

June 2013

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes
- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets

# SIGMASHIELD 220

June 2013

## WARRANTY

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## LIMITATIONS OF LIABILITY

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192274      PDS                      7922  
                 yellow/green      4009002200

# SIGMASHIELD 220 LT

5 pages

June 2013  
Revision of October 2009

## Description

two component reinforced high solids polyamine adduct cured epoxy primer

## PRINCIPAL CHARACTERISTICS

- general purpose primer for coating systems for steel
- cures at temperatures down to -10°C
- good abrasion resistance
- outstanding sea water resistance
- excellent corrosion resistance
- good resistance against chemically polluted water
- resistant to well designed/controlled cathodic protection

## COLOURS AND GLOSS

yellow/green – gloss

## BASIC DATA AT 10°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density	1.5 g/cm <sup>3</sup>
Volume solids	78 ± 2%
VOC (Supplied)	max. 161 g/kg (Directive 1999/13/EC, SED) max. 240 g/l (approx. 2.0 lb/gal)
Recommended dry film thickness	100 - 125 µm
Theoretical spreading rate	7.8 m <sup>2</sup> /l for 100 µm 6.2 m <sup>2</sup> /l for 125 µm *
Touch dry after	4 hours
Overcoating interval	min. 10 hours * max. 14 days *
Full cure after	7 days *

(data for components)

Shelf life (cool and dry place)

at least 12 months  
\* see additional data

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- **for immersion exposure:**
  - steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm
  - steel with approved zinc silicate shop primer; pretreated according to SPSS or powertool cleaned to SPSS-Pt3
- **for atmospheric exposure conditions:**
  - steel; blast cleaned to ISO-Sa2 or ISO-Sa2½, blasting profile 40 - 70 µm
  - steel with approved shop primer; powertool cleaned to SPSS-Pt2
- substrate temperature should be between -10°C up to 15°C during application and curing and at least 3°C above dew point and free from ice and any contamination
- during application and curing a substrate temperature down to -10°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases
- maximum relative humidity during application and curing is 85%

## SYSTEM SPECIFICATION

marine

system sheets: 3101, 3102, 3103, 3107

# SIGMASHIELD 220 LT

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 75 : 25

- the temperature of the mixed base and hardener should preferably be above 5°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Induction time

none

Pot life

1 hour at 10°C \*

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

1.5 - 3 mm

Nozzle pressure

0.2 - 0.4 MPa (= approx. 2 - 4 bar; 29 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 10%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

only for touch up and spot repair

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	7.8	6.2
dft in µm	100	125

Maximum dft when brushing:

80 µm



# SIGMASHIELD 220 LT

June 2013

### Overcoating table for SigmaShield 220 LT for dft up to 150 µm

with epoxy coatings

with polyurethanes

substrate temperature	-10°C	0°C	5°C	10°C	15°C
minimum interval	36 hours	22 hours	16 hours	10 hours	7 hours
minimum interval	72 hours	48 hours	36 hours	24 hours	16 hours
maximum interval	28 days	28 days	28 days	14 days	10 days

- surface should be dry and free from any contamination
- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Curing

### Curing table for dft up to 150 µm

substrate temperature	dry to handle	full cure	Service - water immersion
-10°C	30 hours	--	10 days
0°C	15 hours	28 days	10 days
5°C	12 hours	14 days	7 days
10°C	6 hours	7 days	5 days
15°C	4 hours	5 days	4 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

5°C	2 hours
10°C	1 hour

### Worldwide availability

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# SIGMASHIELD 220 LT

June 2013

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMASHIELD 220 LT

June 2013

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202660      PDS                      7926  
                 yellow/green      4009002200

# SIGMASHIELD 420

4 pages

August 2012  
Revision of February 2011

<b>Description</b>	two component reinforced high solids polyamine adduct cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– coating for cargo tanks of bulk- or oil carriers and storage tanks</li> <li>– build coat for underwater- and boottop systems</li> <li>– excellent abrasion and impact resistance</li> <li>– outstanding (sea)water resistance</li> <li>– easy to clean</li> </ul>
<b>COLOURS AND GLOSS</b>	grey, redbrown (other colours on request) – gloss
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.6 g/cm <sup>3</sup>
Volume solids	81% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 153 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 239 g/l (approx. 2.0 lb/gal)
Recommended dry film thickness	125 - 200 µm depending on system
Theoretical spreading rate	5.4 m <sup>2</sup> /l for 150 µm 4.1 m <sup>2</sup> /l for 200 µm *
Touch dry after	3 hours at 20 °C
Overcoating interval	min. 10 hours * max. 14 days *
Full cure after	5 days * (data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; (e.g. SigmaCover 280 or SigmaShield 220) dry and free from any contamination</li> <li>– substrate temperature should be at least 5°C and at least 3°C above dew point during application and curing</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheets: 3101, 3102, 3103, 3107</span>
<b>INSTRUCTIONS FOR USE</b>	<p>mixing ratio by volume: base to hardener 75 : 25</p> <ul style="list-style-type: none"> <li>– the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance and slower cure</li> <li>– thinner should be added after mixing the components</li> </ul>
Induction time	none
Pot life	1.5 hour at 20 °C * * see additional data

# SIGMASHIELD 420

August 2012

## AIR SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 5 - 10%, depending on required thickness and application conditions  
 Nozzle orifice 1.7 - 2 mm  
 Nozzle pressure 0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 5% for 200 µm dft,  
 10% for 100 µm dft  
 Nozzle orifice approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)  
 Nozzle pressure 15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.1	5.4	4.6	4.1
dft in µm	100	150	175	200

Maximum dft when brushing: 75 µm

### Overcoating table for SigmaShield 420 for dft up to 150 µm

	substrate temperature	5°C	10°C	20°C	30°C	40°C
with epoxy coatings	minimum interval	14 hours	7 hours	3.5 hours	2 hours	1.5 hour
	maximum interval	28 days	28 days	14 days	7 days	4 days
with polyurethanes	minimum interval	22 hours	14 hours	10 hours	6 hours	4 hours
	maximum interval	28 days	28 days	14 days	7 days	4 days

– surface should be dry and free from chalking and contamination

# SIGMASHIELD 420

August 2012

## Curing

### Curing table for dft up to 150 µm

substrate temperature	dry to handle	full cure	Service - water immersion
5°C	15 hours	17 days	10 days
10°C	8 hours	14 days	7 days
20°C	3.5 hours	7 days	5 days
30°C	2 hours	5 days	4 days
40°C	1.5 hour	3 days	3 days

- for cargo hold application: for full cure for hard angular cargoes, please contact your nearest PPG Protective & Marine Coatings sales office
- adequate ventilation to remove solvent must be maintained during application and curing (please refer to sheets 1433 and 1434)
- should SigmaShield 420 or the total coating system (2 x 125 µm) be applied in excess of the specified dry film thickness, then the time necessary to reach full cure will be increased

### Pot life (at application viscosity)

10 °C	3 hours
20 °C	1.5 hour
30 °C	45 min.

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMASHIELD 420

August 2012

## WARRANTY

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Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.**

The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com).

The English text of this data sheet shall prevail over any translation thereof.

	PDS	7951
190960	grey	5177052200
192367	redbrown	6179052200

# SIGMASHIELD 420 LT

5 pages

June 2013  
Revision of February 2011

<b>Description</b>	two component reinforced high solids polyamine adduct cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- coating for cargo tanks of bulk- or oil carriers and storage tanks</li> <li>- build coat for underwater- and boottop systems</li> <li>- cures at temperatures down to -10°C</li> <li>- excellent abrasion and impact resistance</li> <li>- outstanding (sea)water resistance</li> <li>- easy to clean</li> </ul>
<b>COLOURS AND GLOSS</b>	grey, redbrown (other colours on request) – gloss
<b>BASIC DATA AT 10°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.6 g/cm <sup>3</sup>
Volume solids	81 ± 2%
VOC (Supplied)	max. 123 g/kg (Directive 1999/13/EC, SED) max. 191 g/l (approx. 1.6 lb/gal)
Recommended dry film thickness	125 - 200 µm depending on system
Theoretical spreading rate	5.4 m <sup>2</sup> /l for 150 µm 4.1 m <sup>2</sup> /l for 200 µm
Overcoating interval	min. 10 hours * max. 14 days *
Full cure after	7 days*
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- previous coat; (e.g. SigmaCover 280 (LT) or SigmaShield 220 (LT)) dry and free from ice and any contamination</li> <li>- substrate temperature should be between -10°C up to 15°C during application and curing and at least 3°C above dew point and free from ice and any contamination</li> <li>- during application and curing a substrate temperature down to -10°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases</li> <li>- maximum relative humidity during application and curing is 85%</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheets: 3101, 3102, 3103, 3107</span>



# SIGMASHIELD 420 LT

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 75 : 25

- the temperature of the mixed base and hardener should preferably be above 5°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- thinner should be added after mixing the components

Induction time

none

Pot life

1 hour at 10°C

\* see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

1.7 - 2 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5% for 200 µm dft,  
10% for 100 µm dft

Nozzle orifice

approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)

Nozzle pressure

15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5%

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	8.1	5.4	4.6	4.1
dft in µm	100	150	175	200

Maximum dft when brushing:

75 µm

# SIGMASHIELD 420 LT

June 2013

### Overcoating table for SigmaShield 420 LT for dft up to 150 µm

with epoxy coatings  
with polyurethanes

substrate temperature	-10°C	0°C	5°C	10°C	15°C
minimum interval	48 hours	24 hours	10 hours	5 hours	4 hours
minimum interval	72 hours	48 hours	36 hours	24 hours	16 hours
maximum interval	28 days	28 days	28 days	14 days	10 days

- surface should be dry and free from chalking and contamination

### Curing

### Curing table for dft up to 150 µm

substrate temperature	dry to handle	full cure	Service - water immersion
-10°C	34 hours	--	18 days
0°C	17 hours	28 days	10 days
5°C	12 hours	14 days	7 days
10°C	6 hours	7 days	5 days
15°C	4 hours	5 days	4 days

- for cargo hold application: for full cure for hard angular cargoes, please contact your nearest PPG Protective & Marine Coatings sales office
- adequate ventilation to remove solvent must be maintained during application and curing (please refer to sheets 1433 and 1434)
- should SigmaShield 420 LT or the total coating system be applied in excess of the specified dry film thickness, then the time necessary to reach full cure will be increased

### Pot life (at application viscosity)

5°C	2 hours
10°C	1 hour

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

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# SIGMASHIELD 420 LT

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June 2013

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMASHIELD 420 LT

June 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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	PDS	7955
202661	grey	5177052200
202662	grey	5163052200
202659	redbrown	6179052200

# SIGMASHIELD 460

5 pages

June 2013  
Revision of October 2009

<b>Description</b>	two component high solids glassflake reinforced polyamine adduct epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– excellent abrasion and impact resistance</li> <li>– suitable for use on ice-going vessels</li> <li>– excellent resistance to corrosion</li> <li>– long term protection at areas subject to heavy wear and tear</li> <li>– resistant to splash and spillage of a wide range of chemicals</li> <li>– very low water permeability, due to glassflake barrier</li> </ul>
<b>COLOURS AND GLOSS</b>	black (other (light) colours on request) – gloss
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)
	(data for mixed product)
Mass density	1.5 g/cm <sup>3</sup>
Volume solids	81 ± 2%
VOC (Supplied)	max. 165 g/kg (Directive 1999/13/EC, SED) max. 246 g/l (approx. 2.1 lb/gal)
Recommended dry film thickness	250 - 400 µm depending on system
Theoretical spreading rate	3.2 m <sup>2</sup> /l for 250 µm 2.0 m <sup>2</sup> /l for 400 µm *
Touch dry after	3 hours
Overcoating interval	min. 16 hours * max. 28 days *
Full cure after	5 days *
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm</li> <li>– suitable primer; (e.g. SigmaShield 220 (LT), SigmaCover 280 (LT)) dry and free from any contamination</li> <li>– substrate temperature should be at least 5°C and at least 3°C above dew point during application and curing</li> </ul>

# SIGMASHIELD 460

June 2013

**SYSTEM SPECIFICATION** marine system sheets: 3101, 3102

**INSTRUCTIONS FOR USE** mixing ratio by volume: base to hardener 75 : 25

- the temperature of the mixed base and hardener should preferably be above 15°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- very good mechanical mixing of base and hardener is essential
- thinner should be added after mixing the components
- filters should be removed from spray equipment

Induction time none  
 Pot life 1.5 hour at 20°C \*  
 \* see additional data

**AIR SPRAY**

Recommended thinner Thinner 91-92  
 Volume of thinner 5 - 10%, depending on required thickness and application conditions  
 Nozzle orifice 1.5 - 2 mm  
 Nozzle pressure 0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

**AIRLESS SPRAY**

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 5% for dft of about 400 µm  
 Nozzle orifice approx. 0.53 - 0.79 mm (= 0.021 - 0.031 in)  
 Nozzle pressure 19.0 - 22.5 MPa (= approx. 190 - 225 bar; 2756 - 3263 p.s.i.)

**BRUSH/ROLLER**

Brush application only  
 - only for touch up and spot repair  
 - due to thixotropy it is difficult to obtain a smooth film by brush although this does not affect performance

**CLEANING SOLVENT** Thinner 90-53

**ADDITIONAL DATA**

**Film thickness and spreading rate**

theoretical spreading rate m <sup>2</sup> /l	3.2	2.0
dft in µm	250	400

Maximum dft when brushing: 80 µm

maximum recommended dft for complex structures is 250 µm

# SIGMASHIELD 460

June 2013

### Overcoating table for SigmaShield 460 for dft up to 400 µm

substrate temperature	5°C	10°C	20°C	30°C	40°C
minimum interval	48 hours	32 hours	16 hours	12 hours	8 hours
maximum interval	28 days	28 days	28 days	14 days	7 days

- surface should be dry and free from chalking and contamination

### Curing

### Curing table for dft up to 400 µm

substrate temperature	touch dry	dry to handle	Service - water immersion
5°C	16 hours	30 hours	14 days
10°C	8 hours	16 hours	10 days
20°C	3 hours	8 hours	5 days
30°C	2 hours	5 hours	4 days
40°C	1 hour	3 hours	3 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

10°C	3 hours
20°C	1.5 hour
30°C	45 min.

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

# SIGMASHIELD 460

June 2013

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes



# SIGMASHIELD 460

June 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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191640	PDS black	7952 8000002200
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# SIGMASHIELD 460 LT

5 pages

June 2013  
Revision of October 2009

<b>Description</b>	two component high solids glassflake reinforced polyamine adduct epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>- excellent abrasion and impact resistance</li> <li>- cures at temperatures down to -10°C</li> <li>- long term protection at areas subject to heavy wear and tear</li> <li>- excellent resistance to corrosion</li> <li>- suitable for use on ice-going vessels</li> <li>- very low water permeability, due to glassflake barrier</li> <li>- resistant to splash and spillage of a wide range of chemicals</li> </ul>
<b>COLOURS AND GLOSS</b>	black (other (light) colours on request) – gloss
<b>BASIC DATA AT 10°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.5 g/cm <sup>3</sup>
Volume solids	81 ± 2%
VOC (Supplied)	max. 150 g/kg (Directive 1999/13/EC, SED) max. 224 g/l (approx. 1.9 lb/gal)
Recommended dry film thickness	250 - 400 µm depending on system
Theoretical spreading rate	3.2 m <sup>2</sup> /l for 250 µm 2 m <sup>2</sup> /l for 400 µm
Overcoating interval	min. 16 hours * max. 14 days *
Full cure after	7 days
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>- steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm</li> <li>- suitable primer; (e.g. SigmaShield 220 (LT), SigmaCover 280 (LT)) dry and free from any contamination</li> <li>- substrate temperature should be between -10°C up to 15°C during application and curing and at least 3°C above dew point and free from ice and any contamination</li> <li>- during application and curing a substrate temperature down to -10°C is possible, but curing to hardness takes longer and complete resistance will be reached when temperature increases</li> <li>- maximum relative humidity during application and curing is 85%</li> </ul>
<b>SYSTEM SPECIFICATION</b>	marine <span style="float: right;">system sheets: 3101, 3102</span>

# SIGMASHIELD 460 LT

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 75 : 25

- the temperature of the mixed base and hardener should preferably be above 5°C, otherwise extra solvent may be required to obtain application viscosity
- too much solvent results in reduced sag resistance and slower cure
- very good mechanical mixing of base and hardener is essential
- thinner should be added after mixing the components
- filters should be removed from spray equipment

Induction time

none

Pot life

1 hour at 10°C \*

\*see additional data

## AIR SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

5 - 10%, depending on required thickness and application conditions

Nozzle orifice

1.5 - 2 mm

Nozzle pressure

0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

Thinner 91-92

Volume of thinner

0 - 5% for dft of about 400 µm

Nozzle orifice

approx. 0.53 - 0.79 mm (= 0.021 - 0.031 in)

Nozzle pressure

19.0 - 22.5 MPa (= approx. 190 - 225 bar; 2756 - 3263 p.s.i.)

## BRUSH/ROLLER

Brush application only

- only for touch up and repair
- due to thixotropy it is difficult to obtain a smooth film by brush although this does not affect performance

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	3.2	2.0
dft in µm	250	400

Maximum dft when brushing:

80 µm

# SIGMASHIELD 460 LT

June 2013

### Overcoating table for SigmaShield 460 LT for dft up to 400 µm

substrate temperature	-10°C	0°C	5°C	10°C	15°C
minimum interval	72 hours	36 hours	28 hours	16 hours	12 hours
maximum interval	28 days	28 days	28 days	14 days	7 days

- surface should be dry and free from chalking and contamination

### Curing

### Curing table for dft up to 400 µm

substrate temperature	dry to handle	Service - water immersion
-10°C	72 hours	--
0°C	36 hours	18 days
5°C	28 hours	10 days
10°C	16 hours	7 days
15°C	12 hours	5 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

5°C	2 hours
10°C	1 hour

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

# SIGMASHIELD 460 LT

June 2013

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMASHIELD 460 LT

June 2013

## WARRANTY

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## LIMITATIONS OF LIABILITY

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220252	PDS black	7972 8000002200
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# SIGMASHIELD 610

4 pages

May 2013  
Revision of December 2012

<b>Description</b>	two component amide cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– specialised coating for use under SigmaGlide fouling release system</li> <li>– excellent water resistance</li> <li>– good impact resistance</li> </ul>
<b>COLOURS AND GLOSS</b>	redbrown, blue – eggshell
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.3 g/cm <sup>3</sup>
Volume solids	57 ± 2%
VOC (Supplied)	max. 331 g/kg (Directive 1999/13/EC, SED) max. 437 g/l (approx. 3.6 lb/gal)
Recommended dry film thickness	150 µm
Theoretical spreading rate	3.8 m <sup>2</sup> /l for 150 µm
Touch dry after	2 hours* at 20°C
Overcoating interval	min. 6 hours * max. 5 days *
Full cure after	4 days* at 20°C
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; dry and free from any contamination</li> <li>– substrate temperature should be between 10°C up to 20°C during application and curing and at least 3°C above dew point</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	<p>mixing ratio by volume: base to hardener 80 : 20</p> <ul style="list-style-type: none"> <li>– the temperature of the mixed base and hardener should preferably be above 10°C, otherwise extra solvent may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance</li> <li>– thinner should be added after mixing the components</li> </ul>
Induction time	none
Pot life	4 hours* at 20°C * see additional data
<b>AIR SPRAY</b>	
Recommended thinner	Thinner 91-92
Volume of thinner	0 - 10%, depending on required thickness and application conditions
Nozzle orifice	1.5 - 2 mm
Nozzle pressure	0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

# SIGMASHIELD 610

May 2013

## AIRLESS SPRAY

Recommended thinner Thinner 91-92  
 Volume of thinner 0 - 10%, depending on required thickness and application conditions  
 Nozzle orifice approx. 0.53 - 0.68 mm (= 0.021 - 0.027 in)  
 Nozzle pressure 15 MPa (= approx. 150 bar; 2176 p.s.i.)

## BRUSH/ROLLER

Recommended thinner no extra thinner is necessary,  
 Volume of thinner but up to 5% Thinner 91-92 can be added if desired

## CLEANING SOLVENT

Thinner 90-53

## ADDITIONAL DATA

### Overcoating table for SigmaShield 610 for dft up to 150 µm

with SigmaGlide 790

substrate temperature	10°C	15°C	20°C
minimum interval	16 hours	10 hours	6 hours
maximum interval	7 days	6 days	5 days

– surface should be dry and free from any contamination

## Curing

### Curing table for dft up to 150 µm

substrate temperature	touch dry	dry to handle	full cure
10°C	3 hours	6 hours	7 days
15°C	2 hours	4 hours	5 days
20°C	2 hours	3 hours	4 days

– adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

### Pot life (at application viscosity)

10°C	7 hours
20°C	4 hours

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used



# SIGMASHIELD 610

May 2013

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
PPG Protective & Marine Coatings' General working procedure for application of SigmaGlide	

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMASHIELD 610

May 2013

## WARRANTY

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	PDS	7978
252439	redbrown	6179052200
344004	K redbrown	6137002150
247813	blue	1000002200

# SIGMASHIELD 620

4 pages

January 2013  
Revision of April 2009

<b>Description</b>	two component high solids amine cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– specialised coating for use under SigmaGlide fouling release system</li> <li>– excellent impact resistance</li> <li>– excellent water resistance</li> </ul>
<b>COLOURS AND GLOSS</b>	redbrown, blue – gloss
<b>BASIC DATA AT 20 °C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.6 g/cm <sup>3</sup>
Volume solids	85% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 150 g/kg
VOC (UK PG 6/23(92) appendix 3)	max. 235 g/l (approx. 2.0 lb/gal)
Recommended dry film thickness	150 µm
Theoretical spreading rate	5.7 m <sup>2</sup> /l for 150 µm
Touch dry after	3 hours at 20 °C
Overcoating interval	min. 6 hours * max. 5 days *
	(data for components)
Shelf life (cool and dry place)	at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; dry and free from any contamination</li> <li>– substrate temperature should be at least 20°C and at least 3°C above dew point during application and curing</li> </ul>
<b>INSTRUCTIONS FOR USE</b>	mixing ratio by volume: base to hardener 75 : 25
	<ul style="list-style-type: none"> <li>– the temperature of the mixed base and hardener should preferably be above 20°C, otherwise extra solvent may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance and slower cure</li> <li>– thinner should be added after mixing the components</li> </ul>
Induction time	none
Pot life	1.5 hour at 20 °C * * see additional data
<b>AIRLESS SPRAY</b>	
Recommended thinner	no thinner should be added
Nozzle orifice	approx. 0.53 - 0.68 mm (=0.021 - 0.027 in)
Nozzle pressure	15 MPa (= approx. 150 bar; 2176 p.s.i.)

# SIGMASHIELD 620

January 2013

**BRUSH/ROLLER**

Recommended thinner no thinner should be added

**CLEANING SOLVENT**

Thinner 90-53

**ADDITIONAL DATA**

**Overcoating table for SigmaShield 620 for dft up to 150 µm**

with SigmaGlide 790

substrate temperature	20°C	30°C	40°C
minimum interval	6 hours	4 hours	2 hours
maximum interval	5 days	3 days	2 days

- surface should be dry and free from any contamination

**Curing**

**Curing table for dft up to 150 µm**

substrate temperature	dry to handle	full cure	Service - water immersion
20°C	3.5 hours	7 days	5 days
30°C	2 hours	5 days	4 days
40°C	1.5 hour	3 days	3 days

- adequate ventilation to remove solvent must be maintained during application and curing (please refer to sheets 1433 and 1434)
- for advice please contact your nearest PPG Protective & Marine Coatings sales office

**Pot life (at application viscosity)**

20 °C	1.5 hour
30 °C	45 min.

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

# SIGMASHIELD 620

January 2013

## REFERENCES

Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMASHIELD 620

January 2013

## WARRANTY

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	PDS	7948
252062	redbrown	6179052200
344452	K redbrown	6179052150
256894	blue	1000002200

# SIGMASHIELD 905

5 pages

June 2013  
Revision of March 2011

<b>Description</b>	two component glassflake reinforced solvent-free amine cured epoxy coating
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– suitable for both marine and offshore use</li> <li>– one coat protection for cargo holds with excellent corrosion resistance</li> <li>– excellent abrasion and impact resistance, especially to hard angular cargoes</li> <li>– good resistance to various chemicals</li> <li>– good visibility due to light colour</li> <li>– reduced explosion risk and fire hazard</li> <li>– can be applied by heavy duty single feed airless spray equipment (60:1)</li> <li>– ideal for immersed, non immersed and partially immersed such as splash zones, decks etc.,</li> </ul>
<b>COLOURS AND GLOSS</b>	green – gloss
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal) (data for mixed product)
Mass density	1.3 g/cm <sup>3</sup>
Volume solids	100%
VOC (Supplied)	max. 107 g/kg (Directive 1999/13/EC, SED) max. 141 g/l (approx. 1.2 lb/gal) see information sheet 1411
Recommended dry film thickness	400 - 500 µm
Theoretical spreading rate	2.5 m <sup>2</sup> /l for 400 µm *
Touch dry after	8 hours
Overcoating interval	min. 24 hours * max. 20 days *
Full cure after	5 days *
Shelf life (cool and dry place)	(data for components) at least 12 months * see additional data
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– <b>for cargo holds:</b> <ul style="list-style-type: none"> <li>• steel; blast cleaned to ISO-Sa2½, blasting profile 50 - 100 µm</li> </ul> </li> <li>– <b>for immersed areas:</b> <ul style="list-style-type: none"> <li>• steel; blast cleaned to ISO-Sa2½, blasting profile 50 - 100 µm dry and free from any contamination</li> <li>• coated steel; hydrojetted to VIS WJ2/3 I (Blasting profile 50 - 100 µm)</li> </ul> </li> <li>– substrate temperature must be above 10°C and at least 3°C above dew point during application and curing</li> </ul>
<b>SYSTEM SPECIFICATION</b>	cargo holds <span style="float: right;">system sheet: 3107</span>

# SIGMASHIELD 905

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- when mixing the temperature of the base and hardener should be at least 20°C
- at lower temperature the viscosity will be too high for spray application
- no thinner should be added

Induction time

none

Pot life

1 hour at 20°C\*

\* see additional data

## AIRLESS SPRAY

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.53 mm (=0.021 in)

Nozzle pressure

at 20°C (paint temperature) min. 28 MPa (= approx. 280 bar; 4061 p.s.i.)

at 30°C (paint temperature) min. 22 MPa (= approx. 220 bar; 3000 p.s.i.)

- heavy duty single feed airless spray equipment preferably 60:1 pump ratio and suitable high pressure hoses
- in-line heating or insulated hoses may necessary to avoid cooling down of paint in hoses at low air temperature
- application with 45: 1 spray equipment possible provided in-line heated high pressure hoses are used
- in case of using 45: 1 airless spray equipment the paint must be heated to approx. 30°C in order to obtain the right application viscosity
- length of hoses should be as short as possible

## BRUSH/ROLLER

Recommended thinner

for stripe coating and spot repair only

no thinner should be added

## CLEANING SOLVENT

Thinner 90-83 (preferred) or Thinner 90-53

- all application equipment must be cleaned immediately after use
- paint inside the spraying equipment must be removed before the pot life time has been expired



# SIGMASHIELD 905

June 2013

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	2.5	2.0
dft in µm	400	500

Maximum dft when brushing: 150 - 200 µm

### measuring wet film thickness

- a deviation is often obtained between the measured apparent wft and the real applied wft
- this is due to the thixotropy and the surface tension of the paint which retards the release of air trapped in the paint film for some time
- recommendation is to apply a wft which is equal to the specified dft plus 60 µm

### maximum dry film thickness

- because of low initial hardness the dft cannot be measured within some days due to the penetration of the measuring device into the paint film
- the dft should be measured using a calibration foil of known thickness placed in between the coating and the measuring device

### Overcoating table for SigmaShield 905 for dft up to 500 µm

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	36 hours	24 hours	16 hours	12 hours
maximum interval	20 days	20 days	14 days	7 days

- surface should be dry and free from any contamination

### Curing table

substrate temperature	dry to handle	full cure
5°C	60 hours	15 days
10°C	30 hours	7 days
20°C	16 hours	5 days
30°C	10 hours	3 days
40°C	8 hours	2 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

# SIGMASHIELD 905

June 2013

## Pot life (at application viscosity)

20°C	60 min.
30°C	45 min.
40°C	25 min.

- due to exothermic reaction, temperature during and after mixing may increase

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes
  - ventilation should be provided in confined spaces to maintain good visibility

# SIGMASHIELD 905

June 2013

## WARRANTY

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190476	PDS green	7954 4000002200
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# SIGMASHIELD 1090

(SigmaCover Armour Compound)



5 pages

November 2012  
Revision of February 2010

**Description** two component ultra high build flint reinforced solvent free polyamine cured, epoxy compound

**PRINCIPAL CHARACTERISTICS**

- seamless water impermeable layer with excellent anticorrosive properties
- suitable for the protection of steel and concrete
- excellent resistance against impact and wear
- excellent adhesion under dry and wet exposure conditions
- resistant to water and splash of mild chemicals
- can be exposed to water within 30 minutes after application
- texture of surface is rough
- suitable for decks exposed to heavy impact and abrasion

**COLOURS AND GLOSS** white (other colours on request) – flat

**BASIC DATA AT 20 °C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	2.0 g/cm <sup>3</sup>
Volume solids	100%
VOC (Directive 1999/13/EC, SED)	max. 35 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 68 g/l (approx. 0.6 lb/gal)
	*See information sheet 1411
Recommended dry film thickness	3 - 5 mm
Theoretical spreading rate	0.2 m <sup>2</sup> /l for 5000 µm (=approx. 10kg/m <sup>2</sup> ) 0.3 m <sup>2</sup> /l for 3000 µm (=approx. 6 kg/m <sup>2</sup> )
Touch dry after	6 - 8 hours at 20 °C

Overcoating interval	min. 4 days * max. 30 days *
Full cure after	7 days * at 20 °C

(data for components)

Shelf life (cool and dry place)	at least 6 months * see additional data
---------------------------------	--

**RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**

- steel; blast cleaned to ISO-Sa2½, blasting profile 75 - 100 µm
- concrete; free from laitance by blast cleaning
- moisture content of concrete should be max. 4%
- substrate temperature should be above 5°C and at least 3°C above dew point

**SIGMASHIELD 1090**  
(SigmaCover Armour Compound)

November 2012

**INSTRUCTIONS FOR USE**

mixing ratio by volume: base to hardener 90.4 : 9.6

- not prepare more material than can be used within 30 minutes
- the temperature of the mixed base and hardener when mixing the components should be approx. 20°C
- use always mechanical mixing equipment
- add the hardener while stirring the base
- mix thoroughly and quickly until a homogeneous material is obtained

Induction time

none

Pot life

30 minutes at 20 °C \*

\*see additional data

**CLEANING SOLVENT**

Thinner 90-83 (preferred) or Thinner 90-53

- all application equipment must be cleaned immediately after use
- insert a cellulose sponge into the hose inlet and force through with Thinner 90-53, repeat if necessary

**ADDITIONAL DATA**

**Overcoating table for SigmaShield 1090 for dft up to 4 mm**

with SigmaDur 520, SigmaDur 550

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	7 days	4 days	1 day	1 day
maximum interval	30 days	30 days	30 days	30 days

with solventfree epoxies

minimum interval	1 day or immediately wet on wet			
maximum interval	30 days	30 days	30 days	30 days

- surface should be dry and free from any contamination

**Curing**

**Curing table**

substrate temperature	touch dry	dry to handle	full cure
10°C	10 - 12 hours	48 hours	12 days
20°C	6 - 8 hours	24 hours	7 days
30°C	4 - 6 hours	16 hours	4 days
40°C	4 - 4 hours	12 hours	3 days

- adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

**SIGMASHIELD 1090**  
(SigmaCover Armour Compound)

November 2012

**Pot life (at application viscosity)**

20 °C	30 min.
30 °C	15 min.

**APPLICATION**

- A sprayable polymer mortar is a heavy material which has to be transported from the container with mixed material to the mortar spray gun or airless spray gun.
- So preferably 3/4 - 1 inch hoses should be used (for the airless spraying, just before the spraygun 5/8 inch).
- Care should be taken that hoses are of sufficiently large diameter, are as short as possible and that no obstructions are present; otherwise the binder will be pressed out of the mortar leaving dry (untransportable) material behind.

**APPLICATION BY  
TROWEL\$TOUCH UP**

- SigmaShield 1090 can be applied and compacted by trowels
- damaged areas should be reblasted and repaired with SigmaShield 1090 by means of filling knives
  - porosity, blow holes and crevices in concrete should be filled with SigmaShield 1090 by hand (trowel/filling knife)
  - larger areas can be resprayed with a beaker spray unit (e.g. Putzmeister) suitable for spraying materials like coarse filled mortars

other application methods may be possible, please contact the nearest PPG Protective & Marine Coatings sales office

**APPLICATION WITH LOW  
PRESSURE PUMP**

Orifice  
Pressure

**equipment such as type "Swinger Pump" Fizom A112 tech spray systems U.S.A.**

approx. 6.5 - 10 mm preferably with internal mix atomisation  
0.4 - 0.6 MPa (= approx. 4 - 6 bar; 58 - 87 p.s.i.)

**APPLICATION BY PRESSURE  
VESSEL**

Orifice  
Pressure

- pressure vessel with bottom outlet and pressure lid
  - vessel should not contain more than 25 litres
  - before use vessel and hoses have to be wetted with white spirit
  - hoses (diameter 25 mm = approx. 1 inch) not longer than 7 metres. preferably in two lengths of 3.5 metres.
  - at low temperature hoses have to be insulated
- approx. 6.5 - 10 mm preferably with internal mix atomisation  
0.4 - 0.6 MPa (= approx. 4 - 6 bar; 58 - 87 p.s.i.)

**APPLICATION BY  
DISPLACEMENT FEED PUMP**

Orifice  
Pressure

**equipment such as "quick spray" carousel pump and spraying equipment (Quickspray inc. Port Clinton, Ohio, U.S.A.)**  
approx. 4 - 5 mm  
0.4 - 0.6 MPa (= approx. 4 - 6 bar; 58 - 87 p.s.i.)

# SIGMASHIELD 1090

(SigmaCover Armour Compound)

November 2012

## Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.  
Under these circumstances an alternative product data sheet is used.

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Surface preparation of concrete (floors)	see information sheet 1496
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes
  - ventilation should be provided in confined spaces to maintain good visibility
- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets

# SIGMASHIELD 1090

(SigmaCover Armour Compound)

November 2012

## WARRANTY

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## LIMITATIONS OF LIABILITY

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140425	PDS white	7490 7001002120
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# SIGMASHIELD 1200

5 pages

June 2013  
Revision of October 2009

## Description

two component abrasion resistant solvent free amine cured phenolic epoxy coating

## PRINCIPAL CHARACTERISTICS

- single coat system designed for under water hull of ice going and ice breaking vessels
- recognised by Lloyd's register as an abrasion resistant ice coating
- excellent abrasion and impact resistance
- resistant to well designed cathodic protection
- low co-efficient of friction
- suitable for new construction or maintenance/repair
- also suitable for tanks and other structures requiring abrasion resistance
- excellent resistance to crude oil up to 90°C
- excellent water resistance
- good chemical resistance against a wide range of chemicals and solvents
- can be applied by heavy duty single feed airless spray equipment (60:1)
- reduced explosion risk and fire hazard

## COLOURS AND GLOSS

light grey, dark grey, brown (other colours on request) – gloss

## BASIC DATA AT 20°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density	1.5 g/cm <sup>3</sup>
Volume solids	100%
VOC (Supplied)	max. 97 g/kg (Directive 1999/13/EC, SED) max. 143 g/l (approx. 1.2 lb/gal) see information sheet 1411
Recommended dry film thickness	400 - 500 µm
Theoretical spreading rate	2.5 m <sup>2</sup> /l for 400 µm 2 m <sup>2</sup> /l for 500 µm *
Touch dry after	6 hours
Overcoating interval	min. 24 hours * max. 2 months *
Full cure after	5 days *

(data for components)

Shelf life (cool and dry place)

at least 12 months  
\* see additional data

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- steel; blast cleaned to a minimum of ISO-Sa2½, blasting profile 50 - 100 µm
- substrate temperature should be above 10°C and at least 3°C above dew point during application and curing

# SIGMASHIELD 1200

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- when mixing the temperature of the base and hardener should be at least 20°C
- no thinner should be added
- at lower temperature the viscosity will be too high for spray application

Induction time

none

Pot life

1 hour at 20°C \*

\* see additional data

## AIRLESS SPRAY

heavy duty single feed airless spray equipment with a minimum of 60 : 1 pump ratio and suitable high pressure hoses

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.53 mm (=0.021 in)

Nozzle pressure

at 20°C (paint temperature) min. 28 MPa (= approx. 280 bar; 4061 p.s.i.)

at 30°C (paint temperature) min. 22MPa(= approx.220bar; 3000 p.s.i.)

## BRUSH/ROLLER

for stripe coating and spot repair only

Recommended thinner

no thinner should be added

## CLEANING SOLVENT

Thinner 90-83 (preferred) or Thinner 90-53

- all application equipment must be cleaned immediately after use
- paint inside the spraying equipment must be removed before the pot life time has been expired

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	2.5	2.0
dft in µm	400	500

# SIGMASHIELD 1200

June 2013

### Overcoating table for SigmaShield 1200 for dft up to 500 µm

	substrate temperature	10°C	20°C	30°C
with itself	minimum interval	36 hours	24 hours	16 hours
	Max interval when <b>not</b> exposed to direct sunshine maximum interval	3 months	2 months	1 month
	with itself and SigmaCover 525 and SigmaCover 456	Max interval when exposed to direct sunshine maximum interval	22 days	14 days
with SigmaDur 550	Max interval when exposed to direct sunshine maximum interval	14 days	7 days	4 days

- surface should be dry and free from any contamination

### Curing

#### Curing table for dft up to 500 µm

substrate temperature	dry to handle	full cure
10°C	30 hours	7 days
20°C	16 hours	5 days
30°C	10 hours	3 days

- although the paint is solvent free adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434)

#### Pot life (at application viscosity)

20°C	60 min.
30°C	45 min.

- due to exothermic reaction, temperature during and after mixing may increase

### Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

# SIGMASHIELD 1200

June 2013

## REFERENCES

Conversion tables	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes
- ventilation should be provided in confined spaces to maintain good visibility

# SIGMASHIELD 1200

June 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

195822	PDS lightgrey	7744 5177052200
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# SIGMASHIELD 1200 LT

5 pages

August 2012  
Revision of October 2009

**Description** two component abrasion resistant solvent free amine cured phenolic epoxy coating

**PRINCIPAL CHARACTERISTICS**

- single coat system designed for under water hull of ice going and ice breaking vessels
- recognised by Lloyd's register as an abrasion resistant ice coating
- excellent abrasion and impact resistance
- resistant to well designed cathodic protection
- low co-efficient of friction
- suitable for new construction or maintenance/repair
- also suitable for tanks and other structures requiring abrasion resistance
- excellent resistance to crude oil up to 90°C
- excellent water resistance
- good chemical resistance against a wide range of chemicals and solvents
- can be applied by heavy duty single feed airless spray equipment (60:1)
- cures at temperatures down to +5°C
- reduced explosion risk and fire hazard

**COLOURS AND GLOSS** black – gloss

**BASIC DATA AT 10 °C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.5 g/cm <sup>3</sup>
Volume solids	100%
VOC (Directive 1999/13/EC, SED)	max. 92 g/kg
VOC (UK PG 6/23(92) appendix 3)	max. 136 g/l (approx. 1.1 lb/gal)
Recommended dry film thickness	400 - 500 µm
Theoretical spreading rate	2.5 m <sup>2</sup> /l for 400 µm 2 m <sup>2</sup> /l for 500 µm *
Touch dry after	8 hours at 10 °C
Overcoating interval	min. 24 hours * max. 22 days *
Full cure after	5 days * at 10 °C

(data for components)

Shelf life (cool and dry place) at least 12 months  
\* see additional data

**RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**

- steel; blast cleaned to a minimum of ISO-Sa2½, blasting profile 50 - 100 µm
- substrate temperature should be above 5°C and at least 3°C above dew point during application and curing
- dry and free from any contamination

# SIGMASHIELD 1200 LT

August 2012

## INSTRUCTIONS FOR USE

mixing ratio by volume: base to hardener 80 : 20

- when mixing the temperature of the base and hardener should be at least 20°C
- at lower temperature the viscosity will be too high for spray application
- no thinner should be added

Induction time

none

Pot life

30 minutes at 20 °C \*

\* see additional data

## AIRLESS SPRAY

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.53 mm (=0.021 in)

Nozzle pressure

at 20°C (paint temperature) min. 28 MPa (= approx. 280 bar; 4061 p.s.i.)

at 30°C (paint temperature) min. 22 MPa (= approx. 220 bar; 3000 p.s.i.)

- twin feed hot airless spray
- heavy duty single feed airless spray equipment with a minimum of (60:1) pump ratio and suitable high pressure hoses
- in-line heating or insulated hoses may necessary to avoid cooling down of paint in hoses at low air temperature
- length of hoses should be as short as possible

## BRUSH/ROLLER

Recommended thinner

for stripe coating and spot repair only

no thinner should be added

## CLEANING SOLVENT

Thinner 90-83 (preferred) or Thinner 90-53

- all application equipment must be cleaned immediately after use
- paint inside the spraying equipment must be removed before the pot life time has been expired

## ADDITIONAL DATA

### Film thickness and spreading rate

theoretical spreading rate m <sup>2</sup> /l	2.5	2
dft in µm	400	500

Maximum dft when brushing:

150 µm

### measuring wet film thickness

- a deviation is often obtained between the measured apparent wft and the real applied wft
- this is due to the thixotropy and the surface tension of the paint which retards the release of air trapped in the paint film for some time
- recommendation is to apply a wft which is equal to the specified dft plus 60 µm

# SIGMASHIELD 1200 LT

August 2012

### measuring dry film thickness

- because of low initial hardness the dft cannot be measured for some days (depending on ambient temperature) after application due to the penetration of the measuring device into the paint film
- the dft should be measured using a calibration foil of known thickness placed in between the coating and the measuring device

### Overcoating table for SigmaShield 1200 LT for dft up to 500 µm

	substrate temperature	5°C	10°C	20°C	30°C
	minimum interval	36 hours	24 hours	12 hours	6 hours
with itself	Max interval when <b>not</b> exposed to direct sunshine	22 days	22 days	14 days	10 days
with itself, SigmaCover 525 and SigmaCover 456	Max interval when exposed to direct sunshine	14 days	14 days	7 days	5 days

- surface should be dry and free from any contamination

### Curing

#### Curing table for dft up to 500 µm

substrate temperature	dry to handle	full cure
5°C	48 hours	12 days
10°C	24 hours	5 days
20°C	12 hours	3 days
30°C	6 hours	2 days

- although the paint is solvent free adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434)

#### Pot life (at application viscosity)

20 °C	30 min.
30 °C	20 min.

- due to exothermic reaction, temperature during and after mixing may increase

### Worldwide availability

Whilst it is always the aim of Sigma Coatings to supply the same product on a worldwide basis, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances.

Under these circumstances an alternative product data sheet is used.



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# SIGMASHIELD 1200 LT

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August 2012

**REFERENCES**

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

**SAFETY PRECAUTIONS**

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- although this is a solvent free paint, care should be taken to avoid inhalation of spray mist as well as contact between the wet paint and exposed skin or eyes
- ventilation should be provided in confined spaces to maintain good visibility

# SIGMASHIELD 1200 LT

August 2012

## WARRANTY

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241652	PDS black	7746 8000002200
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# SIGMATHERM 175

3 pages

May 2013  
Revision of October 2009

<b>Description</b>	heat resistant modified alkyd aluminium finish	
<b>PRINCIPAL CHARACTERISTICS</b>	<ul style="list-style-type: none"> <li>– heat resistant up to 175°C</li> <li>– high brilliancy</li> <li>– spray application improves the appearance</li> <li>– a minimum drying time of 3 days at 20°C should be allowed before exposure to heat</li> </ul>	
<b>COLOURS AND GLOSS</b>	aluminium – gloss	
<b>BASIC DATA AT 20°C</b>	(1 g/cm <sup>3</sup> = 8.35 lb/US gal; 1 m <sup>2</sup> /l = 40.7 ft <sup>2</sup> /US gal)	
Mass density	1.0 g/cm <sup>3</sup>	
Volume solids	47 ± 2%	
VOC (Supplied)	max. 411 g/kg (Directive 1999/13/EC, SED) max. 417 g/l (approx. 3.5 lb/gal)	
Recommended dry film thickness	25 µm per coat	
Theoretical spreading rate	18.8 m <sup>2</sup> /l for 25 µm	
Touch dry after	3 hours at 5 - 10°C 1 hour at 20°C	
Overcoating interval	min. 36 hours at 5 - 10°C, 16 hours at 20°C max. unlimited	
Shelf life (cool and dry place)	at least 12 months, longer storage period may affect the brilliancy	
<b>RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES</b>	<ul style="list-style-type: none"> <li>– previous coat; (e.g. Sigmarine 24) dry and free from any contamination</li> <li>– substrate temperature should be at least 3°C above dew point</li> </ul>	
<b>SYSTEM SPECIFICATION</b>	for heat resistant systems	system sheet: 3140
<b>INSTRUCTIONS FOR USE</b>	<ul style="list-style-type: none"> <li>– stir well before use</li> <li>– the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity</li> <li>– too much solvent results in reduced sag resistance</li> <li>– adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)</li> </ul>	
<b>AIR SPRAY</b>		
Recommended thinner	Thinner 20-05	
Volume of thinner	0 - 3%, depending on required thickness and application conditions	
Nozzle orifice	1.8 - 2 mm	
Nozzle pressure	0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)	
<b>AIRLESS SPRAY</b>		
Recommended thinner	no thinner should be added	
Nozzle orifice	approx. 0.33 - 0.38 mm (= 0.013 - 0.015 in)	
Nozzle pressure	12 - 15 MPa (= approx. 120 - 150 bar; 1740 - 2176 p.s.i.)	

# SIGMATHERM 175

May 2013

## BRUSH/ROLLER

Recommended thinner no thinner should be added

## CLEANING SOLVENT

Thinner 20-05

## Worldwide availability

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMATHERM 175

May 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

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136663	PDS aluminium	7260 9000002200
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# SIGMATHERM 500

3 pages

February 2013  
Revision of October 2009

**Description** heat resistant modified alkyd aluminium coating

- PRINCIPAL CHARACTERISTICS**
- to be used for the internal and external protection of steel surfaces
  - heat resistant up to 500°C; a minimum of 200°C is necessary to fuse the aluminium coating
  - a minimum drying time of 3 days at 20°C should be allowed before exposure to heat
  - application by spray improves the appearance

**COLOURS AND GLOSS** aluminium – eggshell

**BASIC DATA AT 20 °C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

Mass density	1.1 g/cm <sup>3</sup>
Volume solids	32% ± 2%
VOC (Directive 1999/13/EC, SED)	max. 561 g/kg (Directive 1999/13/EC, SED)
VOC (UK PG 6/23(92) appendix 3)	max. 600 g/l (approx. 5.0 lb/gal) (UK PG 6/23(92) Appendix 3)
Recommended dry film thickness	25 µm
Theoretical spreading rate	12.8 m <sup>2</sup> /l for 25 µm
Touch dry after	3 hours at 5- 10°C 1 hour at 20 °C
Overcoating interval	min. 48 hours at 5 - 10°C, 24 hours at 20°C max. no limitations
Shelf life (cool and dry place)	at least 12 months, longer storage period may affect the brilliancy

**RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES**

- steel; blast cleaned to ISO-Sa2½ or ISO-Sa3, blasting profile 40 - 70 µm

**SYSTEM SPECIFICATION** for heat resistant systems system sheet: 3140

- INSTRUCTIONS FOR USE**
- stir well before use
  - the temperature of the paint should preferably be above 15°C, otherwise extra thinner may be required to obtain application viscosity
  - too much solvent results in reduced sag resistance
  - adequate ventilation must be maintained during application and curing (please refer to sheets 1433 and 1434)

**AIR SPRAY**

Recommended thinner	no thinner should be added
Nozzle orifice	2 - 3 mm
Nozzle pressure	0.3 - 0.4 MPa (= approx. 3 - 4 bar; 44 - 58 p.s.i.)

# SIGMATHERM 500

February 2013

## AIRLESS SPRAY

Recommended thinner	no thinner should be added
Nozzle orifice	approx. 0.38 mm (= 0.015 in)
Nozzle pressure	8 - 12 MPa (= approx. 80 - 120 bar; 1160 - 1740 p.s.i.)

## BRUSH/ROLLER

Recommended thinner	no thinner should be added
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## CLEANING SOLVENT

Thinner 20-05

## Worldwide availability

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## REFERENCES

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Explosion hazard - toxic hazard	see information sheet 1431
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMATHERM 500

February 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

**IN NO EVENT WILL PPG BE LIABLE UNDER ANY THEORY OF RECOVERY (WHETHER BASED ON NEGLIGENCE OF ANY KIND, STRICT LIABILITY OR TORT) FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO, ARISING FROM, OR RESULTING FROM ANY USE MADE OF THE PRODUCT.** The information in this sheet is intended for guidance only and is based upon laboratory tests that PPG believes to be reliable. PPG may modify the information contained herein at any time as a result of practical experience and continuous product development. All recommendations or suggestions relating to the use of the PPG product, whether in technical documentation, or in response to a specific inquiry, or otherwise, are based on data, which to the best of PPG's knowledge, is reliable. The product and related information is designed for users having the requisite knowledge and industrial skills in the industry and it is the end-user's responsibility to determine the suitability of the product for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. PPG has no control over either the quality or condition of the substrate, or the many factors affecting the use and application of the product. Therefore, PPG does not accept any liability arising from any loss, injury or damage resulting from such use or the contents of this information (unless there are written agreements stating otherwise). Variations in the application environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results. This sheet supersedes all previous versions and it is the Buyer's responsibility to ensure that this information is current prior to using the product. Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

136661	PDS aluminium	7261 9000002200
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# SIGMAWELD 165

5 pages

May 2013  
Revision of December 2009

## Description

two component moisture curing, zinc (ethyl) silicate prefabrication primer

## PRINCIPAL CHARACTERISTICS

- suitable for automatic application on shot blasted steel plates
- fast drying properties
- good cutting and excellent welding properties, including MIG/MAG welding in various positions (either automatic or manual welding)
- provides corrosion protection up to 9 months, when applied at a dft of 13 µm (depending on exposure conditions and blasting profile)
- can be used as a first coat in various paint systems
- suitable for sea water immersion in combination with controlled cathodic protection systems
- excellent thermal stability minimizes heat damage during hot work procedures
- no adherence of weldspatter at surrounding primed surface
- approved by Lloyd's Register of Shipping for use as prefabrication primer (see sheet 1880)

## COLOURS AND GLOSS

grey, reddish grey – flat

## BASIC DATA AT 20°C

(1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)

(data for mixed product)

Mass density	1.4 g/cm <sup>3</sup>
Volume solids	30 ± 2%
VOC (Supplied)	max. 428 g/kg (Directive 1999/13/EC, SED) max. 645 g/l (approx. 5.4 lb/gal)
Recommended dry film thickness	13 µm - see further: "Recommended substrate conditions and temperatures"
Theoretical spreading rate	20 m <sup>2</sup> /l for 13 µm
Touch dry after	6 min. at substrate temperature of 20°C 3 min. at a substrate temperature of 40°C
Overcoating interval	min. 3 days max. 9 months longer overcoating intervals can be permitted when primer is still in sound condition
Shelf life (cool and dry place)	(data for components) binder: at least 9 months paste: at least 12 months

# SIGMAWELD 165

May 2013

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- on steel blasted to above profile, the recommended dft, 13 µm, corresponds to 15 µm as measured on a smooth test panel
- minimum thickness for a closed film is 13 µm measured on a smooth test panel
- substrate temperature may be up to max. 50°C
- for automatic application a substrate temperature of 30°C is recommended
- depending on exact substrate temperature and actual condition on site a different thinner may be required
- substrate temperature at least 3°C above dew point
- relative humidity during curing should be above 50% and below 85%
- dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)

**SYSTEM SPECIFICATION**

primers

system sheet: 3015

**SECONDARY SURFACE  
PREPARATION**

- during storage and construction, contamination of the prefabrication primer should be limited
- after fabrication, surface defects should be treated according to the scheme below
- where two possible surface treatments are indicated, the choice of treatment is dependent on the location and on the system to be applied (see system sheets)
- the preferred pretreatment for optimal results is shown; other possibilities are indicated in brackets

areas	immersed conditions	atmospheric conditions
contamination	to be removed or ISO 8501-3 grade P2	to be removed
weldseams	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Pt2
burned	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Ss (SPSS-Pt2)
damaged corroded	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Ss (SPSS-Pt2)
white rust	SPSS-ID Pt2 (SCAP*) or ISO 8501-3 grade P2	SPSS-ID Pt1 (SCAP*)

\* cleaning by silicon carbide impregnated abrasive pad  
 Dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3).  
 Note that the back of welded plate may show discoloration (especially on plate where fillets have been welded on), this is not to be confused with burned areas and does not require special treatment.  
 Burned through areas may be present (this happens especially when welding thin steel) and these should then be treated as per 'burned areas' above.

## SIGMAWELD 165

May 2013

**INSTRUCTIONS FOR USE**

mixing ratio by volume: binder to paste 55 : 45

- the temperature of the mixture of binder and paste should preferably be above 15°C
  - stir the paste thoroughly before adding the binder
  - add gradually one third of the binder to the pigment paste
  - stir thoroughly till homogeneous
  - add remaining binder and continue stirring until the mixture is homogeneous
  - strain mixture through a 30 - 60 mesh screen
  - mixed paint is ready for use
  - some addition of thinner (Thinner 90-53) might be necessary depending on routing, line speed and steel temperature
  - agitate continuously during application
- Pot life 24 hours at 20°C

**AIR SPRAY**

Recommended thinner

Thinner 90-53

Volume of thinner

0 - 35%, depending on required thickness and application conditions

Nozzle orifice

1 - 1.5 mm

Nozzle pressure

0.3 MPa (= approx. 3 bar; 44 p.s.i.)

**AIRLESS SPRAY**

Recommended thinner

Thinner 90-53

Volume of thinner

0 - 35%, depending on required thickness and application conditions

Nozzle orifice

approx. 0.49 - 0.64 mm (= 0.019 - 0.025 in)

Nozzle pressure

8 - 12 MPa (= approx. 80 - 120 bar; 1160 - 1740 p.s.i.)

Note: Depending on exact application conditions a different thinner may be required to ensure optimal application properties. Consult the PPG Protective & Marine Coatings representative in your area when required.

**CLEANING SOLVENT**

- recommended Thinner 90-53

**Worldwide availability**

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used

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# SIGMAWELD 165

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May 2013

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAWELD 165

May 2013

## WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

## LIMITATIONS OF LIABILITY

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	PDS	7171
244462	grey	0000002180
179169	reddish grey	5010002180

# SIGMAWELD 190

5 pages

May 2013  
Revision of October 2009

**Description** two component moisture curing, low zinc (ethyl) silicate prefabrication primer

- PRINCIPAL CHARACTERISTICS**
- suitable for automatic application on shot blasted steel plates
  - fast drying properties
  - good cutting and excellent welding properties, including MIG/MAG welding in various positions (either automatic or manual welding)
  - provides regular, smooth weld seams
  - low fume release during welding and cutting
  - no adherence of weldspatter at surrounding primed surface
  - excellent thermal stability minimizes heat damage during hot work procedures
  - can be used as a first coat in various paint systems
  - suitable for sea water immersion in combination with controlled cathodic protection systems
  - approved by Lloyd's Register of Shipping for use as prefabrication primer (see sheet 1880)

**COLOURS AND GLOSS** redbrown (grey on request) – flat

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.2 g/cm <sup>3</sup>
Volume solids	25% ± 2%
VOC (Supplied)	max. 552 g/kg (Directive 1999/13/EC, SED) max. 680 g/l (approx. 5.7 lb/gal)
Recommended dry film thickness	18 µm - see further: "Recommended substrate conditions and temperatures"
Theoretical spreading rate	11.4 m <sup>2</sup> /l for 18 µm
Touch dry after	6 min. at substrate temperature of 20°C 3 min. at substrate temperature of 40°C
Overcoating interval	min. 3 days max. 6 months longer overcoating intervals can be permitted when primer is still in sound condition
Shelf life (cool and dry place)	(data for components) binder: at least 9 months paste: at least 12 months

# SIGMAWELD 190

May 2013

**RECOMMENDED  
SUBSTRATE CONDITIONS  
AND TEMPERATURES**

- steel; shot blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
- on steel blasted to above profile, the recommended dft, 18 µm, corresponds to 22 µm as measured on a smooth test panel
- minimum thickness for a closed film is 15 µm measured on a smooth test panel
- substrate temperature may be up to max. 35°C
- for automatic application a substrate temperature of 30°C is recommended
- substrate temperature should be at least 3°C above dew point
- relative humidity during curing should be above 50% and below 85%
- dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)

**SYSTEM SPECIFICATION**

primers system sheet: 3015

**SECONDARY SURFACE  
PREPARATION**

- during storage and construction, contamination of the prefabrication primer should be limited
- after fabrication, surface defects should be treated according to the scheme below
- where two possible surface treatments are indicated, the choice of treatment is dependent on the location and on the system to be applied (see system sheets)
- the preferred pretreatment for optimal results is shown; other possibilities are indicated in brackets

areas	immersed conditions	atmospheric conditions
contamination	to be removed or ISO 8501-3 grade P2	to be removed
weldseams	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Pt2
burned	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Ss (SPSS-Pt2)
damaged corroded	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Ss (SPSS-Pt2)
white rust	SPSS-ID Pt2 (SCAP*) or ISO 8501-3 grade P2	SPSS-ID Pt1 (SCAP *)

\* cleaning by silicon carbide impregnated abrasive pad

Dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3).

Note that the back of welded plate may show discoloration (especially on plate where fillets have been welded on), this is not to be confused with burned areas and does not require special treatment.

Burned through areas may be present (this happens especially when welding thin steel) and these should then be treated as per 'burned areas' above.

## SIGMAWELD 190

May 2013

**INSTRUCTIONS FOR USE**

mixing ratio by volume: binder to paste 66.7 : 33.3

- the temperature of the mixture of binder and paste should preferably be above 15°C
- stir the paste thoroughly before adding the binder
- add gradually one third of the binder to the pigment paste
- stir thoroughly till homogeneous
- add remaining binder and continue stirring until the mixture is homogeneous
- strain mixture through a 30 - 60 mesh screen
- mixed paint is ready for use
- some addition of thinner (Thinner 90-53) might be necessary depending on routing, line speed and steel temperature
- agitate continuously during application
- 

Pot life

24 hours at 20 °C

**AIR SPRAY**

Recommended thinner

no thinner should be added

Nozzle orifice

1 - 1.5 mm

Nozzle pressure

0.3 MPa (= approx. 3 bar; 44 p.s.i.)

**AIRLESS SPRAY**

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.43 - 0.53 mm (= 0.017 - 0.021 in)

Nozzle pressure

8 - 12 MPa (= approx. 80 - 120 bar; 1160 - 1740 p.s.i.)

**CLEANING SOLVENT**

recommended Thinner 90-53

**Worldwide availability**

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# SIGMAWELD 190

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May 2013

## REFERENCES

Conversion labels	see information sheet 1410
Explanation to product data sheets	see information sheet 1411
Safety indications	see information sheet 1430
Safety in confined spaces and health safety	
Explosion hazard - toxic hazard	see information sheet 1431
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAWELD 190

May 2013

## WARRANTY

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	PDS	7167
179171	redbrown	2008002180
179172	grey	5000002180

# SIGMAWELD 199

4 pages

June 2013  
Revision of October 2009

**Description** two component moisture curing, low zinc (ethyl) silicate prefabrication primer

**PRINCIPAL CHARACTERISTICS**

- suitable for automatic application on shot blasted steel plates
- fast drying properties
- good cutting and excellent welding properties, including MIG/MAG welding in various positions (either automatic or manual welding)
- provides regular, smooth weld seams
- low fume release during welding and cutting
- no adherence of weldspatter at surrounding primed surface
- excellent thermal stability minimizes heat damage during hot work procedures
- can be used as a first coat in various paint systems
- suitable for sea water immersion in combination with controlled cathodic protection systems
- approved by Lloyd's Register of Shipping for use as prefabrication primer (see sheet 1880)

**COLOURS AND GLOSS** redbrown (grey on request) – flat

**BASIC DATA AT 20°C** (1 g/cm<sup>3</sup> = 8.35 lb/US gal; 1 m<sup>2</sup>/l = 40.7 ft<sup>2</sup>/US gal)  
(data for mixed product)

Mass density	1.3 g/cm <sup>3</sup>
Volume solids	25 ± 2%
VOC (Supplied)	max. 521 g/kg (Directive 1999/13/EC, SED) max. 676 g/l (approx. 5.6 lb/gal)
Recommended dry film thickness	18 µm - see further: "Recommended substrate conditions and temperatures"
Theoretical spreading rate	11.4 m <sup>2</sup> /l for 18 µm
Touch dry after	6 min. at substrate temperature of 20°C 3 min. at substrate temperature of 40°C
Overcoating interval	min. 3 days max. 6 months longer overcoating intervals can be permitted when primer is still in sound condition
Shelf life (cool and dry place)	(data for components) binder: at least 9 months paste: at least 12 months

# SIGMAWELD 199

June 2013

## RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

- steel; shot blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm
- on steel blasted to above profile, the recommended dft, 18 µm, corresponds to 22 µm as measured on a smooth test panel
- minimum thickness for a closed film is 15 µm measured on a smooth test panel
- substrate temperature may be up to max. 35°C
- for automatic application a substrate temperature of 30°C is recommended
- substrate temperature should be at least 3°C above dew point
- relative humidity during curing should be above 50% and below 85%
- dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)

## SYSTEM SPECIFICATION

primers

system sheet: 3015

## SECONDARY SURFACE PREPARATION

- during storage and construction, contamination of the prefabrication primer should be limited
- after fabrication, surface defects should be treated according to the scheme below
- where two possible surface treatments are indicated, the choice of treatment is dependent on the location and on the system to be applied (see system sheets)
- the preferred pretreatment for optimal results is shown; other possibilities are indicated in brackets

areas	immersed conditions	atmospheric conditions
contamination	to be removed or ISO 8501-3 grade P2	to be removed
weldseams	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Pt2
burned	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Ss (SPSS-Pt2)
damaged corroded	ISO-Sa2½ (SPSS-Pt3) or ISO 8501-3 grade P2	SPSS-Ss (SPSS-Pt2)
white rust	SPSS-ID Pt2 (SCAP*) or ISO 8501-3 grade P2	SPSS-ID Pt1 (SCAP*)

\* cleaning by silicon carbide impregnated abrasive pad

Dust quantity rating "1" for dust size class "3", "4" or "5", lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3).

Note that the back of welded plate may show discoloration (especially on plate where fillets have been welded on), this is not to be confused with burned areas and does not require special treatment.

Burned through areas may be present (this happens especially when welding thin steel) and these should then be treated as per 'burned areas' above.

# SIGMAWELD 199

June 2013

## INSTRUCTIONS FOR USE

mixing ratio by volume: binder to paste 66.7 : 33.3

- the temperature of the mixture of binder and paste should preferably be above 15°C
- stir the paste thoroughly before adding the binder
- add gradually one third of the binder to the pigment paste
- stir thoroughly till homogeneous
- add remaining binder and continue stirring until the mixture is homogeneous
- strain mixture through a 30 - 60 mesh screen
- mixed paint is ready for use
- some addition of thinner (Thinner 90-53) might be necessary depending on routing, line speed and steel temperature
- agitate continuously during application

Pot life

24 hours at 20°C

## AIR SPRAY

Recommended thinner

no thinner should be added

Nozzle orifice

1 - 1.5 mm

Nozzle pressure

0.3 MPa (= approx. 3 bar; 44 p.s.i.)

## AIRLESS SPRAY

Recommended thinner

no thinner should be added

Nozzle orifice

approx. 0.43 - 0.53 mm (= 0.017 - 0.021 in)

Nozzle pressure

8 - 12 MPa (= approx. 80 - 120 bar; 1160 - 1740 p.s.i.)

## CLEANING SOLVENT

recommended Thinner 90-53

## Worldwide availability

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Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Relative humidity - substrate temperature - air temperature	see information sheet 1650

## SAFETY PRECAUTIONS

- for paint and recommended thinners see safety sheets 1430, 1431 and relevant material safety data sheets
- this is a solvent borne paint and care should be taken to avoid inhalation of spray mist or vapour as well as contact between the wet paint and exposed skin or eyes

# SIGMAWELD 199

June 2013

## WARRANTY

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	PDS	7177
179165	redbrown	2008002180
179167	grey	5000002180

CONVERSION TABLES

1410

a four page issue

June 2013  
revision of 06-2002

GENERAL	
1 atmosphere	= 14.223 lb/sq.in.
1 foot	= 0.305 metre
1 Imp. gallon	= 4.546 litres
1 litre	= 0.220 Imp. gallon
1 litre	= 0.264 US gallon
1 metre	= 3.281 feet
1 sq. foot	= 0.093 sq. metre
1 sq. metre	= 10.765 sq. feet
1 US gallon	= 3.785 litres
1 yard	= 0.915 metre
1 metre	= 1.0936 yard
degree C	= 5/9 x (degree F - 32)
degree F	= 9/5 x degree C + 32

PRESSURE			
(kg/cm <sup>2</sup> )	(p.s.i.)	(kg/cm <sup>2</sup> )	(p.s.i.)
atmosphere	lb/sq.in.	atmosphere	lb/sq.in.
(bar)		(bar)	
		100	1420
<b>1</b>	<b>14.2</b>	110	1560
2	28.4	120	1710
3	42.7	130	1850
4	56.9	140	1990
5	71.1	150	2130
6	85.3	160	2280
7	99.6	170	2420
8	113.8	180	2560
9	128.0	190	2700
10	142.2	200	2840

VOLUME		
1 Imperial gallon	=	4.55 litre
	=	1.2 US gallons
1 litre	=	0.22 Imperial gallon
	=	0.26 US gallon
1 US gallon	=	3.79 litre
	=	0.83 Imperial gallon

litres	Imperial gallons	US gallons
1	0.22	0.26
2	0.44	0.53
3	0.66	0.79
4	0.88	1.06
5	1.10	1.32
6	1.32	1.58
7	1.54	1.85
8	1.76	2.11
9	1.98	2.38
10	2.20	2.64
15	3.30	3.96
20	4.40	5.28
50	11.00	13.21
100	22.00	26.42

DRY FILM THICKNESS							
mi-crons		mi-crons		mi-crons		mi-crons	
(µm)	mils	(µm)	mils	(µm)	mils	(µm)	mils
8	0.3	105	4.2	205	8.2	305	12.2
10	0.4	110	4.4	210	8.4	310	12.4
15	0.6	115	4.6	215	8.6	315	12.6
20	0.8	120	4.8	220	8.8	320	12.8
<b>25</b>	<b>1.0</b>	125	5.0	225	9.0	325	13.0
30	1.2	130	5.2	230	9.2	330	13.2
35	1.4	135	5.4	235	9.4	335	13.4
40	1.6	140	5.6	240	9.6	340	13.6
45	1.8	145	5.8	245	9.8	345	13.8
50	2.0	150	6.0	250	10.0	350	14.0
55	2.2	155	6.2	255	10.2	355	14.2
60	2.4	160	6.4	260	10.4	360	14.4
65	2.6	165	6.6	265	10.6	365	14.6
70	2.8	170	6.8	270	10.8	370	14.8
75	3.0	175	7.0	275	11.0	375	15.0
80	3.2	180	7.2	280	11.2	380	15.2
85	3.4	185	7.4	285	11.4	385	15.4
90	3.6	190	7.6	290	11.6	390	15.6
95	3.8	195	7.8	295	11.8	395	15.8
100	4.0	200	8.0	300	12.0	400	16.0

**CONVERSION TABLES**

**1410**

June 2013

<b>SPREADING RATE</b>								
Sq.m./l	Sq.ft./ Imp.gal	sq.ft./ US gal	Sq.m./l	Sq.ft./ Imp.gal	sq.ft./ US gal	Sq.m./l	Sq.ft./ Imp.gal	sq.ft./ US gal
1.0	49	41	5.0	244	203	9.0	440	366
1.1	54	45	5.1	249	208	9.1	445	370
1.2	59	49	5.2	254	212	9.2	450	374
1.3	64	53	5.3	259	216	9.3	455	378
1.4	68	57	5.4	264	220	9.4	460	383
1.5	73	61	5.5	269	224	9.5	464	387
1.6	78	65	5.6	274	228	9.6	469	391
1.7	83	69	5.7	279	232	9.7	474	395
1.8	88	73	5.8	284	236	9.8	479	399
1.9	93	77	5.9	288	240	9.9	484	403
2.0	98	81	6.0	293	244	10.0	490	405
2.1	103	85	6.1	298	248	10.5	515	425
2.2	108	89	6.2	303	252	11.0	540	450
2.3	112	94	6.3	308	256	11.5	560	470
2.4	117	98	6.4	313	260	12.0	585	490
2.5	122	102	6.5	318	265	12.5	610	510
2.6	127	106	6.6	323	269	13.0	635	530
2.7	132	110	6.7	328	273	13.5	660	550
2.8	137	114	6.8	332	277	14.0	685	570
2.9	142	118	6.9	337	281	14.5	710	590
3.0	147	122	7.0	342	285	15.0	735	610
3.1	152	126	7.1	347	289	15.5	760	630
3.2	156	130	7.2	352	293	16.0	780	650
3.3	161	134	7.3	357	297	16.5	805	670
3.4	166	138	7.4	362	301	17.0	830	690
3.5	171	142	7.5	367	305	17.5	855	710
3.6	176	146	7.6	372	309	18.0	880	735
3.7	181	151	7.7	376	313	18.5	905	755
3.8	186	155	7.8	381	317	19.0	930	775
3.9	191	159	7.9	386	321	19.5	955	795
4.0	196	163	8.0	391	325	20.0	980	815
4.1	200	167	8.1	396	330	20.5	1000	835
4.2	205	171	8.2	401	334	21.0	1025	855
4.3	210	175	8.3	406	338	21.5	1050	875
4.4	215	179	8.4	411	342	22.0	1075	895
4.5	220	183	8.5	416	346	22.5	1100	915
4.6	225	187	8.6	420	350	23.0	1125	935
4.7	230	191	8.7	425	354	23.5	1150	955
4.8	235	195	8.8	430	358	24.0	1175	975
4.9	240	199	8.9	435	362	24.5	1200	995



**CONVERSION TABLES**

**1410**

June 2013

<b>VISCOSITY IN SECONDS</b>							
DIN cup 4	Ford cup 4	Afnor coupe 4	B.S. cup 4	DIN cup 4	Ford cup 4	Afnor coupe 4	B.S. cup 4
15	15	17	19	44	53	56	60
16	17	18	20	46	55	59	63
17	18	20	22	48	58	62	66
18	19	21	23	50	60	64	69
19	21	23	25	55	67	71	75
20	22	24	26	60	73	78	82
21	23	25	28	65	79	84	89
22	25	27	29	70	86	91	96
23	26	28	31	75	92	97	105
24	28	30	32	80	98	104	109
25	29	31	33	85	104	110	116
26	30	32	34	90	111	117	123
27	31	34	36	95	117	124	130
28	33	35	37	100	123	130	138
29	34	36	38	110	136	144	152
30	35	38	40	120	148	157	166
32	38	40	43	130	160	171	180
34	40	43	46	140	173	184	194
36	43	46	49	150	185	197	207
38	45	48	52	160	198	210	221
40	48	51	54	170	210	224	235
42	51	54	57	180	223	237	249

CONVERSION TABLES

1410

June 2013

TEMPERATURE		$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$					
$^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}$
-10	14.0	8	46.4	32	90	95	203
- 9	15.8	9	48.2	34	93	100	212
- 8	17.6	10	50.0	36	97	110	230
- 7	19.4	11	51.8	38	100	120	248
- 6	21.2	12	53.6	40	104	130	266
- 5	23.0	13	55.4	42	108	140	284
- 4	24.8	14	57.2	44	111	150	302
- 3	26.6	15	59.0	46	115	160	320
- 2	28.4	16	60.8	48	118	170	338
- 1	30.2	17	62.6	50	122	180	356
0	32.0	18	64.4	55	131	190	374
1	33.8	19	66.2	60	140	200	392
2	35.6	20	68.0	65	149	250	482
3	37.4	22	72.0	70	158	300	572
4	39.2	24	75.0	75	167	350	662
5	41.0	26	79.0	80	176	400	752
6	42.8	28	82.0	85	185	450	842
7	44.6	30	86.0	90	194	500	932

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# DIRECTIVES FOR VENTILATION PRACTICE

1434

a three page issue

June 2013  
revision of 10-1999

Ventilation is required for reasons of health and safety. In addition for solvent containing coatings the quality of a coating system is greatly affected by the amount and type of residual solvent in the layer when the coating dries or cures.

Adhesion, water resistance, mechanical and chemical properties can all be adversely affected when solvents remain trapped in the paint film. Very slow evaporation of trapped solvents can also develop internal stresses due to shrinkage.

The ventilation must be maintained throughout the application process at a minimum level of 10% of LEL value and for a period after application is completed when the paint cures or dries. As a guide line for good ventilation after application the confined space should be ventilated 4 to 5 times its contents per hour. Product data sheets indicate when any special ventilation requirements are required.

Hot ventilation: Ventilating air with too high temperature can cause surface curing of epoxy coatings and although it may be necessary to produce a dry substrate before painting, the steel and air temperature should be such that when the application starts, the temperature of the ventilation (dehumidifier/heater) should be dropped so that the conditions stay stable. Hot ventilation air should be replaced by cool dry ventilation air as soon as possible after application of any coat is completed.

Good ventilation consists of at least extraction at the lowest areas, but in most cases when controlled conditions are needed, also of air input (dry and/or heated). The combination of in and output must be correctly balanced.

The opening of the extraction hose should be close to the bottom of the tank (approx 30-60 cm).

Ventilation air should be directed to the bottom of the tank or compartment and should be extracted by exhaust fans of correctly balanced capacity.

For complex structures the ventilation should be distributed over all compartments and confined spaces in order to facilitate good ventilation in all areas.

## **BALLAST TANKS AND OTHER CONFINED SPACES.**

Due to regulations of the shipbuilding industry ballast tanks and double skin tanks count for many square meters confined spaces. Therefore it is necessary to pay good attention to the ventilation conditions during application, drying and curing of the coating on these areas.

Depending on the structure of the ballast tanks, forced ventilation or natural ventilation is used during coating of the new building blocks.

However, natural ventilation in many cases is not sufficient due to half open box conditions and can cause serious drawbacks related to health and safety as well as curing and performance of the coating.

When ventilation is not sufficient solvents will not be removed, but will drift to the lower part of the section. As normally first the upperparts of a section will be painted, the solvents evaporating from the applied coating will drift to the lower part where it will attack the earlier applied coating (not yet fully cured) and this coating will absorb part of the solvents and swell. This coating will then be overcoated and problems related to bad adhesion, curing, water resistance etc. will result.

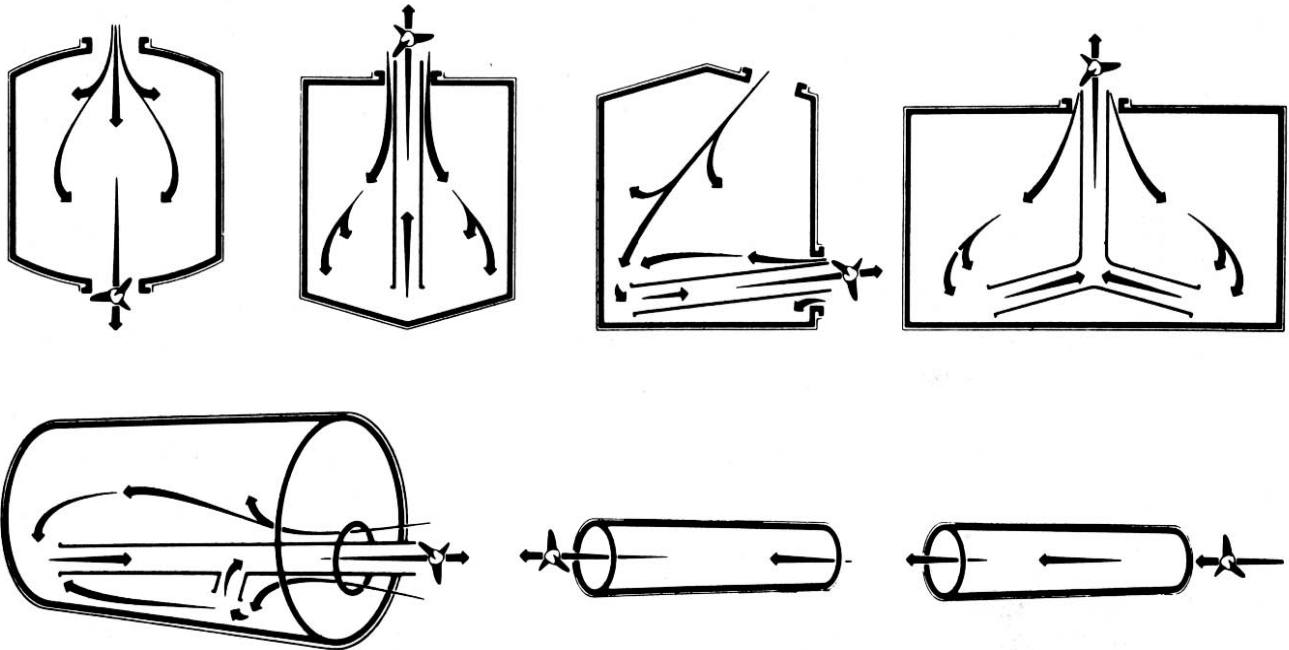
In case of waterborne paints, this advice is not valid. Water vapour rises to the upper areas of the tank and may give condensation. Therefore it is recommended to position an extra exhaust outlet at the top of the tank.

DIRECTIVES FOR VENTILATION PRACTICE

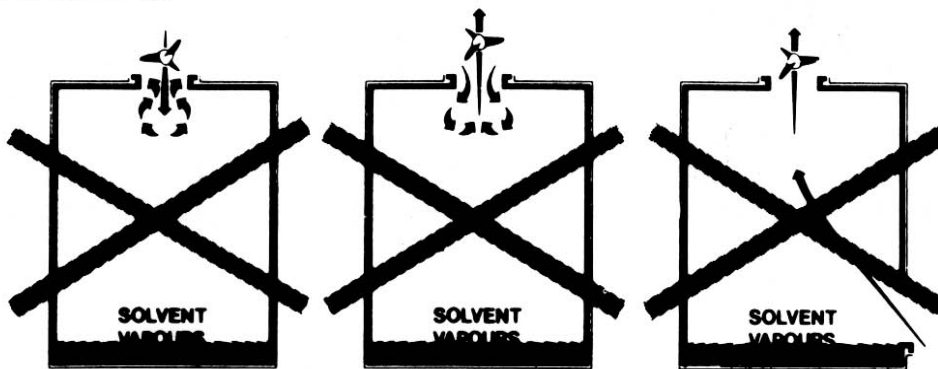
1434

June 2013

Also in this case ventilation is of utmost importance as drying under insufficient ventilation will prevent paint film formation.



Practices not recommended



→ Airflow and direction    ⚙ Fan

## DIRECTIVES FOR VENTILATION PRACTICE

1434

June 2013

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# EXPLANATION TO PRODUCT DATA SHEETS

1411

an nine page issue

June 2013  
revision of October 2010

## GENERAL

For ease of reference figures are usually stated in one unit only. Equivalentents are given in the conversion tables. See sheets 1410 Conversion tables, 1412 Nomograph conversion from english units to metric units and 1413 S.I. units.

All values are given for temperature of 20°C (68°F) and relative humidity of 70%, unless stated otherwise.

## GLOSS

With a 'Lange' gloss gauge 5 ranges of gloss have been determined, compared with a standard sheet of black polished glass. The gloss values are determined on Lange gloss gauge (angle 60°) according to ISO 2813 (= ASTM D-523). The expressions used in the data sheets are:

Flat	corresponds with	0- 15%
Eggshell	corresponds with	15- 30%
Semi-gloss	corresponds with	30- 60%
Gloss	corresponds with	60- 80%
High-gloss	corresponds with	80-100% (at 20° angle above 70%)

In practice, the level of gloss and surface finish will be dependent upon a number of factors, including application and the condition of the surface to be overcoated.

## COLOUR

For products supplied in different colours three colour quality levels exist:

1. Good For finishes in general, especially based on polyurethane, this quality matches the colour standard
2. Approximate For undercoats and low gloss topcoats in general, this quality level is close to the colour standard
3. Best Match For primers in general, this quality level is near to the colour standard

## MICACEOUS IRON OXIDE AND/OR ALUMINIUM CONTAINING PAINTS

Micaceous iron oxide and/or aluminium containing paints show different appearance and colour impression depending on thickness and application method. A touch-up by brushing may be visible on a sprayed area.

## SHELF LIFE

The period from the date of manufacture during which the paint can be transported and stored in undamaged and unopened packing at temperatures between 5-35°C, without any influence on the application or performance of the paint.

After exceeding this period the paint is subject to reinspection.

Water-borne products must be protected from freezing at all times during storage and/or transport.

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# EXPLANATION TO PRODUCT DATA SHEETS

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1411

June 2013

## SUBSTRATE CONDITIONS & TEMPERATURES

In order to achieve optimal application results, the technical requirements as stated in the relevant product data sheets should be followed.

It is recommended that during the application and initial curing, the substrate temperature does not exceed 40° C, unless otherwise stated in the relevant PDS.

However, maintaining the required conditions in practice might prove difficult, and the substrate temperature may occasionally exceed the recommended limits. In such cases special care must be taken to ensure proper substrate wetting and film formation, avoid excessive over spray, dry spray, sagging and other application related coating defects. Precautions such as additional thinning of the coating, providing suitable sun/heat protection and/or forced ventilation might be adequate. However, maintaining the recommended application conditions will facilitate optimal application results.

For further details regarding substrate conditions and temperatures refer to:

Information Sheet 1490 – Cleaning of steel and removal of rust

Information Sheet 1650 – Relative Humidity / Substrate Temperature / Air Temperature

## EXPLANATION TO PRODUCT DATA SHEETS

1411

June 2013

**FULL CURE**

'Full cure' means, that the properties of a paint as described in the product data sheet are achieved (suitable for service). However, in case of dry bulk carriage an extra curing time may be required before the coating has reached its full mechanical strength and is suitable for carriage of hard angular cargoes

**FLASH POINT**

For paints the flash point is determined according to ISO 1523 (= ASTM D-3278, corresponding to Sigma method SM 311-41) or calculated.

For thinners the flash point is determined according to DIN 51755 (corresponding to Sigma method SM 311-42) or calculated.

Please always refer to the latest Material Safety Data Sheet for the paint and thinners.

**OVERCOATING TABLE**

The data given is a fair indication for normal conditions, longer drying times are necessary at lower temperatures and under unfavourable weather and/or ventilation conditions and higher dry film thicknesses.

For epoxy coatings the minimum curing time for the recommended dft is given in the data sheets.

For average dfts 50% higher, the minimum overcoating time should be multiplied by 1,5 and for average dfts 100% higher the multiplication factor is 2,5.

Recoating data are based on atmospheric exposure, for other exposure conditions contact your nearest sales office.

**TOUCH DRY**

The touch dry time corresponds with the tack free time measured in accordance with ASTM D-1640 (corresponding with Sigma method SM 315-01). The touch dry time will be influenced by dft, ventilation conditions and substrate temperature.

**DRY TO HANDLE**

The dry to handle time corresponds with the dry-through time measured in accordance with ASTM D-1640 (corresponding with Sigma method SM 315-01) and indicates the time when walking over is possible.

The dry-to-handle time will be influenced by dft, ventilation conditions and substrate temperature and should not be necessarily interpreted as ready for transportation due to the likelihood of excessive damage.

**DRY FILM THICKNESS (dft) / WET FILM THICKNESS (wft)**

The dry film thickness can be calculated from the applied wet film thickness:

$$dft = \frac{wft \times \% \text{ volume solids}}{100}$$

$$wft = \frac{dft \times 100}{\% \text{ volume solids}}$$

**Recommended dft**

The dry film thickness for a paint system indicated in our system sheets is the recommended dft for the specific exposure conditions and based on airless spray application.

Dft specifications referred to herein are valid for the coatings and coating systems in this manual unless mentioned otherwise in the respective product and system sheets.



June 2013

**Minimum dft for application**

The minimum dft of a **paint system** (also a one coat system) should follow the 90/10 rule (e.g. 90% of the recommended dft is acceptable for up to 10% of the readings only), whilst for **individual coats** the minimum dft should not be lower than 80% of the recommended dft, and must form a closed film.

**Maximum dft for application - General**

Application of a paint at thicknesses in excess of the dft recommended on the product data sheet may result in performance problems. Such problems include solvent retention and a reduction in cohesive strength in association with certain types of topcoat.

In a coating system, the dft of a primer is of the utmost importance. In general, Sigma Coatings would restrict the dft of any primer to 1.5 times that specified on the product data sheet.

For a coating system, including the individual coats (except the primer), the maximum dft is 2 times the recommended dft, whereas for the critical areas of a painted structure, 10% of the readings can be between 2 and 2.2 times the recommended dft. Critical areas are e.g. weld seams, edges, bolts, corners, nuts and areas of difficult access.

For coating specifications requiring coating thicknesses which exceed the recommended dfts as mentioned in the product and system sheets, the maximum dft allowed should be established per project prior to start-up.

Over-application and its consequences is a complex subject and is dependent on the generic type of system, recommended dft and number of coats, as well as the intended exposure.

Please refer to your local Sigma Coatings office if you should have any questions on this important issue.

The life time of any protective coating system is also determined by the dry film thickness applied to critical areas. The dft of all of these critical areas should be closely monitored and controlled by the application of stripe coats with the same material as the consecutive coat of the system (or as recommended otherwise by Sigma Coatings). Please note that if a solvented coating has been applied over the specified dft then the minimum overcoating time must be increased to ensure that sufficient time is given for solvent evaporation. Care must also be taken to avoid over-application on critical areas during the progress of the job. Over-application does not lead to enhanced performance life time of the coating system.

**Maximum dft for application - Linings**

For linings for severe exposure conditions or reinforced solvent free systems, the dft of the primer and the subsequent coatings can be more critical. Dft limitations are detailed in the respective system / product data sheets.

## EXPLANATION TO PRODUCT DATA SHEETS

1411

June 2013

**VOC**

Until further notice, the heavy duty Marine and PC coatings industries in Europe must comply with the VOC Directive 1999/13/EC (SED).

VOC values (in g/kg) to assist with the annual calculation of the solvent limits related to the SED requirements, are mentioned on each Product Datasheet as well as on the label of all products.

For decorative, functional and protective coatings used in 'buildings,' the VOC Directive 2004/42/EC applies. This is based on compliant coatings.

Label Example:

1999/13/EC : 320 g/kg  
2004/42/IIa (i) 600 (2007) 360

Explanation Label Example:

1999/13/EC : 320 g/kg  
2004/42/IIa (i)  
600 (2007)

Max VOC according to Directive 1999/13/EC for material in the can.  
Reference to the sub-category according to Directive 2004/42/IIa  
Threshold limit for sub-category according to Directive 2004/42/IIa from  
1.1.2007 till 1.1.2010

360

The max content of VOC in g/l of the product in a ready to use condition  
(including maximum amount of thinner according to Product Datasheet).

**SOLIDS CONTENT BY VOLUME**

This value is given in the product data sheet. It can be determined by a laboratory test, Sigma Method 314-10 corresponding to ISO method 3233 or calculated from the formulation.

The calculated theoretical solids content by volume is in general lower than the determined solids content by volume. The latter approximates best to practice, assuming that the table for spreading rate losses is used correctly. Diluents with a high boiling point and low vapour pressure are widely used in solvent free coatings, they will remain in the cured film under normal ambient conditions and will therefore have negligible effect on the volume solids of these specific products. Furthermore, due to the relative high boiling point and rather low vapor pressure of these diluents, the ventilation requirements when using solvent free coatings in confined spaces to maintain the internal atmosphere at 10% of the Lower Explosion Limit, will be unchanged.

**TOLERANCES**

Values given for specific gravity, theoretical spreading rate and solids content are averages from standard production batches; these values can vary slightly, also for colours of one product.

## EXPLANATION TO PRODUCT DATA SHEETS

1411

June 2013

**VENTILATION**

Adequate ventilation during application and curing of the coating is not only required for health and safety reasons but also to ensure that the coating gives optimal performance.

Stagnant air/high vapour concentrations in confined spaces must be avoided. Forced ventilation will help to avoid high vapour concentrations and possible solvent entrapment in the coating which may produce a temporary plasticising effect. Ventilation with cold, humid air in the drying stage should be avoided. Also avoid ventilation with heated air during the wet film forming stage as this approach may give skinning and increased solvent entrapment.

For more information, see the following data sheets:

1430 Safety indications

1431 Safety in confined spaces and health safety, explosion hazard - toxic hazard

1434 Directives for ventilation practice

**THEORETICAL SPREADING RATE**

The theoretical spreading rate  $m^2/l$  for a given dry film thickness can be calculated from:

$$m^2/l = \frac{\% \text{ volume solids} \times 10}{\text{dry film thickness (in } \mu\text{m)}}$$

**PRACTICAL SPREADING RATE**

The practical spreading rate depends on a number of factors:

surface condition and profile, application method, normal, high build or solvent-free paint, skill of labour and weather conditions. It is often estimated at about 70 % of the theoretical spreading rate but under many conditions this is still far too high. For calculation purposes the following table has been composed in which spreading rate LOSSES are compiled.

Substrates like wood and concrete are not included because they present too many other variable factors, especially in the preparation, the filling of pores, etc.

**RECOMMENDED THINNERS**

This product must only be thinned using the recommended Sigma thinners. The use of alternative thinners, particularly these containing alcohols, can severely inhibit the curing mechanism of certain coating types and will influence the performance. In case of the use of other thinners than advised, Sigma Coatings will not accept any responsibility.

# EXPLANATION TO PRODUCT DATA SHEETS

1411

June 2013

## ESTIMATED LOSSES IN PERCENTAGES

ALL FIGURES ± 10 DEPENDING ON CIRCUMSTANCES (AS GUIDE ONLY)

Type of surface and application method		BARE STEEL/FIRST COAT 4)				COATED STEEL/NEXT COAT			
		NEW blast-cleaned A-B-C ISO-Sa2½		OLD derusted C St 3 / D ISO-Sa2½		NEW including shop primer		OLD due for maintenance	
		inside	outside	inside	outside	inside	outside	inside	outside
LARGE 1)	airless spray	30	40	40	50	25	35	35	45
	air-spray	40	50	50	60	35	45	45	55
	roller	35	35	40	40	30	30	40	40
SMALL 2)	airless spray	45	55	55	65	40	50	50	60
	air-spray	50	60	65	65	45	55	60	60
	roller-brush	25	25	25	30	20	20	30	30
FRAME- WORK 3)	airless spray	85	85	85	85	85	85	85	85
	brush	20	20	20	20	20	20	30	30

- 1) LARGE SURFACES : hull, decks, deckhouses, tanks, holds
- 2) SMALL SURFACES : masts, water ways, machinery, structural steel and complex structures
- 3) FRAMEWORK : ladders, piping and railings
- 4) PRIMERS : consumption of first coat is always higher than for subsequent coats because of the steel profile

Estimation of volume of paint necessary for a paint job can be calculated from:

$$\frac{10 \times A \times DFT}{VS \times (100-W)} = Q$$

### EXAMPLE

- Q = quantity in litre
- A = area in m<sup>2</sup>
- DFT = dry film thickness
- VS = % volume solids (see data sheet)
- W = estimated losses (see table)

- Q = to be calculated
- A = 1000 m<sup>2</sup>
- DFT = 100 µm
- VS = 50%
- W = 40%

$$Q = \frac{10 \times 1000 \times 100}{50 \times (100-40)} = 333 \text{ ltr.}$$

EXPLANATION TO PRODUCT DATA SHEETS

1411

June 2013

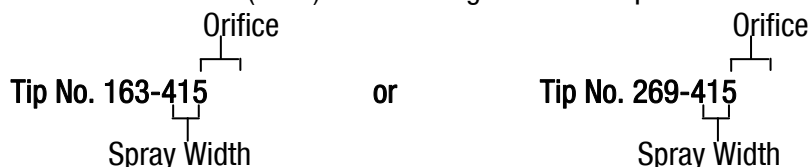
**NOZZLE ORIFICE AND SPRAY ANGLE**

In the product data sheets only the recommended orifice is stated. The choice of the spray angle depends very much on the practical situation. The table below compares orifice and angle with the corresponding codes of various manufacturers. Please consult other manufacturers for their corresponding codes.

ORIFICE		Angle	WIWA - Spray Tips <sup>1)</sup>	GRACO - Spray Tips <sup>2)</sup>	
Inches	mm's			Contractor	Finish
0,007	0.18	40°	018/40	--	163-407
0,009	0.23	40°	023/40	--	163-409
0,009	0.23	65°	--	--	163-609
0,011	0.28	25°	028/25	269-211	163-211
0,011	0.28	40°	028/40	269-411	163-411
0,011	0.28	65°	028/65	--	163-611
0,013	0.33	25°	033/25	269-213	163-213
0,013	0.33	50°	033/50	269-513	163-513
0,013	0.33	65°	033/65	269-613	163-613
0,013	0.33	80°	033/80	--	163-813
0,015	0.38	40°	038/40	<b>269-415</b>	<b>163-415</b>
0,015	0.38	65°	038/65	269-615	163-615
0,015	0.38	80°	--	269-815	163-815
0,018	0.46	65°	046/65	--	163-618
0,018	0.46	80°	--	--	163-818
0,021	0.53	65°	053/65	269-621	163-621
0,021	0.53	80°	--	269-821	163-821
0,026	0.66	40°	066/40	--	163-426
0,026	0.66	65°	066/65	--	163-626
0,026	0.66	95°	--	--	163-926
0,036	0.91	40°	091/40	--	--
0,036	0.91	80°	091/80	--	--

1) In the **WIWA** number the relation between orifice and angle is clear

2) **Orifice Size** determines how many liters per minute can be atomized through the airless spray tip. The last two digits of the part number tell the Orifice Size in thousandths of an inch. In this example, the orifice is 0.381 mm (015"). For ordering use the complete number.



**Spray Width** is based on spraying distance 305 mm (12") from the surface. Double the fourth digit of the tip part number to determine the approximate minimum Spray Width in inches. Add two inches to that number for maximum width. In this example, this tip size produces a 203-254 mm (8-10") spray pattern (width) at 305 mm (12") distance from the surface.

## EXPLANATION TO PRODUCT DATA SHEETS

1411

June 2013

**MIXING RATIO - twin-feed products**

The mix ratios in volume for twin-feed applied products should be retrieved from specific data sheets. It is very important that right ratios are maintained but deviations up to max. 3% are acceptable unless otherwise stated on specific data sheets.

These products are generally supplied ready for use after mixing of components as extra diluting is not allowed.

**INDUCTION TIME**

If mentioned on the product data sheet the coating should be thoroughly mixed and left for the recommended time for the particular temperature conditions at application. This induction time or pre-curing of the product ensures that the coating will give the required performance and application properties.

**POT LIFE**

This gives the time interval after mixing of the components of the coating during which the material can be applied, without change of application and performance properties of the coating. For solvent containing coatings an extra addition of thinner up to 5% is allowed. For solvent free coatings addition of thinner is not permitted. For solvent free and high solid coatings an exothermic reaction occurs, resulting in gelation shortly after reaching the end of the pot life. It is important to clean equipment with the recommended cleaning thinner before the pot life has expired and/or directly after completion of application of the paint.

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# RELATIVE HUMIDITY - SUBSTRATE TEMPERATURE - AIR TEMPERATURE

**1650**

a four page issue

June 2013  
revision of 10-1999

## RELATIONSHIP BETWEEN (VENTILATION) AIR-TEMPERATURE, SUBSTRATE TEMPERATURE AND RELATIVE HUMIDITY

To achieve optimum results in coating work it is essential to ensure that no condensation occurs on the substrate or in-between coats during the painting process. Air at a given temperature can only contain a certain (maximum) amount of water vapour. This amount is lower at lower temperatures.

The maximum water content of air at different temperatures is given in the next table:

Degrees Centigrade	Maximum water content g/m <sup>3</sup>
0	4,8
5	6,8
10	9,5
15	12,8
20	17,3
25	23,0
30	30,4
35	39,6
40	51,1
45	65,0

From these figures the relationship between dew point, air temperature and relative humidity can be calculated. This relationship is given in the next table:

### Relation between dew point, air temperature and relative humidity

Air Temperature °C	Dew point in °C at a relative humidity of:								
	50%	55%	60%	65%	70%	75%	80%	85%	90%
5	-4.1	-2.9	-1.8	-0.9	0.0	0.9	1.8	2.7	3.6
6	-3.2	-2.1	-1.0	-0.1	0.9	1.8	2.8	3.7	4.5
7	-2.4	-1.3	-0.2	0.8	1.8	2.8	3.7	4.6	5.5
8	-1.6	-0.4	0.8	1.8	2.8	3.8	4.7	5.6	6.5
9	-0.8	0.4	1.7	2.7	3.8	4.7	5.7	6.6	7.5
10	0.1	1.3	2.6	3.7	4.7	5.7	6.7	7.6	8.4
11	1.0	2.3	3.5	4.6	5.6	6.7	7.6	8.6	9.4
12	1.9	3.2	4.5	5.6	6.6	7.7	8.6	9.6	10.4
13	2.8	4.2	5.4	6.6	7.6	8.6	9.6	10.6	11.4
14	3.7	5.1	6.4	7.5	8.6	9.6	10.6	11.5	12.4
15	4.7	6.1	7.3	8.5	9.5	10.6	11.5	12.5	13.4

# RELATIVE HUMIDITY - SUBSTRATE TEMPERATURE - AIR TEMPERATURE

1650

June 2013

Air Temperature °C	Dew point in °C at a relative humidity of:								
	50%	55%	60%	65%	70%	75%	80%	85%	90%
16	5.6	7.0	8.3	9.5	10.5	11.6	12.5	13.5	14.4
17	6.5	7.9	9.2	10.4	11.5	12.5	13.5	14.5	15.3
18	7.4	8.8	10.2	11.4	12.4	13.5	14.5	15.4	16.3
19	8.3	9.7	11.1	12.3	13.4	14.5	15.5	16.4	17.3
20	9.3	10.7	12.0	13.3	14.4	15.4	16.4	17.4	18.3
21	10.2	11.6	12.9	14.2	15.3	16.4	17.4	18.4	19.3
22	11.1	12.5	13.8	15.2	16.3	17.4	18.4	19.4	20.3
23	12.0	13.5	14.8	16.1	17.2	18.4	19.4	20.3	21.3
24	12.9	14.4	15.7	17.0	18.2	19.3	20.3	21.3	22.3
25	13.8	15.3	16.7	17.9	19.1	20.3	21.3	22.3	23.2
26	14.8	16.2	17.6	18.8	20.1	21.2	22.3	23.3	24.2
27	15.7	17.2	18.6	19.8	21.1	22.2	23.2	24.3	25.2
28	16.6	18.1	19.5	20.8	22.0	23.2	24.2	25.2	26.2
29	17.5	19.1	20.5	21.7	22.9	24.1	25.2	26.2	27.2
30	18.4	20.0	21.4	22.7	23.9	25.1	26.2	27.2	28.2

Using these figures curves can be drawn which give the relationship between air temperature, relative humidity and dew point. (See graph).

To allow a sensible safety margin normally the substrate temperature must be at least 3 degrees centigrade above the dew point. The dew point is the temperature of a given air-water vapour mixture at which condensation starts, since at that temperature the maximum water content of the air is reached.

Many important conclusions can be drawn from the graph, e.g.:

- at a relative humidity of 85% the lowest acceptable substrate temperature is approximately equal to the temperature of the (ventilation) air. For this reason outdoor paintwork must normally be carried out at a relative humidity below 85%.
- at a relative humidity of 90% the difference in temperature between substrate and dew point will be only 2°C, which means that the safety margin is narrowed. This can be overcome by raising the substrate temperature by approx. 1°C.
- at a relative humidity of 70% the relationship between the acceptable substrate temperature and the temperature of the (ventilation) air is given by the following table:

air temperature °C	5	10	20	30
dew point °C	0,0	4,7	14,4	23,9
lowest acceptable substrate temperature °C	3,0	7,7	17,4	26,9



RELATIVE HUMIDITY - SUBSTRATE TEMPERATURE -  
AIR TEMPERATURE

1650

June 2013

Although the substrate temperatures given in this table are well below the temperature of the surrounding air no condensation will occur under the stated prevailing conditions.

- if the lowest acceptable substrate temperature is for example 5°C and the temperature of the atmosphere is also 5°C than the ventilation air can be heated and relative humidity will then be reduced according to the following table:

air temperature °C	5	10	20	30	40
relative humidity %	85	60	32	18	11

In general reduction in temperature leads to risk of condensation.

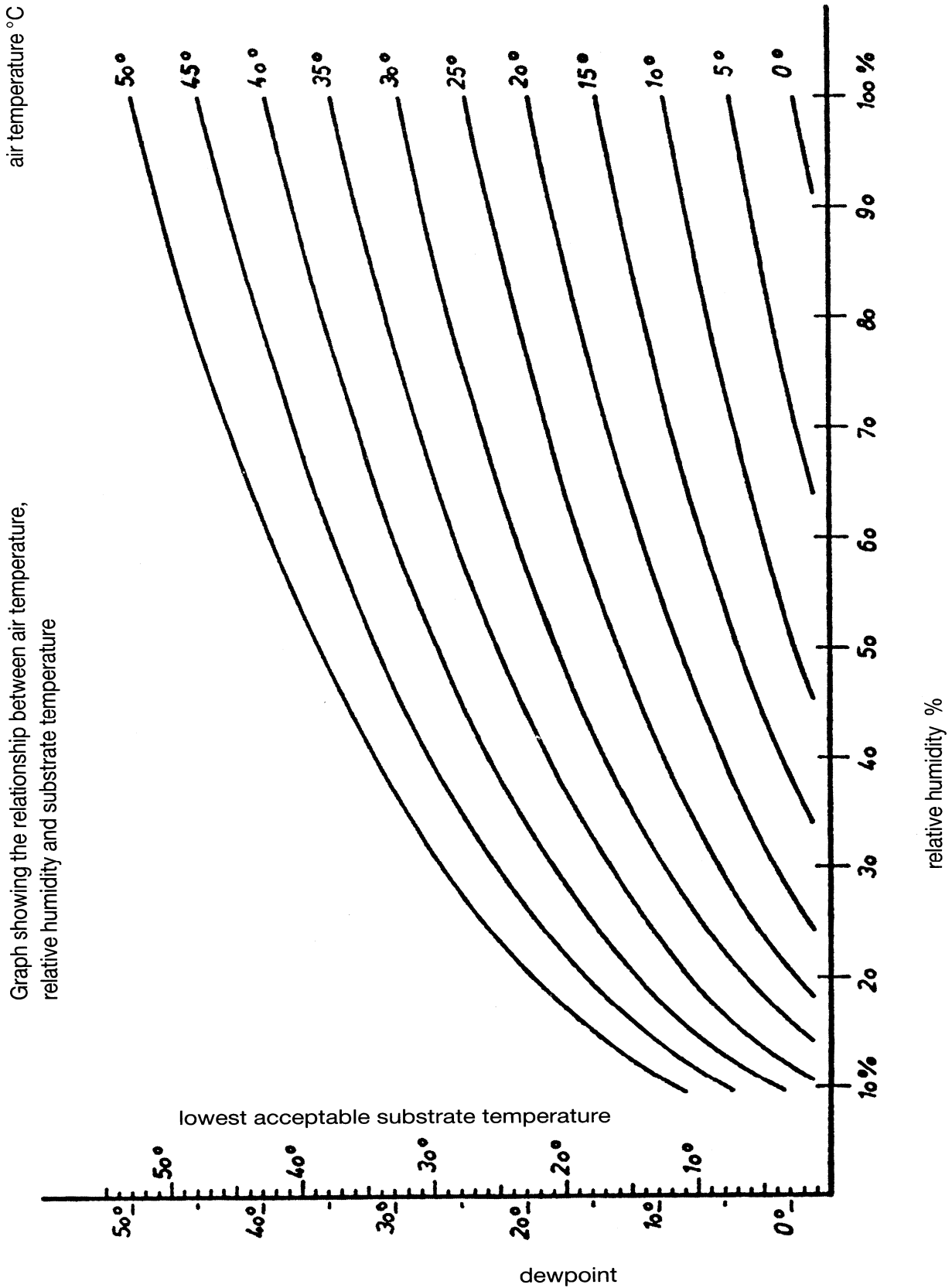
For instance steel cooled down during the night will often show condensation and this will not evaporate until the steel is heated up again by sunlight or other means.

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RELATIVE HUMIDITY - SUBSTRATE TEMPERATURE -  
AIR TEMPERATURE

1650

June 2013



# SAFE WORKING IN CONFINED SPACES

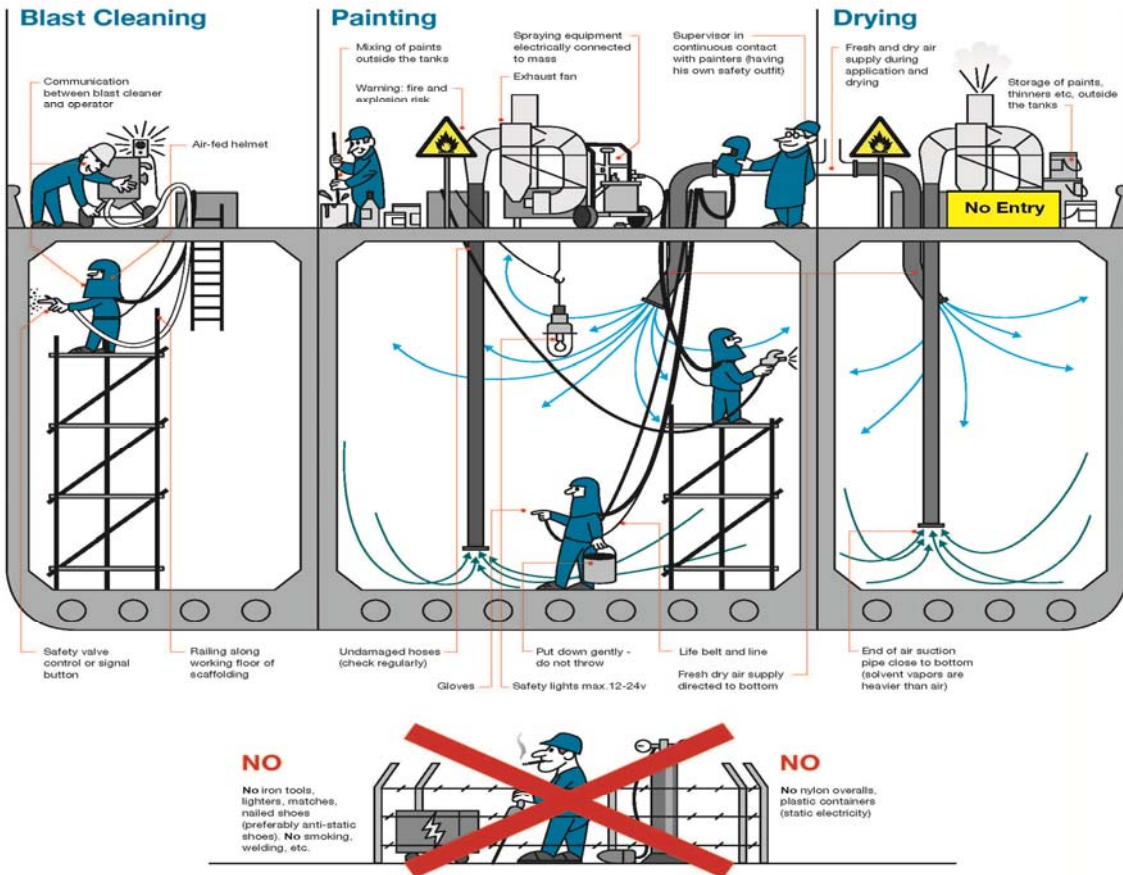
A two page issue

June 2013  
Revision of October 1999

Safe working is always of the greatest importance, but particularly during application of tank coatings. The illustrations on this sheet indicate the quite simple principal measures that will ensure safe working.

## Safe working practices: confined spaces

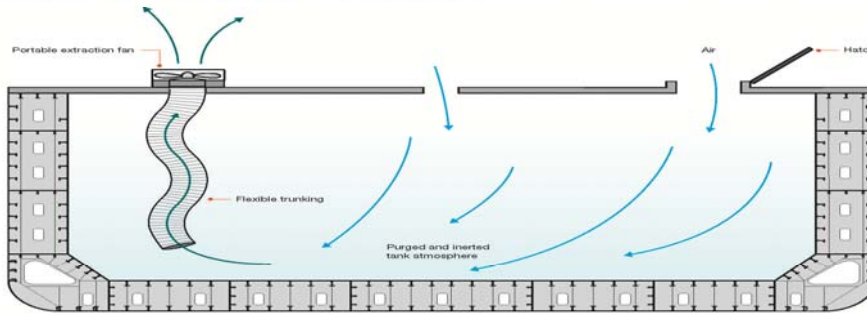
Safe working is always of the greatest importance, but particularly during application of tank coatings.



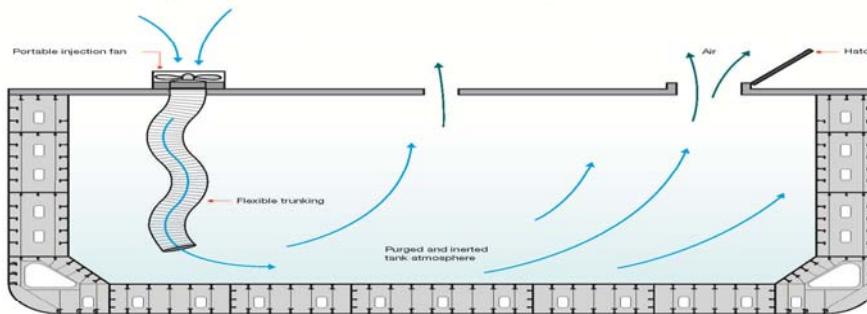
SAFE WORKING IN CONFINED SPACES

June 2013

Safe working practices:  
ventilation methods



Ventilation by displacement method for cargo vapors heavier than air.



Ventilation by displacement method for cargo vapors lighter than air.

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# SAFETY IN CONFINED SPACES AND HEALTH SAFETY

## EXPLOSION HAZARD - TOXIC HAZARD

1431

a five page issue

June 2013  
revision of 10-1999

When paints containing solvents are applied in enclosed or confined spaces, two hazards can exist, explosion and toxicity and precautions must be taken to eliminate them.

### General aspects of explosion hazards

The nature of this hazard is explained in detail below. The essential precaution to be taken is that sufficient ventilation air must be provided to maintain the ratio of vapour/air at no more than 10% of the lower explosive limit. The method for calculation is given below and data on minimum ventilation air quantity is given in product data sheets. If the flash point of the solvent is above the working temperature, then an explosion cannot occur. However, it may still be necessary to ventilate to provide a clean working atmosphere or to eliminate toxic hazard.

An explosion is simply very rapid burning of a flammable mixture (in the case of paint, it is the burning of solvent vapour in oxygen contained in the air). The speed of combustion is so great that there is extremely rapid development of heat and pressure (6 to 9 times the original pressure). This can lead to destruction of the compartment and injury to work people. Three factors must be present to create an explosion.

- The mixture of vapour and air must be between the lower explosive limit (LEL) and the upper explosive limit.
- The mixture must be at a temperature above the flash point temperature of the vapour.
- A source of ignition with high enough temperature and energy must be present to initiate the explosion reaction.

These three factors explain the reasons for the safety precautions.

### Ventilation to provide an atmosphere below LEL

It is usual to specify that ventilation should be provided to reduce vapour concentration to less than 10% of LEL. This large safety margin is required to allow for variations in ventilation in all parts of a compartment.

The minimum ventilation air in m<sup>3</sup> per minute may be calculated from the formula: 
$$\frac{(P \times A) + (Q \times B)}{t}$$

### Calculation

- P = volume of paint applied in the compartment in litres during time t minutes.  
Q = volume of added solvent used in the paint applied in the compartment in litres in time t minutes.  
A = ventilation air quantity for 1 litre of paint to reach 10% LEL.  
B = ventilation air quantity for 1 litre of solvent to reach 10% LEL.  
t = time of application in minutes of volume P of paint.

# SAFETY IN CONFINED SPACES AND HEALTH SAFETY

## EXPLOSION HAZARD - TOXIC HAZARD

1431

June 2013

### Example

100 litres of paint (P) plus 5 litres of thinner (Q) are used within 45 minutes (t).

Value A is e.g. 60 m<sup>3</sup> (given in product data sheet).

Value B is e.g. 130 m<sup>3</sup> (given in product data sheet).

Ventilation air quantity m<sup>3</sup> per minute to reach 10% LEL is:

$$\frac{(100 \times 60) + (5 \times 130)}{45} = 147.7 \text{ m}^3 \text{ per minute.}$$

### Remarks

This quantity of ventilation air must be maintained throughout the application of the paint and also during the period of evaporation of solvent.

The ventilation must be arranged so that all parts of the compartment are properly ventilated. It is necessary for the applicator or the contractor to check vapour concentrations (in varying positions) regularly with an explosion meter. If the concentration rises above 10% LEL, painting must stop until the vapour concentration is reduced to a safe level again.

### Flash point

If possible paints with flash points above the ambient temperature should be used. This often is not possible, particularly in compartments heated up by strong sunlight in summer. In such cases it is even more essential that ventilation below 10% LEL is maintained.

### Sources of ignition

Sparks, hot surfaces, flames and all other sources of ignition must be absolutely prevented. Flame proof lighting and electrical equipment must be used, spark proof tools and clothing should be used and all work must be prohibited in adjacent compartments. All equipment, whether electrical or not electrical (e.g. pneumatic pumps, spray tips, etc.) must be adequately earthed to ensure no accumulation of static electrical charge.

TOXIC HAZARD

# SAFETY IN CONFINED SPACES AND HEALTH SAFETY

## EXPLOSION HAZARD - TOXIC HAZARD

1431

June 2013

### General aspects of toxic hazard

Many solvents used in paint have some degree of toxicity and it is necessary to provide sufficient ventilation air to maintain safe atmosphere below the threshold limit value (TLV). With many common solvents this may be impractical when applying large volumes of paint in a short time. In such cases ventilation to give a clear visibility and safety from explosion will still be necessary. It will also be necessary to provide operators in the compartment with fresh air masks or hoods. Barrier creams and protective clothing may also be necessary. Full details are given below and data for calculation of RAQ (required air quantity) are also provided.

It is necessary to keep certain rules when using any paint since all can be harmful (even ordinary emulsion paints are dangerous if swallowed!). The following are basic safety precautions:

### Inhalation of dust and fumes

This must be avoided by the use of ventilation or extraction.

- products should be used in well ventilated areas
- forced ventilation or fresh air masks should be used in confined spaces
- a face mask should be worn when spraying, sanding or blast cleaning

### Skin contact

Some substances used in paint may cause irritation after repeated or prolonged contact with the skin and in susceptible cases there is a risk of dermatitis.

- operatives with a history of skin sensitivity should not be employed in processes where skin contact can occur
- prolonged or repeated contact of paint with the skin should be avoided
- barrier cream should be supplied and used
- gloves should be worn
- do not wash hands with solvent
- use a proprietary hand cleanser

### Ingestion

The ingestion (swallowing) of paint must always be avoided.

- food should not be brought into or consumed in the work area where coatings are stored or used
- thorough washing of hands and face is essential after applying paint, particularly before eating or smoking
- if paint or thinners should accidentally be swallowed, seek medical attention immediately

# SAFETY IN CONFINED SPACES AND HEALTH SAFETY

## EXPLOSION HAZARD - TOXIC HAZARD

1431

June 2013

### Eye protection

Steps should be taken to prevent material entering the eyes.

- goggles should be worn whenever necessary
- if the eyes become contaminated they should be irrigated with water; seek medical attention immediately

### Theoretical ventilation requirements

In the product data sheets, data are given for the minimum required ventilation air quantity (RAQ) in cubic metres when 1 litre of paint is applied or when 1 litre of thinner is used. The TLV (=threshold limit value) for the mixture of components and solvents in the paint or for the mixture of solvents used in thinners has been calculated.

### Calculation

The quantity of ventilation air required in m<sup>3</sup> per minute during application and drying can be calculated from the formula:

$$\frac{(P \times M) + (Q \times N)}{t}$$

P = quantity of paint consumed in litres.

Q = quantity of thinner consumed in litres.

M = min. ventilation air quantity needed to reach TLV of 1 litre of paint.

N = min. ventilation air quantity needed to reach TLV of 1 litre of thinner.

t = application time in minutes.

### Example

100 litres of paint (P) are consumed in 45 minutes (t). 5 Litres of thinner (Q) were added to thin down the paint to the prescribed application viscosity. Value M is e.g. 780 m<sup>3</sup> (see product data sheet). Value N is e.g. 2170 m<sup>3</sup> (see product data sheet).

The ventilation air quantity required during application and drying to reach TLV is:

$$\frac{(100 \times 780) + (5 \times 2170)}{45} = 1974 \text{ m}^3 \text{ per minute}$$

### Remarks

In semi-confined areas such as rooms with open doors and windows or the super structure of a ship, natural ventilation will be about 2 to 5 times the content of the room or space per hour, depending on weather conditions.

The amount of fresh air necessary to reach TLV will be approximately 10 to 20 times the amount of fresh air necessary to reach 10% of LEL. When it is impractical to ventilate in such a way that TLV is not reached then fresh air masks must be used.



# SAFETY IN CONFINED SPACES AND HEALTH SAFETY

## EXPLOSION HAZARD - TOXIC HAZARD

1431

June 2013

### Emergency procedure

It may be necessary to enter an atmosphere which is unsafe. (You may have to rescue somebody). Before entering a confined space or tank ensure that:

- you wear breathing apparatus
- you wear a lifeline
- the lifeline is properly tended
- a watch is kept on you
- a means of communication exists
- a system of signals is agreed
- you and everybody else involved understand the signals

You must also make sure that:

- a back-up or rescue squad is equipped to render assistance
- resuscitation equipment is on hand

If you have to keep watch or tend a lifeline:

- keep a careful watch on your men below

If you cannot see them:

- call out to them from time to time
- make sure they answer

If they do not answer repeated calls or if they show signs of drunkenness or unusual behaviour:

- RAISE THE ALARM IMMEDIATELY
- DO NOT ATTEMPT TO RESCUE THE VICTIM BY YOURSELF
- DO NOT BECOME A VICTIM

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## SAFETY INDICATIONS

1430

a three page issue

June 2013  
revision of 10-1999

Most paints contain flammable solvents and some contain materials which can harm the skin, or damage the health if swallowed or inhaled. Whilst most countries have developed regulations to control labelling, storage and use of toxic or hazardous material as yet there is no agreed international code or system.

Sigma Coatings will adopt the local requirements in any country where their products are sold, but since it is quite impossible and even confusing to apply all the marks which could be required for every country, a Sigma Coatings system has been developed which is standard for our products throughout the world. We will then add local regulation markings in addition, if required.

Two major classes of risk must be controlled and precautions defined which will reduce the risk to acceptable levels:

A) Health risks, these include: –

1. Gases or vapours. These could include solvent evaporation during the drying period, or perhaps formed during heating of the painted object.
2. Liquids in the paint. These might be solvents, or perhaps binders, which may be toxic if swallowed or inhaled as spray droplets, or dermatitic or toxic in contact with the skin.
3. Powders or dusts. These can be formed during heating painted objects (e.g. flame cutting or welding painted steel), or be present in powder formed during sanding operations, or in spray mist.

B) Fire or explosion risks, these include: –

1. Fire risk during storage or transport. Most paints other than water based products can be ignited and will support flame.
2. Explosion hazard during application. Flammable solvents in mixture with oxygen in air can explode within certain concentration limits if ignited or detonated.

The following sentences are used to define the classes of hazard and this data sheet gives details of precautions which should be taken in each case.

## SAFETY INDICATIONS

1430

June 2013

Relatively harmless paint	<p>Normal measures which are always applicable are:</p> <ul style="list-style-type: none"> <li>– Wash hands regularly and thoroughly with warm water/soap.</li> <li>– Immediately cover any wound or cut.</li> <li>– Do not roll cigarettes, smoke, or eat with dirty hands.</li> <li>– Beware of possible dust or fumes resulting from sand papering or burning.</li> <li>– Check carefully that there is no possible fire or explosion risk.</li> <li>– Check whether extra ventilation is required.</li> </ul>
Highly flammable paint. Flash point up to and including 23°C (DIN 53213).	<p>Flash point of paints and solvents is stated in all our product data sheets. This is the lowest temperature at which a mixture of the material with air can ignite or explode. If the temperature of the air is near, or above, the flash point it is essential that sufficient ventilation air is provided to reduce the concentration of solvent well below the lower explosive limit (L.E.L.). Mixtures of solvent and air can only explode when the concentration lies between the lower and upper explosive limits. These limits vary from one solvent to another but the LEL is usually about 50 g per 1 m<sup>3</sup> of air. This is described in detail in sheet 1431. In brief 200 m<sup>3</sup> ventilation air is required per kilo of solvent to maintain an atmosphere below 10% of LEL. Such a mixture is safe even at temperatures above the flash point.</p>
Gloves recommended  Paint which irritates or affects skin or mucous membranes.	<p>Solvents and other components in some paints can irritate the skin, and although in normal paints this may only be a minor and temporary irritation, dermatitis of sensitive skins can be caused by solvents or chemicals in some paints. These are indicated by this 'glove' sentence. Barrier creams together with gloves, goggles and possibly face masks should be used. In all cases, however, the habit of using solvents to clean the skin after painting should be discouraged. Contact of paint with the skin should be avoided by use of barrier creams and protective gloves. Any paint on the skin should be removed at once with skin cleaning liquids or jellies and then washed with water.</p>
Mask recommended  Inhalation of dust and spraymist is harmful.	<p>Dust, smoke and spray mist can be filtered by face masks containing a dust filter cartridge. Cartridges are also available which absorb both dust and solvents. These are only effective whilst there is no apparent smell of solvent. The filter is exhausted when the odour of solvent can be detected and the filter should then be changed. It is most important that the correct filter for the class of work should be used. These are described by the manufacturers of the face mask and filter.</p>

## SAFETY INDICATIONS

1430

June 2013

- Fresh Air Mask recommended  
Inhalation of vapour and dust is harmful.
- Toxic substances in paints usually enter the body by inhalation of gases, vapours, fumes, dusts or spray mists. An indication of the level of hazard is the Threshold Limits Value (T.L.V.), at one time called Maximum Allowable Concentration (M.A.C.). This is the concentration which can be tolerated by a healthy worker for 8 hours a day without adverse effects. The lower the figure, the more toxic the substance.
- The concentrations are given either as parts per million (ppm), i.e. cm<sup>3</sup> of vapour per m<sup>3</sup> of air, or for solid dusts as mg per m<sup>3</sup>. The minimum volume for air required to achieve this safe level of concentration will be given in our data sheets. This volume may in some cases be as much as 20 times that required to reach 10% of LEL and in some classes of work it may be impractical to supply the volume of air required to allow the required rate of usage of paint in the compartment. In such cases it is essential that operators are supplied with, and required to use, fresh air masks or respirators fed with clean air at positive pressure. It is important that the mask has a good facial fit. See also sheet 1431.
- Paint contains heavy toxic substances and is dangerous.
- Keep skin covered as far as possible, wear gloves and protect the eyes. Avoid contamination of the skin. Provide very good ventilation **and** wear fresh air mask. Change all overclothes and shoes immediately after finishing the work. Keep dirty cloths and other objects separate, destroy or clean contaminated clothes with care. Wash the hands very thoroughly. Handle empty containers with care and avoid contamination of the environment with any poisonous paint or waste.

THE SIGMA WARNING SYSTEM will show one, or a combination of more than one, of the described sentences. The safety code required in each country will be added to drums used in that country.

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## SPECIFICATION FOR MINERAL ABRASIVES (ISO 11126)

1491

a two page issue

June 2013  
revision of June 2007

## SCOPE

This specification covers mineral abrasives such as corundum, aluminium silicate slag, or any slag mixtures which are suitable for removing rust, scale, old paint or shop primer from steel by blast cleaning and giving a satisfactory anchor pattern.

This specification covers only those abrasives commonly known as utility grades.

## REQUIREMENTS

**Material** – The abrasive may be any material meeting the requirements of this specification. It shall be composed of clean, sound, hard particles free from foreign substances such as dirt, oil, grease, toxic substances, organic matter and water soluble salts.

The abrasive supplier shall certify that any product to be delivered conforms to all requirements stated herein.

**pH** – 100 gram of a representative abrasive sample is crushed using a mortar and pestle. Approximately 50 grams of the crushed sample is added to 200 ml de-ionized water. The pH of this slurry is then determined through the use of an electronic pH meter with an accuracy of  $\pm 0.01$  pH unit.

A slurry mixture prepared in this way shall not have a pH below 6.20.

**Water Soluble Salts (ISO 11127-6 1993)** – The abrasive is mixed with de-ionized water, conductivity max. 1  $\mu\text{S}/\text{cm}$ , in the proportion 1:1, e.g. 100 g abrasive to 100  $\text{cm}^3$  water. The mixture is shaken for 5 minutes, allowed to settle for at least 1 hour and then shaken again for 5 minutes. Some of the water is decanted, the temperature is recorded and the conductivity measured by a conductivity gauge.

If the conductivity gauge does not have any temperature compensation adjustment, the conductivity should be converted to 20°C or measurement should be carried out at this temperature.

If the conductivity exceeds 250  $\mu\text{S}/\text{cm}$  the abrasive is rejected.

If the abrasive is to be used for High Pressure Wet Abrasive Blastcleaning the total amount of water soluble matter should be below 0,5% by weight.

**Moisture Content** – Approximately 200 grams of abrasive shall be weighed to the nearest 0.1 g in a tared weighing dish and dried at 105 to 110°C for 3 hours or more until successive weighings after additional 1 hour heating periods show a weight change of not more than 0.1%. The percentage of moisture is calculated as follows:

$$\text{percent moisture} = \frac{\text{original weight} - \text{final weight}}{\text{original weight of sample}} \times 100$$

The moisture content for material delivered in bags or in bulk shall not exceed 0.5% by weight.

**Oil and Grease** – The abrasive shall not be contaminated with oil and grease. 10  $\text{cm}^3$  abrasive is shaken with 10  $\text{cm}^3$  methylene chloride for about 5 minutes. 5 drops of the solvent are applied to a clean glass plate. After complete evaporation of the solvent the glass plate is exposed to ultraviolet light in total darkness.

If there is blue fluorescence the abrasive is rejected.

## SPECIFICATION FOR MINERAL ABRASIVES (ISO 11126)

1491

June 2013

**Hardness** – Examine the abrasive material under a low-power microscope (10 x) and, if grains of different colour or character are present, select a few grains of each. Separately place the grains thus differentiated between two glass microscope slides. While applying pressure, slowly move one slide over the other with a reciprocating motion for 10 seconds. Examine the glass surface and, if scratched, the material shall be considered as having a minimum hardness of 6 on Moh's scale. If any grains that fail to scratch glass are present, in any appreciable quantity, the total batch is rejected.

**Grain Shape** – The individual abrasive grains shall be angular in shape.

**Surface Profile** – The abrasive material shall produce a prescribed blasting profile  $R_z$  value (varying between 30-100  $\mu\text{m}$ )

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# ANTICORROSIVE SYSTEMS FOR UNDERWATER AND BOOTTOP - TO BE OVERCOATED WITH ANTIFOULING 3101

a seven page issue

January 2010  
revision of May 2007

Application areas: Boottop and underwater area of the outside hull of vessels

Contains the following specifications:

- Specification 1: multi-purpose epoxy coating system
- Specification 2: multi-purpose epoxy coating system
- Specification 3: high solids reinforced epoxy coating system
- Specification 4: high solids glassflake reinforced epoxy coating system
- Specification 5: high solids epoxy mastic coating system
- Specification 6: solvent free abrasion resistant epoxy coating system
- Specification 7: chlorinated rubber coating system
- Specification 8: coaltar epoxy coating system

## **SURFACE PRE-TREATMENT**

The quality of the surface pretreatment affects the performance of underwater and boottop systems, particularly when cathodic protection is applied. Optimal results will be obtained on substrates blast cleaned to ISO-Sa2½ which means that the shop primer should be removed. This is particularly important when (underfilm) corrosion has already started. Also the right blasting profile will be obtained.

## **ACCEPTANCE OF SHOP PRIMER**

The quality and generic type of shop primer, will determine the performance of the coating system. The types of shop primer acceptable are those which are equivalent to SigmaWeld 165 and SigmaWeld 199 - zinc silicate and approved by PPG Protective & Marine Coatings. In addition, any degradation or underfilm corrosion of the shop primer will limit the performance of the total system, unless correctly treated. These remarks are of particular importance when cathodic protection is installed.

The general condition of the weathered shop primer may vary widely throughout the structure and in many instances it is difficult to assess the severity of breakdown. Experience shows that in practice reblasting of corroded shop primed steel to ISO-Sa2½ is the most satisfactory method of correcting corrosion defects and eliminating the detrimental effect of surface contamination.

Approved shop primers in good condition should be cleaned to remove contamination and/or zinc salts. If necessary sweep blasting according to SPSS/Ss or mechanical cleaning according to SPSS-Pt3 should be carried out.

Special attention should be paid to heat damaged areas, including areas alongside weldseams and backburns.

# ANTICORROSIVE SYSTEMS FOR UNDERWATER AND BOOTTOP - TO BE OVERCOATED WITH ANTIFOULINGS

3101

January 2010

<b>SPECIFICATION 1</b>	multi-purpose epoxy system for UNDERWATER and BOOTTOP with good resistance to mechanical impact, abrasion and well designed cathodic protection	
pretreatment	steel; blast cleaned to ISO-Sa2½ steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, weld seams, burned and rusty areas; blast cleaned to ISO-Sa2½ or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 700	125 µm
	SigmaCover 525	125 µm
	antifouling as specified	
notes	<ul style="list-style-type: none"> <li>– SigmaCover 525 can be replaced by SigmaCover 555</li> <li>– at temperatures below 5°C, SigmaPrime 700 can be replaced by SigmaPrime 700 LT</li> </ul>	
maintenance	should preferably be carried out to this specification	

<b>SPECIFICATION 2</b>	multi-purpose epoxy system for UNDERWATER and BOOTTOP with good resistance to mechanical impact, abrasion and well designed cathodic protection	
pretreatment	steel; blast cleaned to ISO-Sa2½ steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, weld seams, burned and rusty areas; blast cleaned to ISO-Sa2½ or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 200	125 µm
	SigmaCover 525	125 µm
	antifouling as specified	
notes	<ul style="list-style-type: none"> <li>– SigmaCover 525 can be replaced by SigmaCover 555</li> <li>– at temperatures below 5°C, SigmaPrime 200 can be replaced by SigmaPrime 200 LT</li> </ul>	
maintenance	should preferably be carried out to this specification	



# ANTICORROSIVE SYSTEMS FOR UNDERWATER AND BOOTTOP - TO BE OVERCOATED WITH ANTIFOULINGS

3101

January 2010

<b>SPECIFICATION 3</b>	high solids reinforced epoxy system for UNDERWATER and BOOTTOP with excellent resistance to mechanical impact, abrasion and well designed cathodic protection	
pretreatment	steel: blast cleaned to ISO-Sa2½ steel with approved zinc silicate shop primer: sweep blasted to SPSS-Ss, weld seams, burned and rusty areas: blast cleaned to ISO-Sa2½ or power tool cleaned to SPSS-Pt3	
paint system	SigmaShield 220	125 µm
	SigmaShield 420	125 µm
	SigmaCover 525	75 µm
	antifouling as specified	
notes	<ul style="list-style-type: none"> <li>– SigmaShield 220 can be replaced by SigmaPrime 200 or 700</li> <li>– SigmaCover 525 can be replaced by SigmaCover 555</li> <li>– at temperatures below 5°C, SigmaPrime 200 or 700, SigmaShield 220 and SigmaShield 420 can be replaced by the LT versions</li> </ul>	
maintenance	should preferably be carried out to this specification	

<b>SPECIFICATION 4</b>	high solids, glassflake reinforced epoxy system on top of in situ applied epoxy primer for UNDERWATER and BOOTTOP with good resistance to heavy impact (fender areas - ice going vessels) and well designed cathodic protection	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile (R <sub>z</sub> ) 50 - 100 µm	
paint system	SigmaShield 220	100 µm
	SigmaShield 460	400 µm
	SigmaCover 525	75 µm
	antifouling as specified	
notes	<ul style="list-style-type: none"> <li>– if a holding primer is required, SigmaShield 220 can be replaced by SigmaCover 280 at a dft of 50 µm</li> <li>– SigmaCover 525 can be replaced by SigmaCover 555</li> <li>– at temperatures below 5°C, SigmaShield 220 and SigmaShield 460 can be replaced by the LT versions</li> </ul>	
maintenance	should preferably be carried out to this specification	

# ANTICORROSIVE SYSTEMS FOR UNDERWATER AND BOOTTOP - TO BE OVERCOATED WITH ANTIFOULINGS

3101

January 2010

**SPECIFICATION 5**

high solids, epoxy mastic coating system for maintenance of UNDERWATER and BOOTTOP with good resistance to mechanical impact and well designed cathodic protection

pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile (R<sub>z</sub>) 40 - 70 µm  
steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3

paint system

SigmaCover 380 125 µm  
SigmaCover 525 125 µm

notes

- SigmaCover 380 can be replaced by SigmaCover 630 aluminium
- at temperatures below 5°C, SigmaCover 380 can be replaced by the LT version

maintenance

should preferably be carried according to this specification

pretreatment

in case of hydrojetted to VIS WJ2 L or ISO Wa 2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see information sheet 1498)

**SPECIFICATION 6**

solvent free, abrasion resistant epoxy system for UNDERWATER and BOOTTOP with excellent resistance to mechanical impact (e.g. for ice going and ice breaking vessels) and well designed cathodic protection

pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile (R<sub>z</sub>) 50 - 100 µm

paint system

SigmaShield 1200 400 µm  
SigmaCover 525 75 µm  
antifouling as specified

notes

- SigmaCover 525 can be replaced by SigmaCover 555
- at temperatures below 5°C, SigmaShield 1200 can be replaced by SigmaShield 1200 LT

maintenance

should preferably be carried out to this specification

# ANTICORROSIVE SYSTEMS FOR UNDERWATER AND BOOTTOP - TO BE OVERCOATED WITH ANTIFOULINGS

3101

January 2010

**SPECIFICATION 7**

chlorinated rubber system for UNDERWATER and BOOTTOP with good resistance to well designed cathodic protection

## pretreatment

steel; blast cleaned to ISO-Sa2½  
steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, weld seams, burned and rusty areas; blast cleaned to ISO-Sa2½ or power tool cleaned to SPSS-Pt3

## paint system

Sigma Vikote 18 light	75 µm
Sigma Vikote 18 dark	75 µm
Sigma Vikote 18 light	75 µm
antifouling as specified	

## note

for touch up areas 2 coats of Sigma Vikote 18 at a dft of 100 µm each can be specified

## maintenance

should preferably be carried out to this specification

**SPECIFICATION 8**

coal tar epoxy system for UNDERWATER and BOOTTOP with good resistance to mechanical impact, abrasion and well designed cathodic protection

## pretreatment

steel: blast cleaned to ISO-Sa2½  
steel with approved zinc silicate shop primer:  
sweep blasted to SPSS-Ss  
weld seams, burned and rusty areas: blast cleaned to ISO-Sa2½ or power tool cleaned to SPSS-Pt3  
if a holding primer is required, SigmaCover 280 can be used (dft of 50 µm)

## paint system

SigmaCover 300 brown	125 µm
SigmaCover 510	125 µm
antifouling as specified	

## note

at temperatures below 5°C, SigmaCover 300 can be replaced by SigmaCover 300 brown LT

## maintenance

should preferably be carried out to this specification

## pretreatment

in case of hydrojetted to VIS WJ2 L or ISO Wa 2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see sheet 1498)

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**ANTICORROSIVE SYSTEMS FOR UNDERWATER AND BOOTTOP -  
TO BE OVERCOATED WITH ANTIFOULINGS**

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3101

January 2010

**MAINTENANCE**

As in normal dry-docking practice, fouling, loose paint and other contaminants should be removed by high pressure water cleaning (HPWC). Any fouling and/or loose paint remaining after HPWC must be removed by scraping or sweep blasting. The removal of an oil or grease belt can be achieved by scraping heavy deposits from the surface followed by HPWC in combination with the use of suitable detergents. This should be followed by a thorough fresh water wash and drying prior to blasting and/or repainting. It might, however, be necessary to blast clean such areas after this operation when oil has penetrated the underlying paint systems. Rusty spots should be pretreated by blast cleaning and touched up with the original anticorrosive system within the requirements given in the relevant specifications.

**CATHODIC PROTECTION**

Sacrificial zinc anodes produce potential differences related to the Ag/AgCl reference electrode of approx. minus 1050 mV. As the resistance of bituminous aluminium coatings and chlorinated rubber coatings lie in the region of this figure it is therefore recommended to apply a protective shield around the anodes when a vessel with such a coating system is fitted with anodes. For this purpose it is recommended to blast the related area to ISO-Sa2½ followed by 1 coat of 75 µm of SigmaCover 280 and 2 coats of 300 µm each of SigmaShield 460 as a protective shield.

# ANTICORROSIVE SYSTEMS FOR UNDERWATER AND BOOTTOP - TO BE OVERCOATED WITH ANTIFOULINGS

3101

## REFERENCES

Sigma Vikote 18	see product data sheet 7318
SigmaCover 280	see product data sheet 7417
SigmaCover 300	see product data sheet 7472
SigmaCover 300 LT	see product data sheet 7483
SigmaCover 380	see product data sheet 7979
SigmaCover 380 LT	see product data sheet 7980
SigmaCover 510	see product data sheet 7479
SigmaCover 525	see product data sheet 7902
SigmaCover 555	see product data sheet 7905
SigmaCover 630 aluminium	see product data sheet 7431
SigmaPrime 200	see product data sheet 7416
SigmaPrime 200 LT	see product data sheet 7931
SigmaPrime 700	see product data sheet 7930
SigmaPrime 700 LT	see product data sheet 7946
SigmaShield 220	see product data sheet 7922
SigmaShield 220 LT	see product data sheet 7926
SigmaShield 420	see product data sheet 7951
SigmaShield 420 LT	see product data sheet 7955
SigmaShield 460	see product data sheet 7952
SigmaShield 460 LT	see product data sheet 7972
SigmaShield 1200	see product data sheet 7744
SigmaShield 1200 LT	see product data sheet 7746
SigmaWeld 165	see product data sheet 7171
SigmaWeld 199	see product data sheet 7177
Cleaning of steel and removal of rust	see information sheet 1490
Hydrojetting	see information sheet 1498
Prefabrication primers	see system sheet 3015

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## HEAT RESISTANT SYSTEMS

3140

a two page issue

January 2010  
revision of September 2005

## GENERAL ASPECTS

Most heat resistant paints rely on aluminum pigments for their protective properties.

For the lower temperature range an alkyd based system can be used at temperatures up to 100°C and a normal epoxy based system can be used at temperatures up to 125°C.

Alkyd based heat resistant aluminum paints will protect steel up to about 175°C. Above this temperature the alkyd binder will eventually be destroyed, but the aluminum pigment will continue to protect the surface after sintering at a temperature above 350°C.

Epoxy aluminum paints have good resistance to heat, up to about 200°C.

Silicone based paints will give prolonged service at high temperatures up to respectively 400°C - 500°C.

Good surface preparation is essential for a good performance of heat resistant paint systems. Steel preparation to minimum ISO-St3 can be accepted for internal areas, but blast cleaning to ISO-Sa2½ is the minimum acceptable standard for external areas.

Steel abraded by means of flexible carborundum abrasive discs, resulting in a rustfree **abraded** SPSS-Pt3, is acceptable for a steel surface that has no mill scale.

**SPECIFICATION 1**

heat resistant system, based on aluminum pigmented alkyd paint applied to an anticorrosive primer for substrate temperatures **up to 175°C**, for normal atmospheric exposure

pretreatment

steel; blast cleaned to ISO-Sa2½  
steel without mill scale; power tool cleaned to SPSS-Pt3, by means of flexible carborundum abrasive discs

paint system

Sigmarine 24	35 µm
SigmaTherm 175	25 µm
SigmaTherm 175	25 µm
SigmaTherm 175	25 µm

**SPECIFICATION 2**

heat resistant system based on epoxy paint for substrate temperatures **up to 200°C** for marine and industrial atmospheric exposure

pretreatment

steel; blast cleaned to ISO-Sa2½  
steel without mill scale; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 by means of flexible carborundum abrasive discs

paint system

SigmaCover 435	75 µm
SigmaCover 435	75 µm
SigmaCover 435	75 µm

## HEAT RESISTANT SYSTEMS

3140

January 2010

<b>SPECIFICATION 3</b>	heat resistant system based on aluminum pigmented alkyd paint for substrate temperatures <b>up to 500°C</b> for interior use only	
pretreatment	steel; blast cleaned to ISO-Sa2½ steel without mill scale; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 by means of flexible carborundum abrasive discs	
paint system	SigmaTherm 500	25 µm
	SigmaTherm 500	25 µm
note	a minimum temperature of 200°C during 1 hour within a short time after application is necessary to obtain maximum performance	

## REFERENCES

SigmaCover 435	see product data sheet 7465
Sigmarine 24	see product data sheet 7135
SigmaTherm 175	see product data sheet 7260
SigmaTherm 500	see product data sheet 7261
Cleaning of Steel and Removal of Rust	see information sheet 1490

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## HOT WATER RESISTANT SYSTEMS

3141

an one page issue

January 2010  
revision of April 2009

## GENERAL ASPECTS

Salt water distilled (condensate) or demineralized water of neutral pH are all very similar in effect on protective coatings but acidic or alkaline water is more aggressive. The system described is resistant up to a water temperature of 100°C.

Protection against hot water by a paint system is in fact very critical. Only the combination of a very good pretreatment, right film thicknesses and good curing and ventilation will give the desired protection against the influence of hot water.

Blast cleaning to ISO-Sa2½ is essential. A (blast cleaned) pitted corroded surface, impurities in the protective coating or bad workmanship will result in failures.

In service the steel substrate should have about the same temperature as the hot water itself in order to avoid blistering. Equipment, tank or vessel must therefore be insulated adequately to reduce heat transfer through steel wall plus coating system.

Application of the paints must be done very carefully, avoiding excess thickness, avoiding entrapment of solvent and maintaining good ventilation and curing conditions throughout the application and curing process (please refer to sheets 1431, 1433 and 1434).

For recommended application instructions and repair procedure – see working procedure –

<b>SPECIFICATION</b>	phenolic epoxy based system resistant to hot water up to 100°C	
pretreatment	steel; blast cleaned in situ to at least ISO-Sa2½ and free from rust, mill scale, prefabrication primer and any other contamination blasting profile (R <sub>Z</sub> ); 50 - 100 µm	
paint system	PhenGuard 930	100 µm
	PhenGuard 935	100 µm
	PhenGuard 940	100 µm

## REFERENCES

PhenGuard 930	see product data sheet 7409
PhenGuard 935	see product data sheet 7435
PhenGuard 940	see product data sheet 7436
Safe working in confined spaces	see information sheet 1433
Safety in confined spaces and health safety explosion hazard - toxic hazard	see information sheet 1431
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490

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## MISCELLANEOUS SYSTEMS

3108

a four page issue

January 2010  
revision of January 2007

Application areas: systems for objects and/or areas on board of ships which are not yet mentioned in our other system sheets, such as:

- Oil resisting system for below gratings, and engine room below floor level.
- Systems for void spaces, chain lockers, behind ceilings and linings.
- Clear varnish system for woodwork internal and external.
- System for galvanised steel.

Contains the following specifications:

Specification 1:	multi-purpose epoxy coating system
Specification 2:	multi-purpose epoxy coating system
Specification 3:	solvent free epoxy system for cofferdams, void spaces etc.
Specification 4:	wood oil phenolic resin clear varnish system
Specification 5:	epoxy system for galvanised steel

**ACCEPTANCE OF SHOP PRIMER**

The quality and nature of shop primer, will determine the performance of the coating system. The types of shop primer acceptable are those which are equivalent to SigmaWeld 165 and SigmaWeld 199 - zinc silicate and approved by PPG Protective & Marine Coatings.

Unless correctly treated, the condition of the shop primer with regard to degradation and underfilm corrosion will determine the performance of the total system.

The general condition of the weathered shop primer may vary widely throughout the structure and in many instances it is difficult to assess the severity of breakdown.

Experience shows that in practice reblasting to ISO-Sa2½ of corroded shop primed steel is the most satisfactory method of correcting corrosion defects and eliminating the detrimental effect of surface contamination.

Approved shop primers in good condition should be cleaned to remove contamination and/or zinc salts. If necessary, sweep blasting according to SPSS-Ss or mechanical cleaning according to SPSS-Pt3 should be carried out. Special attention should be taken to areas damaged by heat.

<b>SPECIFICATION 1</b>	multi-purpose epoxy coating system for internal spaces	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile (Rz) 40 - 70 µm steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 700	75 µm
maintenance	should preferably be carried out according to this specification	

## MISCELLANEOUS SYSTEMS

3108

January 2010

<b>SPECIFICATION 2</b>	multi-purpose epoxy coating system for internal spaces	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile (Rz) 40 - 70 µm steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 200	75 µm
maintenance	should preferably be carried out according to this specification	

<b>SPECIFICATION 3</b>	system for non immersed areas such as chain lockers, cofferdams, void spaces and behind linings cold sprayable solvent free epoxy coating resistant to dry and wet exposure conditions	
pretreatment	steel; blast cleaned to ISO-Sa2½ shop primed steel; sweep blasted to SPSS-Ss	
paint system	SigmaGuard 425 edges, weld seams, bolts etc. to be stripe coated	300 µm

<b>SPECIFICATION 4</b>	clear varnish system for interior and exterior use good resistance to salt water, fresh water and abrasion approved for low flame spread, see sheet 1883 (B)	
pretreatment	open grain wood; free from contamination tropical timber; to be sealed with a clear polyurethane varnish to seal off aggressive products in the wood previous clear coats; free from any contamination, surface should be sandpapered to obtain good adhesion	
paint system	Sigmarine 42 diluted 100% with Thinner 20-05 Sigmarine 42 diluted 50% with Thinner 20-05 Sigmarine 42 undiluted Sigmarine 42 undiluted  (between each coat sand papering is required)	
notes	<ul style="list-style-type: none"> <li>- oil seals (linseed etc) should not be used under Sigmarine 42, the varnish should be applied directly to the bare wood or on top of a polyurethane sealer (two component)</li> <li>- in general a four coat system is sufficient</li> </ul>	

## MISCELLANEOUS SYSTEMS

3108

January 2010

<b>SPECIFICATION 5</b>	epoxy based system for galvanised steel exposed to marine, industrial or wet conditions (handrails, ventilation trunks, guard rails)	
pretreatment	galvanised steel and aluminium; degreasing with suitable detergent and removal of (zinc)salts by means of mechanical cleaning (e.g. by brushing with nylon brushes) followed by fresh water washing, drying and roughening up of the surface	
paint system	SigmaCover 280	50 µm
	SigmaCover 456	75 µm
	SigmaDur 550	50 µm

**MAINTENANCE**

Maintenance of a system is normally carried out by reblasting to ISO-Sa2½ for major areas of breakdown and recoating with the original system. Minor areas should be pretreated according to at least the minimum surface pretreatment and repaired as described in the system specifications.

## MISCELLANEOUS SYSTEMS

3108

January 2010

## REFERENCES

SigmaCover 280	see product data sheet 7417
SigmaCover 456	see product data sheet 7466
SigmaDur 550	see product data sheet 7537
SigmaGuard 425	see product data sheet 7953
SigmaPrime 200	see product data sheet 7416
SigmaPrime 700	see product data sheet 7930
Sigmarine 42	see product data sheet 8103
SigmaWeld 165	see product data sheet 7171
SigmaWeld 199	see product data sheet 7177
Cleaning of steel and removal of rust	see information sheet 1490
Certificates for low-flame spread	see information sheet 1883 (B)

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## NOVAGUARD TANKCOATING SYSTEM

3328

a three page issue

January 2010  
revision of April 2009**GENERAL DESCRIPTION**

The NovaGuard tankcoating system is a 1 or 2 coat, solvent free phenolic epoxy tank lining, with excellent resistance against a wide range of chemicals.

Prefabrication primers must be removed. This tankcoating system consists of either 1 or 2 coats, depending on configuration of area to be coated, with specification film thicknesses ranging from 300 to 450 microns.

Single coat application is only recommended for large flat surfaces such as tanktops. For more complex structures a two coat system is required to ensure adequate dry film thickness is applied to the entire coated area.

Sharp edges, holes, backsides of bulbs, weld seams and other areas not readily accessible to sprayguns should be stripe coated by brush with the next coat of the system to achieve the specified film thickness.

For detailed information on resistance and resistance notes, please refer to latest issue of the Tankcoating Resistance list (TRIS)

For recommended application instructions

– see working procedure –

**SPECIFICATION FOR IN SITU BLASTED STEEL**

<b>SPECIFICATION1</b>	recommended system for chemical and solvent resistance (according to latest issue of the Tankcoating Resistance list (TRIS) )	
pretreatment	steel; blast cleaned to ISO-Sa2½ blasting profile (Rz); 50 - 100 µm	
paint system	NovaGuard 840	300 µm
Note	In case of complicated tank structures it is recommended to apply 2 coats of 250 µm of NovaGuard 840	

**NOVAGUARD TANKCOATING SYSTEM**

**3328**

January 2010

<b>SPECIFICATION 2</b>	maintenance of minor defects	
pretreatment	corroded mechanically damaged spots and other defects should be freed from rust and any contamination by reblasting to ISO-Sa2½ (preferably vacuum blasting) or disc sanding according to SPSS-Pt3 the areas surrounding the cleaned spots should be feather edged or sanded in order to obtain good adhesion	
paint system	original system specification, if repaired by brush, at least, 2 coats have to be applied in order to achieve the specified minimum dry film thickness (300 µm)	
	or	
	SigmaGuard 795	125 µm
	SigmaGuard 795	125 µm

**CURING TABLE**

substrate temperature	min. curing time of NovaGuard tankcoating system before transport of cargoes without note 4, 7, 8 or 11 and ballast water and tanktest with seawater
5°C	15 days
10°C	7 days
20°C	5 days
30°C	3 days
40°C	2 days

- minimum curing time of NovaGuard tankcoating system before transport of cargoes with note 4, 7, 8 or 11: 3 months
- for detailed information on resistance and resistance notes, please refer to latest issue of the Tankcoating Resistance list (TRIS)
- adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434)

## NOVAGUARD TANKCOATING SYSTEM

3328

January 2010

## REFERENCES

NovaGuard 840	see product data sheet 7468
SigmaGuard 795	see product data sheet 7455
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491

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## PHENGUARD 965 TANKCOATING SYSTEM

3329

a four page issue

January 2010  
revision of April 2009**GENERAL DESCRIPTION**

The PhenGuard 965 tankcoating system is a 3 coat phenolic epoxy tanklining, with maximum cargo flexibility and excellent resistance against a very wide range of organic acids, alcohols, edible oils, fats (regardless of free fatty acid content) and solvents.

This tankcoating system, consisting of a primer, a coating and a finish is especially developed for tanks which are to carry the widest range of liquid cargoes possible.

Prefabrication primers, if present, must be removed. The specified total minimum dry film thickness is 300 µm, the average maximum dft is 450 µm and locally the maximum dft should not exceed 600 µm. (Minimum and maximum dfts per coat for airless spray application are 80 µm and 200 µm respectively.) Edges, welding seams, backsides of bulbs, corners and other areas not readily accessible to spray application, to be stripe coated by brush with the next coat of the system to achieve the specified film thickness.

For detailed information on resistance and resistance notes, please refer to the latest issue of the Tankcoating Resistance list (TRIS).

For recommended application instructions

– see working procedure –

**SYSTEM SPECIFICATION FOR IN SITU BLASTED STEEL**

<b>SPECIFICATION 1</b>	system for chemical and solvent resistance according to latest issue of the Tankcoating Resistance list (TRIS)	
pretreatment	steel; blast cleaned in situ to at least ISO-Sa2½ and free from rust, scale, prefabrication primer and any other contamination blasting profile (Rz); 50 - 100 µm	
paint system	PhenGuard 965 white	100 µm
	PhenGuard 965 pink	100 µm
	PhenGuard 965 grey	100 µm

For airless spray application the minimum dft per coat is 80 µm and the maximum dft per coat is 150 µm for the primer and 200 µm for the coating or finish



## PHENGUARD 965 TANKCOATING SYSTEM

3329

January 2010

<b>SPECIFICATION 2</b>	maintenance of minor defects	
pretreatment	corroded mechanically damaged spots and other defects should be freed from rust and any contamination by reblasting to a minimum of ISO-Sa2½ (preferably vacuum blasting) or disc sanding according to SPSS-Pt3 the areas surrounding the cleaned spots should be carefully feather edged in order to obtain good adhesion	
paint system	original system specification if repaired by brush, at least 4 coats have to be applied in order to obtain the specified dry film thickness (300 µm) or SigmaGuard 795 150 µm SigmaGuard 795 150 µm	

## DATA FOR OVERCOATING

Substrate temperature	minimum interval between coats	maximum Interval between coats
5°C	24 hours	28 days
10°C	20 hours	25 days
15°C	14 hours	21 days
20°C	8 hours	14 days
30°C	6 hours	7 days
Remarks:	1, 2	2

## PHENGUARD 965 TANKCOATING SYSTEM

3329

January 2010

**CURING TABLE**

substrate temperature	min. curing time of PhenGuard 965 tankcoating system before transport of cargoes without note 4, 7, 8 or 11 and ballast water and tanktest with seawater
5°C	7 days
10°C	5 days
15°C	4 days
20°C	3 days
30°C	2 days

**REMARKS**

1. Minimum curing time of Phenguard 965 tankcoating system before transport of cargoes with note 4, 7, 8 or 11: 3 months.
2. For detailed information on resistance and resistance notes, please refer to the latest issue of the Tankcoatings Resistance list (TRIS) .
3. For transport of methanol and vinyl acetate monomer, a hot cargo cure is required which cannot be substituted by a service period of 3 months with non-aggressive cargoes.
4. adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434)

**REFERENCES**

PhenGuard 965	see product data sheet 7959
SigmaGuard 795	see product data sheet 7455
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Recognized corrosion control coating (Lloyd's register)	see information sheet 1886

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# APPENDIX TO PHENGUARD 965 TANKCOATING SYSTEM

## HOT CURE

3329

January 2010

### Method: Hot Water using Butterworth Systems

For vessels of double skin construction the procedure for hot cure of the PhenGuard system with hot fresh water gives good results.

Temperature of the water: approximately 80 - 85 Degrees Centigrade.

Steel Temperature: Minimum steel temperature of the internal surface must be constant 60 Degrees Centigrade.

Minimum curing time in relation to steel temperature:

Min curing time	Steel Temperature
16 Hours	60 Degrees Centigrade
6 Hours	70 Degrees Centigrade
3 Hours	80 Degrees Centigrade

### Procedure

Recommended procedure is to commence by heating up of water to a temperature of 80 - 85 Degrees Centigrade using heating coils in slop tanks or by other means such as heat exchangers, then distributing the hot water through butterworths using recirculation method continuously for periods as described in above table.

Start up time before achievement of required substrate temperature depends on the capacity of heating equipment, and external temperatures.

### Special note

- 1) Heating up times are not included in the minimum curing times mentioned in the above table
- 2) Steel temperatures during curing period must be monitored continuously and extensively by automatic equipment. Special attention to be taken to cold areas such as but not limited to stiffeners etc. A record of temperatures to be maintained at all times.
- 3) To avoid cold wall effect, adjacent areas must be free from Ballast or Cargo.

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## PHENGUARD TANKCOATING SYSTEM

3322

a four page issue

January 2010  
revision of April 2009**GENERAL DESCRIPTION**

The PhenGuard tankcoating system is a 3 coat phenolic epoxy tanklining, with maximum cargo flexibility and excellent resistance against a very wide range of organic acids, alcohols, edible oils, fats (regardless of free fatty acid content) and solvents.

This tankcoating system, consisting of a primer, a coating and a finish is especially developed for tanks which are to carry the widest range of liquid cargoes possible.

Prefabrication primers, if present, must be removed. The specified total minimum dry film thickness is 300 µm, the average maximum dft is 450 µm and locally the maximum dft should not exceed 600 µm. (Minimum and maximum dfts per coat for airless spray application are 80 µm and 200 µm respectively.) Edges, welding seams, backsides of bulbs, corners and other areas not readily accessible to spray application, to be stripe coated by brush with the next coat of the system to achieve the specified film thickness.

For detailed information on resistance and resistance notes, please refer to the latest issue of the Tankcoating Resistance list (TRIS).

For recommended application instructions

– see working procedure –

**SYSTEM SPECIFICATION FOR IN SITU BLASTED STEEL**

<b>SPECIFICATION 1</b>	system for chemical and solvent resistance according to latest issue of the Tankcoating Resistance list (TRIS)	
pretreatment	steel; blast cleaned in situ to at least ISO-Sa2½ and free from rust, scale, prefabrication primer and any other contamination blasting profile (Rz); 50 - 100 µm	
paint system	PhenGuard 930	100 µm
	PhenGuard 935	100 µm
	PhenGuard 940	100 µm

For airless spray application the minimum dft per coat is 80 µm and the maximum dft per coat is 150 µm for the primer and 200 µm for the coating or finish

## PHENGUARD TANKCOATING SYSTEM

3322

April 2009

<b>SPECIFICATION 2</b>	maintenance of minor defects		
pretreatment	corroded mechanically damaged spots and other defects should be freed from rust and any contamination by reblasting to a minimum of ISO-Sa2½ (preferably vacuum blasting) or disc sanding according to SPSS-Pt3 the areas surrounding the cleaned spots should be carefully feather edged in order to obtain good adhesion		
paint system	original system specification if repaired by brush, at least 4 coats have to be applied in order to obtain the specified dry film thickness (300 µm) or SigmaGuard 795 150 µm SigmaGuard 795 150 µm		

## DATA FOR OVERCOATING

Substrate temperature	Interval between coats 1 and 2	Interval between coats 2 and 3	Interval between coats 1, 2 and 3
	minimum	minimum	maximum
10°C	60 hours	36 hours	28 days
15°C	48 hours	32 hours	25 days
20°C	36 hours	24 hours	21 days
30°C	24 hours	16 hours	14 days
40°C	16 hours	12 hours	7 days
Remarks:	1, 2	2	2

**PHENGUARD TANKCOATING SYSTEM**

**3322**

April 2009

**CURING TABLE**

substrate temperature	min. curing time of PhenGuard tankcoating system before transport of cargoes without note 4, 7, 8 or 11 and ballast water and tanktest with seawater
10°C	14 days
15°C	14 days
20°C	10 days
30°C	7 days
40°C	5 days

**REMARKS**

1. Minimum curing time of PhenGuard tankcoating system before transport of cargoes with note 4, 7, 8 or 11: 3 months.
2. For detailed information on resistance and resistance notes, please refer to the latest issue of the Cargo Resistance List.
3. For transport of methanol and vinyl acetate monomer, a hot cargo cure is required which cannot be substituted by a service period of 3 months with non-aggressive cargoes.
4. Adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434).
5. The performance of the applied system strongly depends on the curing degree of the first coat at time of recoating. Therefore the overcoating time between 1st and 2nd coat is extended in comparison between 2nd and 3rd coat. (see overcoating details).

**REFERENCES**

PhenGuard 930	see product data sheet 7409
PhenGuard 935	see product data sheet 7435
PhenGuard 940	see product data sheet 7436
SigmaGuard 795	see product data sheet 7455
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Recognized corrosion control coating (Lloyd's register)	see information sheet 1886

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# APPENDIX TO PHENGUARD TANKCOATING SYSTEM

## HOT CURE

3322

April 2009

### Method: Hot Water using Butterworth Systems

For vessels of double skin construction the procedure for hot cure of the PhenGuard system with hot fresh water gives good results.

Temperature of the water: approximately 80 - 85 Degrees Centigrade.

Steel Temperature: Minimum steel temperature of the internal surface must be constant 60 Degrees Centigrade.

Minimum curing time in relation to steel temperature:

Min curing time	Steel Temperature
16 Hours	60 Degrees Centigrade
6 Hours	70 Degrees Centigrade
3 Hours	80 Degrees Centigrade

### Procedure

Recommended procedure is to commence by heating up of water to a temperature of 80 - 85 Degrees Centigrade using heating coils in slop tanks or by other means such as heat exchangers, then distributing the hot water through butterworths using recirculation method continuously for periods as described in above table.

Start up time before achievement of required substrate temperature depends on the capacity of heating equipment, and external temperatures.

### Special note

- 1) Heating up times are not included in the minimum curing times mentioned in the above table
- 2) Steel temperatures during curing period must be monitored continuously and extensively by automatic equipment. Special attention to be taken to cold areas such as but not limited to stiffeners etc. A record of temperatures to be maintained at all times.
- 3) To avoid cold wall effect, adjacent areas must be free from Ballast or Cargo.

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## PREFABRICATION PRIMERS

# 3015

a four page issue

January 2010  
revision of September 2005

### GENERIC TYPES

The most commonly encountered prefabrication primers are:

- Reinforced polyvinyl butyral (PVB) prefabrication primers.\*  
These have satisfactory application, welding and handling properties, but have a lower anticorrosive performance, especially as part of a system for immersed areas in conjunction with cathodic protection.
- Zinc epoxy prefabrication primers.  
These have good anticorrosive properties and acceptable cutting and welding properties.
- Red oxide epoxy prefabrication primers.  
These have good weatherability, reasonable cutting and welding properties, but show a moderate thermal stability and poor resistance to seawater exposure with cathodic protection.
- Zinc silicate prefabrication primers. **(SigmaWeld 165)**  
These have excellent heat resistance and weatherability and acceptable cutting and welding properties.
- Reduced zinc silicate prefabrication primers. **(SigmaWeld 199)**  
These have excellent cutting and welding properties, especially in MIG/MAG welding techniques, excellent heat resistance and good weatherability.

### WELDING

The welding techniques generally used, are:

Manual Metal Arc welding (MMA)

Gravity welding

Submerged Arc welding (SAW)

Metal Inert Gas / Metal Active Gas welding (MIG/MAG)

It is known that automatic welding confers considerable economic advantages to construction yards and the MIG/MAG technique in particular has become economically attractive because it can also be used on thin plate without too much distortion.

These welding techniques are characterized by the following properties.

	MMA	Gravity Welding	SAW	MIG/MAG
Welding position	all	horizontal	horizontal	all
Automatisation	minor	yes	common	yes
Deposition rate	low	high	high	medium
Heat distortion	medium	high	high	low
Cost indication	high	medium	low	medium

\* The chromium content of these primers may be detrimental to the health of operatives and Sigma Coatings has therefore discontinued the use of these products.



## PREFABRICATION PRIMERS

3015

January 2010

The 'weldability' of a prefabrication primer is generally described by the tendency of the primer to produce little or no porosity in a weld.

During welding, the type of primer will influence spatter formation, especially in case of MIG/MAG welding.

Generic type Prefabrication primer	MMA/gravity all positions	MIG/MAG			SAW	
		1G	2F	3F	1G	2F
Red oxide epoxy	+	± (P)	– P	± P	– (P)	P
Epoxy-zinc	+	± (P)	– P	– P	+	– P
Zinc silicate SigmaWeld 165	+	+	± (S, P)	– S, P	+	± (P)
reduced zinc silicate SigmaWeld 199	+	+	+	+	+	+

1G = Butt welding

2F = Horizontal (automatic) welding of T-joint

3F = Vertical downward welding of T-joints

P = Porosity

S = Spatter

+ = Excellent

± = Possible defects, between brackets the type of defect

– = Defects

### THERMAL STABILITY

The thermal stability of a prefabrication primer depends on its composition.

Because of its inorganic nature, the behavior of silicate primers is, in this respect, excellent.

During cutting and welding, silicate primers, like SigmaWeld 199 and SigmaWeld 165, can withstand temperatures up to 1000°C for short periods.

This high level of thermal stability has several practical advantages

- cutting and welding damage is minimized
- fumes created by hot work procedures will be reduced
- the amount of weld spatter will be reduced
- weld spatter will not adhere to the primed steel

By comparison organic prefabrication primers can only resist temperatures up to 500°C for short periods.

## PREFABRICATION PRIMERS

3015

January 2010

**HEALTH AND SAFETY**

Fumes are inevitably generated during welding and cutting due to combustion of primer material.

The amount and composition of such fumes depends on the raw materials from which the prefabrication primer has been made.

Fume extracting equipment should be used in case primed steel has to be welded or cut in confined spaces.

All Sigma Coatings' prefabrication primers are checked by the North of England Industrial Health Service and fulfill Occupational Exposure Limits requirements (see information sheet 'Health certificates for prefabrication primers' 1881).

**WEATHERABILITY**

The weatherability of a primer is a function of the quality of surface preparation, film thickness applied, type of environment to which the plates and/or sections are stored and degree of damage to which they are subjected during this period.

In general zinc dust primers will perform better during atmospheric exposure than primers formulated with a minimum amount of zinc or containing no zinc at all.

Primers with a high zinc content can therefore be applied at lower dry film thicknesses.

**SECONDARY SURFACE PREPARATION**

In order to ensure satisfactory adhesion of the subsequently applied system, prefabrication primed sections have to undergo some degree of secondary surface preparation prior to system application.

The degree and type of secondary surface preparation required before application of the full coating system depends on:

the resistance to exterior exposure of the prefabrication primer

the service conditions of the subsequently applied system

the prevailing shop regulations

At the very least, this involves removal of dirt, dust and debris; but other problems will be associated with handling damage, weldseams, burn damage or excessively weathered plate.

Generally, weldseam areas and corroded or burned areas will require thorough blast cleaning or mechanical cleaning. Zinc salts should be removed by sweepblasting or by abrading mechanically using silicon carbide impregnated abrasive pads (SCAP).

A total lack of surface preparation, an insufficient degree thereof or an inappropriate service situation can all lead to rather serious consequences for the coating system on heat affected zones, weldseam areas and contaminated, corroded or damaged areas.

## PREFABRICATION PRIMERS

3015

January 2010

**RECOATABILITY**

Beside the function to protect shot blast cleaned steel during storage and construction, a prefabrication primer is often also the first coat of anticorrosive paint systems. Proper organization of all shop activities, taking into consideration all specific properties of the prefabrication primer involved, will lead to the avoidance of extensive surface preparation before overcoating.

- Epoxy prefabrication primers in sound condition may be used in coating systems which are resistant to seawater exposure without cathodic protection.  
In practice, however, these kinds of prefabrication primers are often heavily damaged by heat or mechanical influences. This means that extra attention should be paid to the pretreatment of these damaged areas when the steel structure has to be exposed to immersion in (sea) water. Experience shows that blast cleaning to ISO-Sa2½ is the most effective pretreatment method for these areas and exposure conditions.
- Zinc containing prefabrication primers may show the formation of zinc salts during weathering, depending on exposure conditions and time. The formation of zinc salts can be avoided by overcoating the prefabrication primer before the structure leaves the shop. If this is not possible, a second surface preparation should take place especially after long weathering periods.
- The presence of a prefabrication primer in tankcoating systems is generally not accepted because the chemical resistance of the tankcoating system will be diminished.

**REFERENCES**

SigmaWeld 165

see product data sheet 7171

SigmaWeld 199

see product data sheet 7177

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**SIGMAGLIDE FOULING RELEASE COATING SYSTEM****3127**

a four page issue

January 2010  
revision of May 2008**GENERAL DESCRIPTION**

The SigmaGlide coating system is a biocide free, silicone elastomeric, low surface energy coating to protect vessels and other immersed substrates from fouling. The SigmaGlide coating system is high gloss and colour stable.

Once applied, the SigmaGlide system forms a smooth surface to which algal and macro fouling have difficulty adhering. This fouling may settle, but friction due to water movement will cause the fouling to detach.

This fouling release mechanism does not rely on biocidal activity and therefore the SigmaGlide system is environmentally friendly and not subject to special environmental legislation.

The very smooth surface aids the fuel performance of most vessels and furthermore, because the silicone based SigmaGlide system is highly durable, extended service life is possible.

In order to get optimal benefits from the SigmaGlide system proper application under supervision of a PPG Protective & Marine Coatings Field Technical Services Representative experienced with application of fouling release systems is essential.

The specified minimum dry film thickness for both SigmaGlide 790 (Tiecoat) and SigmaGlide 890 (Finish) is 150 µm. The SigmaGlide 990 is specified with a minimum dry film thickness of 180 µm. It is important that this minimum dry film thickness is applied in order to ensure optimal performance of the system.

The SigmaGlide system can only be used over freshly applied epoxy coating. In order to make sure that under all application conditions an optimal coating system is obtained, only a few anticorrosive products are recommended as substrates for the SigmaGlide systems. These recommended anticorrosive products are given in the specifications below.

In order to have optimal benefits from the smooth surface and the long durability of the SigmaGlide system it is recommended to blast the steel surface to a minimum of ISO-Sa2½ with a blasting profile of 40-70 µm.

For recommended application instructions and repair procedure

– see working procedure –

## SIGMAGLIDE FOULING RELEASE COATING SYSTEM

3127

January 2010

## SPECIFICATIONS FOR IN SITU BLASTED STEEL

<b>SPECIFICATION 1</b>	Fouling Release system with multipurpose epoxy anticorrosive coating for Underwater and Boottop. This coating system is recommended for substrate temperatures between 10 and 20°C.	
pretreatment	steel; blast cleaned to a minimum of ISO-Sa2½, blasting profile 40-70 µm	
paint system	SigmaPrime 200 yellow/green	150 µm
	SigmaShield 610 redbrown	150 µm
	SigmaGlide 790 grey	150 µm
	SigmaGlide 990 dark red	180 µm
Notes	<ul style="list-style-type: none"> <li>- SigmaGlide 990 dark red can be replaced by SigmaGlide 890 redbrown</li> <li>- for low VOC system SigmaPrime 200 can be replaced by SigmaShield 220 in a dft of 125 µm</li> </ul>	

<b>SPECIFICATION 2</b>	Fouling Release system with multipurpose epoxy anticorrosive coating for Underwater and Boottop. This coating system is recommended for substrate temperatures above 20°C	
pretreatment	steel; blast cleaned to a minimum of ISO-Sa2½, blasting profile 40-70 µm	
paint system	SigmaPrime 200 yellow/green	150 µm
	SigmaShield 620 redbrown	150 µm
	SigmaGlide 790 grey	150 µm
	SigmaGlide 990 dark red	180 µm
Notes	<ul style="list-style-type: none"> <li>- SigmaGlide 990 dark red can be replaced by SigmaGlide 890 redbrown</li> <li>- for low VOC system SigmaPrime 200 can be replaced by SigmaShield 220 in a dft of 125 µm</li> </ul>	

## SIGMAGLIDE FOULING RELEASE COATING SYSTEM

3127

January 2010

## DATA FOR OVERCOATING

- surface should be dry and free from any contamination
- relative humidity should be above 40%

**Overcoating table for SigmaShield 610 for dft up to 150 µm**

With SigmaGlide 790

substrate temperature	10°C	20°C
minimum interval	24 hours	12 hours
maximum interval	7 days	5 days

**Overcoating table for SigmaShield 620 for dft up to 150 µm**

With SigmaGlide 790

substrate temperature	20°C	30°C	40°C
minimum interval	12 hours	4 hours	4 hours
maximum interval	5 days	3 days	2 days

\* at temperatures between 10°C and 20°C SigmaShield 610 should be specified;  
at temperatures above 20°C SigmaShield 620 should be applied

**Overcoating table for SigmaGlide 790 for dft up to 150 µm**

With SigmaGlide 790

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	30 min.	15 min.	10 min.	10 min.
maximum interval	14 days	5 days	3 days	2 days

**Overcoating table for SigmaGlide 790 for dft up to 150 µm**

With SigmaGlide 990 and 890

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	24 hours	12 hours	10 hours	8 hours
maximum interval	14 days	5 days	3 days	2 days

## SIGMAGLIDE FOULING RELEASE COATING SYSTEM

3127

January 2010

**Overcoating table for SigmaGlide 990 and 890**

With SigmaGlide 990 and 890

substrate temperature	10°C	20°C	30°C	40°C
minimum interval	3 hours	2 hours	1 hour	1 hour
refloating	8 hours	8 hours	8 hours	8 hours

**REFERENCES**

SigmaPrime 200	see product data sheet 7416
SigmaShield 220	see product data sheet 7926
SigmaShield 610	see product data sheet 7978
SigmaShield 620	see product data sheet 7948
SigmaGlide 790	see product data sheet 7386
SigmaGlide 890	see product data sheet 7399
SigmaGlide 990	see product data sheet 7397
Explanation to product datasheets	see information sheet 1411
Safety indications	see information sheet 1430

PPG Protective & Marine Coatings' General working procedure for application of SigmaGlide

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## SIGMAGUARD 720 TANK COATING SYSTEM

3320

a four page issue

May 2013  
revision of January 2010**GENERAL DESCRIPTION**

The SIGMAGUARD 720 tank coating system is a fast drying, glossy, easy to clean tank coating, with good resistance against a wide range of chemicals including water and ballast water.

The tank coating system consists of one coat SIGMAGUARD 720 grey followed by one coat SIGMAGUARD 720 green.

The specified total minimum dry film thickness is 250 µm (for vessels which are not built under IMO resolution MSC. 288(87), locally the maximum should not exceed 600 µm.

Edges, weld seams, reverse sides of bulbs, corners and other areas not readily accessible to spray application should be stripe coated by brush with the next coat of the system to achieve the specified film thickness.

For detailed information on resistance and resistance notes, please refer to the latest issue of the Tank coating Resistance list (TRIS)

For recommended application instructions

– see working procedure –

**SPECIFICATIONS FOR IN SITU BLASTED STEEL**

<b>SPECIFICATION 1</b>	System for chemical and solvent resistance according to the latest issue of the Tank coating Resistance list (TRIS)	
Pre-treatment	steel; blast cleaned to a minimum of ISO-Sa2½ blasting profile (Rz); 40 - 70 µm	
Paint system	SIGMAGUARD 720 grey	125 µm
	SIGMAGUARD 720 green	125 µm



**SIGMAGUARD 720 TANK COATING SYSTEM**

**3320**

May 2013

<b>SPECIFICATION 2</b>	system for Cargo Tanks of Crude Oil tankers according to IMO resolution MSC.288(87)	
Pre-treatment	steel; blast cleaned to a minimum of ISO-Sa2½ blasting profile (R <sub>Z</sub> ); 30 - 75 µm See also detailed information in the relevant Product Data Sheet.	
Paint system	SIGMAGUARD 720 grey	160 µm
	SIGMAGUARD 720 green	160 µm
Min. and max. dft of the system	Min.dft: 320 µm applied according to 90/10 rule * Max. dft: For optimum performance, in relation to typical properties such as curing and time to first cargo, the dry film thickness of the applied coating system should not be in excess of 600 µm.	
Maintenance	See also recommendations described in the MSC.291(87) guidelines for maintenance and repair of protective coatings for cargo oil tanks of crude oil tankers.	
*90/10 rule:	90% of the recommended dft of the coating system is acceptable for up to 10% of the readings only. See also Sheet 1411.	

<b>SPECIFICATION 3</b>	Maintenance of minor defects	
Pre-treatment	Corroded, damaged spots and other defects should be freed from rust and any contamination by re-blasting to a minimum of ISO 8501-1 Sa2½ (preferably vacuum blasting) or disc sanding according to SPSS-Pt3. The overlapping areas around the cleaned spots should be carefully disc sanded and feather edged in order to obtain good adhesion of subsequent coats.	
Paint system	SIGMAGUARD 720 grey	125 µm
	SIGMAGUARD 720 green	125 µm
	or	
	SIGMAGUARD 795	100 µm
	SIGMAGUARD 795	100 µm

## SIGMAGUARD 720 TANK COATING SYSTEM

3320

May 2013

Data for overcoating

SIGMAGUARD 720		
substrate temperature	min.	max.
5°C	32 hours	28 days
10°C	24 hours	28 days
15°C	16 hours	28 days
20°C	8 hours	28 days
30°C	4 hours	14 days
40°C	3 hours	7 days

## CURING TABLE

Substrate temperature	Min. curing time of SIGMAGUARD 720 tank coating system before transport of	
	aliphatic petroleum products and ballast water and tank test with seawater	cargoes without note 4, 7, 8 or 11
5°C	10 days	17 days
10°C	7 days	14 days
15°C	5 days	8 days
20°C	3 days	5 days
30°C	2,5 days	4 days
40°C	1,5 day	3 days

- minimum curing time of SIGMAGUARD 720 tank coating system before transport of cargoes with note 4, 7, 8 or 11: 3 months
- for detailed information on resistance and resistance notes, please refer to the latest issue of the Tank coating Resistance list (TRIS)
- adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434)

## SIGMAGUARD 720 TANK COATING SYSTEM

3320

May 2013

## REFERENCES

SIGMAGUARD 720	see product data sheet 7433
SIGMAGUARD 795	see product data sheet 7455
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Recognized corrosion control coating (Lloyd's Register)	

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Current sheets for all PPG Protective & Marine Coatings Products are maintained at [www.ppgpmc.com](http://www.ppgpmc.com). The English text of this sheet shall prevail over any translation thereof.

## SYSTEM FOR POTABLE WATER TANKS

3325

a two page issue

January 2010  
revision of September 2005**GENERAL DESCRIPTION**

The formulations of coating systems, suitable and approved for potable water tanks, call for close consideration of a variety of important factors.

In addition to an excellent resistance to water it is of extreme importance that the coating does not cause tainting, neither should the migration of any substance affect the water in such a way that it is injurious to the health of the consumer. These and other requirements demand that stringent controls must be exercised in the choice and the composition of the raw materials used. Also, surface pretreatment, application and curing of the system must be carried out with great care and under close supervision.

The requirements for the issue of an approval certificate for coatings for the carriage of potable water vary from country to country. Our systems have, therefore, been tested by several prominent institutes throughout the world. (for approvals see information sheet 1882)

Full cure is essential in view of the possibility of migration if this is not effected. An incompletely cured coating can give migration of unwanted substances as well as bacterial growth or early damage of coating. For this reason special attention must be given to the provision of adequate ventilation, which must be continuous throughout the application and curing period. (please refer to sheet 1433 and 1434)

For recommended application instructions

– see working procedure –

**SPECIFICATION FOR IN SITU BLASTED STEEL**

<b>SPECIFICATION 1</b>	a high build solvent free pure epoxy based system	
pretreatment	steel; blast cleaned to ISO-Sa2½ – ISO-Sa3 blasting profile (Rz); 50 - 100 µm	
paint system	SigmaGuard CSF 585 sharp edges, weld seams, bolts, etc. to be stripe coated	300 µm
note	before using the freshly coated tanks, a tankwash should be carried out (see product data sheet 7785)	

## SYSTEM FOR DRINKING WATER TANKS

3325

January 2010

## REFERENCES

SigmaGuard CSF 585	see product data sheet 7785
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Specification for mineral abrasives	see information sheet 1491
Certificates for drinking water	see information sheet 1882
Recognized corrosion control coating (Lloyd's Register)	see information sheet 1886

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## SYSTEMS FOR BALLAST TANKS

3106

a nine page issue

January 2010  
revision of July 2009

Application areas: internal areas of Ballast Tanks including the Freshwater Tanks.

For application details, careful attention should be given to the relevant working procedures and product data sheets.

Contains the following specifications:

Specification 1:	Multi-purpose epoxy coating system	SigmaPrime 700
Specification 2:	Multi-purpose epoxy coating system	SigmaPrime 200
Specification 3:	Multi-purpose high solids epoxy coating system	SigmaPrime 800
Specification 4:	Coating system under development	
Specification 5:	Coaltar epoxy coating system	SigmaCover 300
Specification 6:	High solids epoxy coating system	SigmaCover 380
Specification 7:	Solvent free epoxy coating system	SigmaGuard 225/425

**BALLAST TANKS**

Ballast Tanks are among the most critical areas within a ship with regard to corrosion protection. During the life time of a ship these areas are subject to water exposure either by seawater or when empty to heavy condensation which can be even more aggressive to organic coatings. Ballast tank coatings may also be exposed to considerable temperature shock especially during reballasting operations.

Apart from the aggressive conditions, ballast/freshwater tanks and double bottoms are always of a complex structure and in addition are not usually easily accessible. These factors determine the main criteria that a ballast tank or double bottom coating has to fulfill.

Firstly the coating has to exhibit superior water resistance. Not only should it resist permanent immersion in seawater but it should resist condensation at high temperatures. Preferably this property should be combined with good application properties including good edge covering characteristics. (It is known from experience that the first paint breakdown occurs at areas that are difficult to coat such as sharp edges, weldseams, ratholes etc.). The film thickness at these areas is often far from sufficient due to poor accessibility, and edge receding (natural tendency related to surface tension, where a freshly applied paint film moves away from sharp edges).

**ACCEPTANCE OF SHOP PRIMER**

The quality and nature of shop primer will determine the performance of the coating system. The types of shop primer acceptable are those which are approved by PPG Protective & Marine Coatings and equivalent to the following products: SigmaWeld 165 and SigmaWeld 199 - zinc silicate.

In addition, any degradation or underfilm corrosion of the shop primer will limit the performance of the total system, unless correctly treated.

The general condition of the weathered shop primer may vary widely throughout the structure and in many instances it is difficult to assess the severity of breakdown.

## SYSTEMS FOR BALLAST TANKS

3106

January 2010

Approved zinc silicate shop primers in good condition should be cleaned to remove contamination and/or zinc salts.

If necessary, sweep blasting according to SPSS-Ss or mechanical cleaning according to SPSS-Pt3 or ISO 8501-3:2006 Grade P2 should be carried out.

Special attention should be paid to heat damaged areas and weld seams, including areas along weld seams and back burns.

**IMO resolution MSC.215 (82) Requirements for Water Ballast Tanks**

For vessels built under IMO resolution MSC.215 (82) there are strict rules that should be followed. These rules are valid for surface pretreatment and paint system used.

The zinc silicate shop primer and the epoxy based coating system should have an IMO PSPC type approval. For zinc silicate shop primers that do not have an IMO PSPC type approval at least 70 % of the intact shop primer should be removed by blast cleaning (ISO-Sa2) prior to the application of the coating system.

PPG Protective & Marine Coatings has a number of Water Ballast coating systems that are compliant with IMO resolution MSC.215 (82). Details can be found in the different specifications below.

For all vessels build under IMO resolution MSC.215 (82) the following surface pretreatment should be followed:

- Steel; ISO 8501-3:2006 grade P2, with all edges treated to a rounded radius of minimum 2 mm or subject to three pass grinding
- Steel or steel with not approved zinc silicate shop primer; blast cleaned (dry or wet) to ISO-Sa 2½, blasting profile 30 – 75 µm
- Steel with approved zinc silicate shop primer; weld seams and areas of damaged shop primer or breakdown should be blast cleaned to ISO-Sa 2½, blasting profile 30 – 75 µm
  - for shop primer with IMO PSPC type approval; no additional requirements
  - for shop primer without IMO PSPC type approval; blast cleaned (dry or wet) to ISO-Sa2 removing at least 70% of intact shop primer, blasting profile 30 – 75 µm
- Dust quantity rating “1” for dust size class “3”, “4” or “5”, lower dust size classes to be removed if visible on the surface to be coated without magnification (ISO 8502-3:1992)

For recommended application instructions

– see working procedure –

## SYSTEMS FOR BALLAST TANKS

3106

January 2010

**SPECIFICATION 1**

multi-purpose epoxy coating system for BALLAST TANKS, suitable for block stage application

## pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm  
 steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or ISO 8501-3:2006 Grade P2  
 Water Ballast Tanks compliant with IMO resolution MSC.215 (82); see detailed information on page 2 and in the relevant Product Data Sheets.

## paint system

SigmaPrime 700	125 µm
SigmaPrime 700	125 µm

## min. dft

min. dft is 250 µm applied according to 90/10 rule\*

Paint system compliant with IMO resolution MSC.215 (82)

SigmaPrime 700	160 µm
SigmaPrime 700	160 µm

min. and max. dft for the system

min. dft is 320 µm applied according to 90/10 rule\*  
 max. dft: Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG Protective & Marine Coatings must be consulted in case DFT readings fall outside this recommendation

## note

at temperatures below 5°C SigmaPrime 700 can be replaced by SigmaPrime 700 LT

## maintenance

should be carried out according to this specification

\* 90/10 rule: 90% of the recommended dft of the coating system is acceptable for up to 10% of the readings only. See also sheet 1411



## SYSTEMS FOR BALLAST TANKS

3106

January 2010

**SPECIFICATION 2**

multi-purpose epoxy coating system for BALLAST TANKS, suitable for block stage application

## pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm  
steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or ISO 8501-3:2006 Grade P2  
Water Ballast Tanks compliant with IMO resolution MSC.215 (82); see detailed information on page 2 and in the relevant Product Data Sheets.

## paint system

SigmaPrime 200	125 µm
SigmaPrime 200	125 µm

## min. dft

min. dft is 250 µm applied according to 90/10 rule\*

Paint system compliant  
with IMO resolution  
MSC.215 (82)

SigmaPrime 200	160 µm
SigmaPrime 200	160 µm

min. and max. dft  
for the system

min. dft is 320 µm applied according to 90/10 rule\*  
max. dft: Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG Protective & Marine Coatings must be consulted in case DFT readings fall outside this recommendation

## note

at temperatures below 5°C SigmaPrime 200 can be replaced by SigmaPrime 200 LT

## maintenance

should be carried out according to this specification

\* 90/10 rule: 90% of the recommended dft of the coating system is acceptable for up to 10% of the readings only. See also sheet 1411

## SYSTEMS FOR BALLAST TANKS

3106

January 2010

<b>SPECIFICATION 3</b>	multi-purpose high solids epoxy coating system for BALLAST TANKS, suitable for block stage application	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or ISO 8501-3:2006 Grade P2 Water Ballast Tanks compliant with IMO resolution MSC.215 (82); see detailed information on page 2 and in the relevant Product Data Sheets.	
paint system	SigmaPrime 800	125 µm
	SigmaPrime 800	125 µm
min. dft	min. dft is 250 µm applied according to 90/10 rule*	
Paint system compliant with IMO resolution MSC.215 (82)	SigmaPrime 800	160 µm
	SigmaPrime 800	160 µm
min. and max. dft for the system	min. dft is 320 µm applied according to 90/10 rule* max. dft: Dry Film Thickness of 2000 µm may occur occasionally (minor areas) where multiple overlapping is unavoidable (i.e. around scallops, corners, erection joint lines etc.). PPG Protective & Marine Coatings must be consulted in case DFT readings fall outside this recommendation	
note	at temperatures below 5°C SigmaPrime 800 can be replaced by SigmaPrime 800 LT	
maintenance	should be carried out according to this specification	
* 90/10 rule: 90% of the recommended dft of the coating system is acceptable for up to 10% of the readings only. See also sheet 1411		

**SPECIFICATION 4**

Coating system under development

January 2010

## SYSTEMS FOR BALLAST TANKS

3106

<b>SPECIFICATION 5</b>	coal tar epoxy coating system for BALLAST TANKS, suitable for block stage application	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or ISO 8501-3:2006 Grade P2	
paint system	SigmaCover 300 brown	125 µm
	SigmaCover 300 black	125 µm
notes	<ul style="list-style-type: none"> <li>– edges, weldseams, bolt holes etc. to be stripe coated with SigmaCover 280 or SigmaCover 300 brown</li> <li>– at temperatures below 5°C SigmaCover 300 can be replaced by SigmaCover 300 LT</li> </ul>	
min. and max. dft for the system	min. dft is 250 µm according to 90/10 rule*; max. dft in critical areas is 800 µm applied in two equal coats	
maintenance	should preferably be carried according to this specification	
pretreatment	in case of hydrojetted to VIS WJ2 L or ISO Wa 2½ L an extra coat of SigmaCover 280 should be applied as first layer at a dft of 50 µm (for more info see sheet 1498)	

\* 90/10 rule: 90% of the recommended dft of the coating system is acceptable for up to 10% of the readings only. See also sheet 1411

## SYSTEMS FOR BALLAST TANKS

3106

January 2010

**SPECIFICATION 6**

high solids epoxy coating system for BALLAST TANKS, suitable for block stage application

## pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm  
 steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or ISO 8501-3:2006 Grade P2  
 Water Ballast Tanks compliant with IMO resolution MSC.215 (82); see detailed information on page 2 and in the relevant Product Data Sheets.

## paint system

SigmaCover 380	125 µm
SigmaCover 380	125 µm

## min. dft

min. dft is 250 µm applied according to 90/10 rule\*

Paint system compliant  
 with IMO resolution  
 MSC.215 (82)

SigmaCover 380	160 µm
SigmaCover 380	160 µm

min. and max. dft  
 for the system

min. dft is 320 µm applied according to 90/10 rule\*  
 max. dft in critical areas is 1500 µm applied in two equal coats

## note

at temperatures below 5°C SigmaCover 380 can be replaced by SigmaCover 380 LT

## maintenance

should be carried out according to this specification

\* 90/10 rule: 90% of the recommended dft of the coating system is acceptable for up to 10% of the readings only. See also sheet 1411

## SYSTEMS FOR BALLAST TANKS

3106

January 2010

**SPECIFICATION 7**

	solvent free, high performance epoxy coating system for Ballast Tanks, with good edge covering capacity, suitable for block stage application	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 30 - 75 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or ISO 8501-3:2006 Grade P2 Water Ballast Tanks compliant with IMO resolution MSC.215 (82); see detailed information on page 2 and in the relevant Product Data Sheets.	
paint system compliant with IMO resolution MSC.215 (82)	SigmaGuard 225 SigmaGuard 425	100 µm 250 µm
note	SigmaGuard 225 can be replaced by SigmaCover 280 at a dft of 75 µm	
min. and max. dft for the system	min. dft is 350 µm according to 90/10 rule*; whilst for solvent free coating systems higher max. dfts do not influence long time performance, we recommend the max. dft in critical areas below 1000 µm	
note	for critical areas and for pit-filling requirements higher maximum dfts may be permitted (please consult your local PPG Protective & Marine Coatings office for further details)	
maintenance	should be carried out according to this specification	

\* 90/10 rule: 90% of the recommended dft of the coating system is acceptable for up to 10% of the readings only. See also sheet 1411

**VENTILATION**

adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434)

## SYSTEMS FOR BALLAST TANKS

3106

January 2010

## REFERENCES

SigmaCover 280	see product data sheet 7417
SigmaCover 300	see product data sheet 7472
SigmaCover 300 LT	see product data sheet 7483
SigmaCover 380	see product data sheet 7979
SigmaCover 380 LT	see product data sheet 7980
SigmaGuard 225	see product data sheet 7921
SigmaGuard 425	see product data sheet 7953
SigmaPrime 200	see product data sheet 7416
SigmaPrime 200 LT	see product data sheet 7931
SigmaPrime 700	see product data sheet 7930
SigmaPrime 700 LT	see product data sheet 7946
SigmaPrime 800	see product data sheet 7938
SigmaPrime 800 LT	see product data sheet 7940
SigmaWeld 165	see product data sheet 7171
SigmaWeld 199	see product data sheet 7177
Explanation to product data sheets	see information sheet 1411
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Certificates for low-flame spread	see information sheet 1883
Recognized corrosion control coating (Lloyd's register)	see information sheet 1886
prefabrication primers	see system sheet 3015

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**SYSTEMS FOR BOOTTOP AND TOPSIDE****3102**

an eight page issue

January 2010  
revision of May 2008

Application areas: Boottop and Topside of the outside hull of vessels

Contains following specifications:

Specification 1: multi-purpose epoxy coating system	linked with 3101-spec. 1
Specification 2: multi-purpose epoxy coating system	linked with 3101-spec. 2
Specification 3: multi-purpose epoxy/polyurethane coating system	linked with 3101-spec. 1
Specification 4: multi-purpose epoxy/polyurethane coating system	linked with 3101-spec. 2
Specification 5: recoatable epoxy system	linked with 3101-spec. 1 or 2
Specification 6: high solids reinforced epoxy coating system	linked with 3101-spec. 3 or 4
Specification 7: high solids, glassflake reinforced epoxy coating system	linked with 3101-spec. 3 or 4
Specification 8: high solids epoxy mastic coating system	linked with 3101-spec. 5
Specification 9: solvent free abrasion resistant epoxy coating system	linked with 3101-spec. 6
Specification 10: chlorinated rubber/modified acrylic coating system	linked with 3101-spec. 7
Specification 11: alkyd coating system	

**SURFACE PRETREATMENT**

The quality of the surface pretreatment affects the performance of boottop and topside systems, particularly when for the boottop area cathodic protection is applied. Optimal results will only be obtained only obtained on substrates blast cleaned to ISO-Sa2½, which means that up to the deep loadline the shop primer should be removed. This is particularly important when (underfilm) corrosion has already started. Also the right blasting profile will be obtained.

**ACCEPTANCE OF SHOP PRIMER**

The quality and generic type of shop primer will determine the performance of the coating system. The types of shop primer acceptable are those which are equivalent to SigmaWeld 165 and SigmaWeld 199 - zinc silicate and approved by PPG Protective & Marine Coatings. In addition, the condition of the shop primer with regard to degradation and underfilm corrosion will determine the performance of the total system.

These remarks are of particular importance when cathodic protection is installed.

The general condition of the weathered shop primer may vary widely throughout the structure and in many instances it is difficult to assess the severity of breakdown.

Experience shows that reblasting of corroded shop primed steel to ISO-Sa2½ is the most satisfactory method of correcting corrosion defects and eliminating the detrimental effect of surface contamination.

Approved shop primers in good condition should be cleaned to remove contamination and/or zinc salts. If necessary sweep blasting according to SPSS-Ss or mechanical cleaning according to SPSS-Pt3 should be carried out.

Special attention should be taken for heat damaged areas, including areas alongside weldseams and backburns.

## SYSTEMS FOR BOOTTOP AND TOPSIDE

3102

January 2010

<b>SPECIFICATION 1</b>	multi-purpose epoxy system for BOOTTOP and TOPSIDE	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 700	125 µm
	SigmaCover 456	125 µm
notes	<ul style="list-style-type: none"> <li>– if a durable topcoat is required for topsides, an extra coat of PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss) can be applied</li> <li>– at temperatures below 5°C, SigmaPrime 700 can be replaced by SigmaPrime 700 LT</li> </ul>	
maintenance	should preferably be carried out to this specification	

<b>SPECIFICATION 2</b>	multi-purpose epoxy system for BOOTTOP and TOPSIDE	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 200	125 µm
	SigmaCover 456	125 µm
notes	<ul style="list-style-type: none"> <li>– if a durable topcoat is required for topsides, an extra coat of PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss) can be applied</li> <li>– at temperatures below 5°C, SigmaPrime 200 can be replaced by SigmaPrime 200 LT</li> </ul>	
maintenance	should preferably be carried out to this specification	

<b>SPECIFICATION 3</b>	multi-purpose epoxy/polyurethane coating system for TOPSIDE	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 700	150 µm
	SigmaDur 550	50 µm
	SigmaDur 550	50 µm
note	at temperatures below 5°C, SigmaPrime 700 can be replaced by SigmaPrime 700 LT	
maintenance	should preferably be carried out to this specification	



## SYSTEMS FOR BOOTTOP AND TOPSIDE

3102

January 2010

<b>SPECIFICATION 4</b>	multi-purpose epoxy/polyurethane coating system for TOPSIDE	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 200	150 µm
	SigmaDur 550	50 µm
	SigmaDur 550	50 µm
note	at temperatures below 5°C, SigmaPrime 200 can be replaced by SigmaPrime 200 LT	
maintenance	should preferably be carried out to this specification	

<b>SPECIFICATION 5</b>	recoatable epoxy system for TOPSIDE	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaCover 435	125 µm
	SigmaCover 456	125 µm
notes	if a durable topcoat is required for topsides, an extra coat of PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss) can be applied	
maintenance	should preferably be carried out to this specification	

## SYSTEMS FOR BOOTTOP AND TOPSIDE

3102

January 2010

**SPECIFICATION 6**

high solids reinforced epoxy system for BOOTTOP and TOPSIDE with excellent resistance to mechanical impact, and abrasion

## pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm  
steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3

## paint system

SigmaShield 220	125 µm
SigmaShield 420	125 µm
SigmaCover 456	75 µm

## notes

- SigmaShield 220 can be replaced by SigmaPrime 200 or 700
- if a durable topcoat is required for topsides, SigmaCover 456 can be replaced by PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss)
- at temperatures below 5°C, SigmaShield 220 and SigmaShield 420 can be replaced by the LT versions

## maintenance

should preferably be carried according to this specification

## pretreatment;

in case of hydrojetted to VIS WJ2/3 L or ISO Wa 2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see sheet 1498)

## SYSTEMS FOR BOOTTOP AND TOPSIDE

3102

January 2010

**SPECIFICATION 7**

high solids, glassflake reinforced epoxy system on top of in situ applied epoxy primer for BOOTTOP (and topside), with good resistance to heavy impact (fender areas - ice going vessels) can be finished with a recoatable epoxy coating

pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 50 - 100 µm	
paint system	SigmaShield 220	100 µm
	SigmaShield 460	400 µm
notes	<ul style="list-style-type: none"> <li>- if a holding primer is required, SigmaShield 220 can be replaced by SigmaCover 280 at a dft of 50 µm</li> <li>- if a recoatable epoxy coating is required as top coat, SigmaCover 456 at a dft of 75 µm can be applied on top of SigmaShield 460</li> <li>- if a durable topcoat is required, an extra coat of PSX 700 (gloss) SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss) can be applied</li> <li>- at temperatures below 5°C, SigmaShield 220 and SigmaShield 460 can be replaced by the LT versions</li> </ul>	
maintenance	should preferably be carried according to this specification	

**SPECIFICATION 8**

high solids, epoxy mastic coating system for maintenance of BOOTTOP and TOPSIDE with good resistance to mechanical impact

pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaCover 380	125 µm
	SigmaCover 630	125 µm
note	<ul style="list-style-type: none"> <li>- SigmaCover 380 can be replaced by SigmaCover 630 aluminium</li> <li>- at temperatures below 5°C, SigmaCover 380 can be replaced by SigmaCover 380 LT</li> <li>- if a durable topcoat is required, an extra coat of PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss) can be applied</li> </ul>	
maintenance	should preferably be carried out according to this specification	
pretreatment;	in case of hydrojetted to VIS WJ2 L or ISO Wa 2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see sheet 1498)	

## SYSTEMS FOR BOOTTOP AND TOPSIDE

3102

January 2010

**SPECIFICATION 9**

solvent free, abrasion resistant epoxy system for BOOTTOP and TOPSIDE, with excellent resistance to mechanical impact (e.g. for ice going and ice breaking vessels) and well designed cathodic protection

pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 50 - 100 µm

paint system

SigmaShield 1200

400 µm

SigmaCover 456

75 µm

note

- at temperatures below 5°C, SigmaShield 1200 can be replaced by SigmaShield 1200 LT
- if a durable topcoat is required, SigmaCover 456 can be replaced by PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss)

maintenance

should preferably be carried out to this specification

**SPECIFICATION 10**

chlorinated rubber/modified acrylic system for maintenance of BOOTTOP and TOPSIDE

pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm  
steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3

paint system

Sigma Vikote 18

75 µm

Sigma Vikote 46

100 µm

Sigma Vikote 56

35 µm

maintenance

should preferably be carried out to this specification

Note

Sigma Vikote 46 and 56 have good overcoating and good drying characteristics also below 0°C, which simplifies maintenance

**SPECIFICATION 11**

alkyd system for TOPSIDE, colours black, redbrown or green (4199)

pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm  
steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3

paint system

Sigmarine 28

75 µm

Sigmarine 28

75 µm

Sigmarine 48

35 µm

Sigmarine 48

35 µm

Note

Sigmarine 48 can be replaced by Sigma Vikote 56

maintenance

should preferably be carried out to this specification

## SYSTEMS FOR BOOTTOP AND TOPSIDE

3102

January 2010

**MAINTENANCE**

As in normal dry-docking practice, fouling, loose paint and other contaminants should be removed by high pressure water cleaning (HPWC). The removal of an oil or grease belt can be achieved by scraping heavy deposits from the surface followed by high pressure water cleaning in combination with the use of suitable detergents.

This should be followed by a thorough fresh water wash and drying prior to blasting and/or repainting. It might, however, be necessary to blast clean such areas after this operation when oil has penetrated the underlying paint systems. Rusty spots should be pretreated by blast cleaning and touched up with the original anticorrosive system within the requirements given in the relevant specifications.

**REFERENCES**

## PSX 700

Sigma Vikote 18

Sigma Vikote 46

Sigma Vikote 56

SigmaCover 280

SigmaCover 380

SigmaCover 380 LT

SigmaCover 435

SigmaCover 456

SigmaCover 630

SigmaDur 1800

SigmaDur 520

SigmaDur 550

SigmaPrime 200

SigmaPrime 200 LT

SigmaPrime 700

SigmaPrime 700 LT

Sigmarine 28

Sigmarine 48

SigmaShield 220

SigmaShield 220 LT

SigmaShield 420

SigmaShield 420 LT

SigmaShield 460

SigmaShield 460 LT

SigmaShield 1200

SigmaShield 1200 LT

SigmaWeld 165

SigmaWeld 199

Cleaning of steel and removal of rust

Hydrojetting

Prefabrication primers

see product data sheet 7318

see product data sheet 7350

see product data sheet 7355

see product data sheet 7417

see product data sheet 7979

see product data sheet 7980

see product data sheet 7465

see product data sheet 7466

see product data sheet 7430

see product data sheet 7529

see product data sheet 7524

see product data sheet 7537

see product data sheet 7416

see product data sheet 7931

see product data sheet 7930

see product data sheet 7946

see product data sheet 7117

see product data sheet 7238

see product data sheet 7922

see product data sheet 7926

see product data sheet 7951

see product data sheet 7955

see product data sheet 7952

see product data sheet 7972

see product data sheet 7744

see product data sheet 7746

see product data sheet 7171

see product data sheet 7177

see information sheet 1490

see information sheet 1498

see system sheet 3015

## SYSTEMS FOR BOOTTOP AND TOPSIDE

3102

January 2010

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**SYSTEMS FOR CARGO HOLDS****3107**

an eleven page issue

July 2011  
revision of February 2011

Application areas: Cargo holds, for the carriage of WET or DRY cargoes

For application instructions, careful attention should be given to the relevant working procedures and product data sheets.

Relevant specifications:

- Specification 1: solvent free glassflake epoxy system
- Specification 2: high solids reinforced epoxy coating system
- Specification 3: allround general epoxy coating system
- Specification 4: universal primer system
- Specification 5: alkyd system

**INTRODUCTION**

Cargo hold coatings systems in service are frequently exposed to severe mechanical abrasion and impact. In this respect, hard angular cargoes such as ores, coal, bauxite and coke can be especially aggressive. Successful in-service performance of cargo hold coating systems depends not only on the correct choice of coating system, but also upon the adoption of a correct standard of surface preparation, paint application procedures and curing conditions; all of these will determine the performance of the coating system in service and extent of damage.

Within the PPG Protective & Marine Coatings range there are a number of cargo hold coating systems that can be used depending on exact operational requirements and service life expectations. An overview, including related properties and specific requirements is described in this system sheet. When modifications to these standard systems are required, please always contact your PPG Protective & Marine Coatings Sales representatives for advice.

In order to minimize the mechanical damage of the applied coating system during loading, discharging and transportation of cargoes, the coating systems must be sufficiently cured. Following the required curing times will allow the coating to achieve its maximum resistance to mechanical damage. The rate at which optimal mechanical strength is obtained is specific for each coating system and depends upon several factors:

- Application and curing temperature
- Ventilation conditions during curing
- Applied film thickness
- The properties of the coating system itself

In this system sheet advice is given on curing times and maximum dry film thicknesses of the different cargo hold coating systems. Information sheets 1411 and 1434 provide additional information related to ventilation and standards of surface preparation and application.

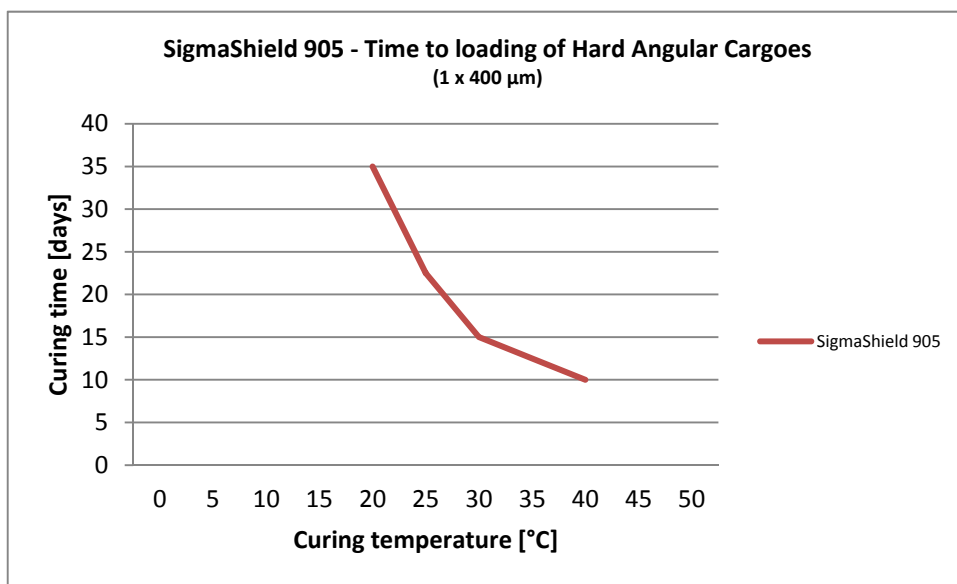
SYSTEMS FOR CARGO HOLDS

3107

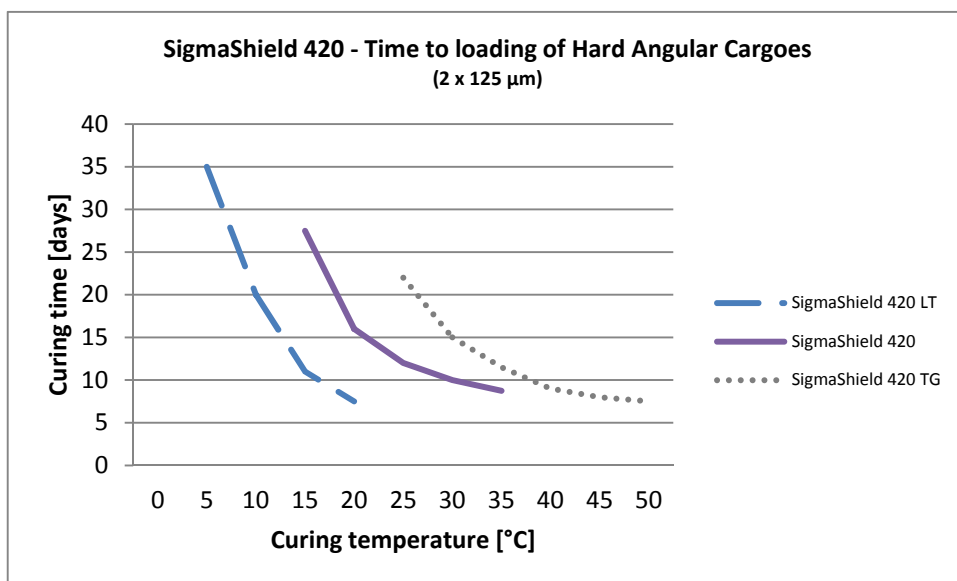
July 2011

CURING PROPERTIES / TIME TO FIRST CARGO

The technical data-sheets of our epoxy coatings include tables with “full cure times”. These specific full cure times refer to curing times allowing for immersion in seawater. However the curing process is not complete because an additional post cure of these epoxy coatings is still continuing. When these coatings are used in cargo hold coating systems, longer curing times are required in order to allow the coating system to reach its optimal properties before loading the first cargoes. In graphs 1 to 4 recommendations are given for our 2 component epoxy cargo hold coatings.



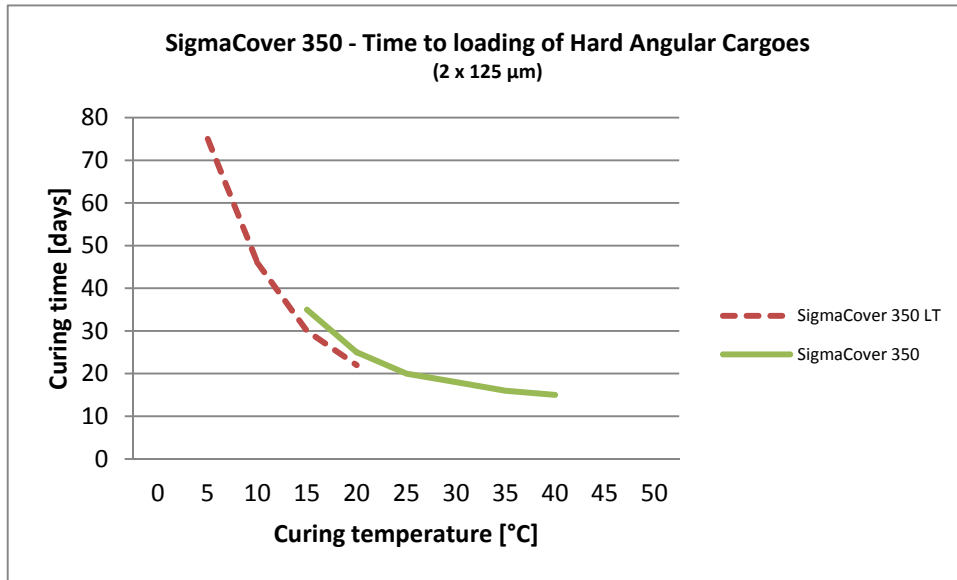
Graph 1: SigmaShield 905 (specification 1)



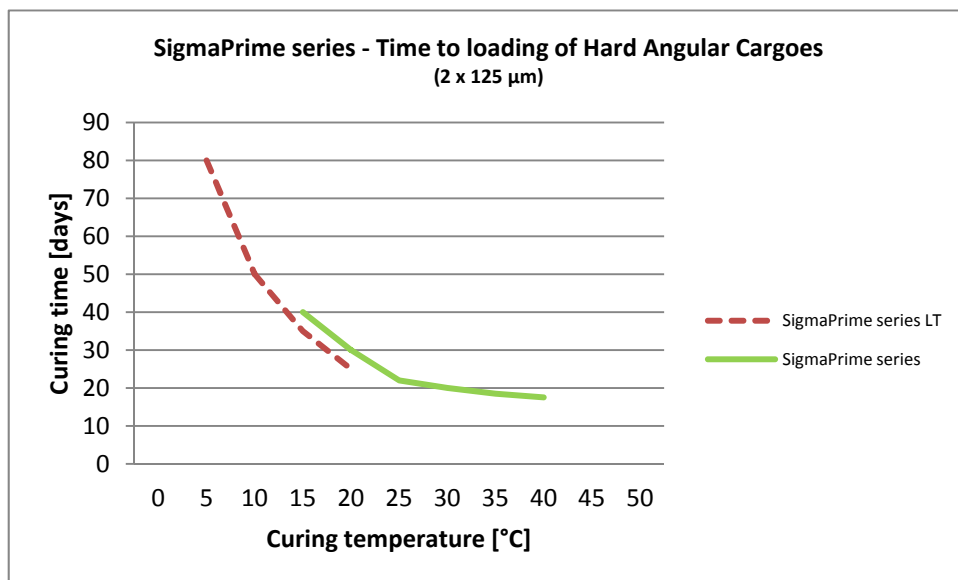
Graph 2: SigmaShield 420 (specification 2)



July 2011



Graph 3: SigmaCover 350 (specification 3)



Graph 4: SigmaPrime series (specification 4)

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**SYSTEMS FOR CARGO HOLDS**

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**3107**

July 2011

**NEWBUILDING - ACCEPTANCE OF SHOP PRIMER**

The quality and nature of shop primer will determine the performance of the coating system. For coating systems where high levels of impact and abrasion resistance are required, shop-primer removal is highly recommended. Should it be decided not to remove the shop primer, the types of shop primer acceptable are those which are approved by PPG Protective & Marine Coatings and equivalent to the following products: SigmaWeld 165 and SigmaWeld 199 - zinc silicate.

In addition, any degradation or underfilm corrosion of the shop primer will limit the performance of the total system, unless correctly treated.

The general condition of the weathered shop primer may vary widely throughout the structure and in many instances it is difficult to assess the severity of breakdown.

Approved shop primers in good condition should be cleaned to remove contamination and/or zinc salts. If necessary, sweep blasting according to SPSS-Ss or mechanical cleaning according to SPSS-Pt3 should be carried out. Special attention should be paid to areas damaged by heat.

Experience shows that in practice re-blasting of corroded shop primed steel to ISO-Sa2½ is the most satisfactory method of correcting corrosion defects and eliminating the detrimental effect of surface contamination.

**MAINTENANCE**

Whilst optimum coating performance will be achieved when applied on a substrate abrasive blasted to ISO-Sa 2½, in practice this is not always possible, (i.e. for older bulk carriers where ISO - Sa 2 is the best standard achievable) and other surface preparation methods and standards may be used. However, in some cases this can lead to a reduction in the mechanical resistance of the applied coating system.

## SYSTEMS FOR CARGO HOLDS

3107

July 2011

**SPECIFICATION 1**

solvent free glassflake epoxy system with excellent impact and abrasion resistance, especially recommended for carriage of hard angular cargoes

pretreatment

steel; blast cleaned to ISO-Sa 2½, blasting profile (R<sub>Z</sub>) 50 - 100 µm

paint system

SigmaShield 905

400 -500 µm

dry film thickness (dft)

SigmaShield 905 can be applied as a one coat system for cargo holds.

For the minimum and maximum applied dry film thickness principles of good coating practice are valid.

The minimum dft of the paint system should follow the 85/15 rule (e.g. 85 % of the recommended dft is acceptable for up to 15 % of the readings only).

(see also information sheet 1411 for additional details)

note

- edges, weld seams, bolts etc. to be stripe coated

- for wet cargo holds a primer coat of SigmaShield 220 (100 µm) or SigmaCover 280 (50 µm) is required

maintenance

Should be carried out according to this specification. In case alternative maintenance systems are preferred, please contact nearest sales office for advice.

## SYSTEMS FOR CARGO HOLDS

3107

July 2011

**SPECIFICATION 2**

high solids reinforced epoxy coating system for new building and maintenance with excellent impact and abrasion resistance and designed for carriage of hard angular cargoes for prolonged periods.

## pretreatment

steel; blast cleaned to ISO - Sa 2½, blasting profile (R<sub>Z</sub>) 40 - 70 µm steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3

## paint system

SigmaShield 220	125 µm
SigmaShield 420	125 µm

## dry film thickness (dft)

For the minimum and maximum applied dry film thickness principles of good coating practice are valid.

The minimum dft of the paint system should follow the 85/15 rule (e.g. 85 % of the recommended dft is acceptable for up to 15 % of the readings only).

For optimum performance, in relation to typical properties like curing and time to first cargo, the dry film thickness of the applied coating system should not be in excess of 2 times the recommended value. This is valid for each individual coat and for the paint system. On areas for which there are application constraints the applied dry film thickness may be up to 2.2 times the recommended value, however these areas should typically not exceed 15% of the total area.

(see also information sheet 1411 for additional details)

## notes

- SigmaShield 220 can be replaced by SigmaPrime series
- if a holding primer is required SigmaCover 280 can be applied at a dft of 50 µm, replacing SigmaShield 220 and the dft of SigmaShield 420 should be increased to 200 µm
- edges, weld seams, bolts etc. to be stripe coated
- at application temperatures below 5°C the specified products can be replaced by the LT versions

## maintenance

Should be carried out according to this specification. In case alternative maintenance systems are preferred, please contact nearest sales office for advice.

## pretreatment

When hydrojetting will be used, the following standards are recommended:

- For dry cargo holds - VIS WJ2/3 L or ISO Wa 2/2½ L followed by above specification
- For wet cargo holds - VIS WJ2 L or ISO Wa 2½ L followed by appropriate primer as first coat
- For more information see sheet 1498

## SYSTEMS FOR CARGO HOLDS

3107

July 2011

**SPECIFICATION 3**

General purpose epoxy coating system for new building and maintenance and wide range of surface pretreatments. Good impact and abrasion resistance and suitable for carriage of a wide range of cargoes. Also resistant against hard angular cargoes for normal service life expectations.

pretreatment

steel; blast cleaned to ISO – Sa 2½, blasting profile (R<sub>Z</sub>) 40 - 70 µm steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS - Pt3

paint system

SigmaCover 350  
SigmaCover 350

125 µm  
125 µm

dry film thickness (dft)

For the minimum and maximum applied dry film thickness principles of good coating practice are valid.

The minimum dft of the paint system should follow the 85/15 rule (e.g. 85 % of the recommended dft is acceptable for up to 15 % of the readings only).

For optimum performance, in relation to typical properties like curing and time to first cargo, the dry film thickness of the applied coating system should not be in excess of 2 times the recommended value. This is valid for each individual coat and for the paint system. On areas for which there are application constraints the applied dry film thickness may be up to 2.2 times the recommended value, however these areas should typically not exceed 15% of the total area.

(see also information sheet 1411 for additional details)

notes

- if a recoatable epoxy system is required, SigmaCover 456 should be specified as topcoat at a dft of 125 µm replacing the SigmaCover 350
- The mechanical properties of SigmaCover 456 are not the same as SigmaCover 350, therefore this should be taken in consideration with regard to transportation of hard angular cargoes.
- at application temperatures below 5°C, the specified products can be replaced by the LT versions

maintenance

should preferably be carried out according to this specification

pretreatment

When hydrojetting will be used, the following standards are recommended:

- For dry cargo holds - VIS WJ2/3 L or ISO Wa 2/2½ L followed by above specification
- For wet cargo holds - VIS WJ2 L or ISO Wa 2½ L followed by appropriate primer as first coat
- For more information see sheet 1498

## SYSTEMS FOR CARGO HOLDS

3107

July 2011

**SPECIFICATION 4**

Pure epoxy primer system designed to facilitate new building application procedures. Good abrasion resistance and suitable for a wide range of cargoes. Can also be used when hard angular cargoes are occasionally carried.

pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile (R<sub>Z</sub>) 40 - 70 µm  
steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3

paint system

SigmaPrime series 125 µm  
SigmaPrime series 125 µm

dry film thickness (dft)

For the minimum and maximum applied dry film thickness principles of good coating practice are valid.

The minimum dft of the paint system should follow the 85/15 rule (e.g. 85 % of the recommended dft is acceptable for up to 15 % of the readings only).

For optimum performance, in relation to typical properties like curing and time to first cargo, the dry film thickness of the applied coating system should not be in excess of 2 times the recommended value. This is valid for each individual coat and for the paint system. On areas for which there are application constraints the applied dry film thickness may be up to 2.2 times the recommended value, however these areas should typically not exceed 15% of the total area.

(see also information sheet 1411 for additional details)

notes

– at temperatures below 5°C, SigmaPrime series can be replaced by the corresponding LT versions

maintenance

should preferably be carried out according to this specification

pretreatment

When hydrojetting will be used, the following standards are recommended:

- For dry cargo holds - VIS WJ2/3 L or ISO Wa 2/2½ L followed by above specification
- For wet cargo holds - VIS WJ2 L or ISO Wa 2½ L followed by appropriate primer as first coat
- For more information see sheet 1498

## SYSTEMS FOR CARGO HOLDS

3107

July 2011

**SPECIFICATION 5**

alkyd system for dry cargo holds. Provides basic protection and is not recommended for hard angular cargoes.

## pretreatment

steel without mill scale; power tool cleaned to ISO-St3  
steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3

## paint system

Sigmarine 28	75 µm
Sigmarine 80	25 µm
Sigmarine 80	25 µm

## note

one coat of Sigmarine 28 can be replaced by 2 coats of Sigmarine 24 at a dft of 35 µm each

## maintenance

should preferably be carried out to this specification

## SYSTEMS FOR CARGO HOLDS

3107

July 2011

**ONBOARD MAINTENANCE**

Maintenance of an applied cargo hold coating system is normally carried out by re-blasting to the original specification, followed by application of the system. Minor areas of rusting can be mechanically cleaned to SPSS-Pt3 or hydro jetting to at least VIS WJ2 L or ISO Wa 2½ L (for more info see sheet 1498) and recoated with the specified system.

For over-coating systems which are not of PPG manufacture, consult your local PPG Protective & Marine Coatings representative.

Temporary protection can be provided with Sigmarine 80.

**VENTILATION**

Adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434 and the relevant cargo hold working procedure)



## SYSTEMS FOR CARGO HOLDS

3107

July 2011

## REFERENCES

SigmaCover 280	see product data sheet 7417
SigmaCover 350	see product data sheet 7970
SigmaCover 350 LT	see product data sheet 7977
SigmaPrime 200	see product data sheet 7416
SigmaPrime 200 LT	see product data sheet 7931
SigmaPrime 700	see product data sheet 7930
SigmaPrime 700 LT	see product data sheet 7946
Sigmarine 28	see product data sheet 7117
Sigmarine 24	see product data sheet 7135
Sigmarine 80	see product data sheet 7263
SigmaShield 220	see product data sheet 7922
SigmaShield 220 LT	see product data sheet 7926
SigmaShield 420	see product data sheet 7951
SigmaShield 420 LT	see product data sheet 7955
SigmaShield 905	see product data sheet 7954
SigmaWeld 165	see product data sheet 7171
SigmaWeld 199	see product data sheet 7177
Explanation to product data sheets	see information sheet 1411
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Hydrojetting	see information sheet 1498

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**SYSTEMS FOR DECKS****3103**

a six page issue

January 2010  
revision of May 2008

Application areas: all decks on ships, interior and exterior

Contains following specifications:

- Specification 1: multi-purpose epoxy coating system
- Specification 2: multi-purpose epoxy coating system
- Specification 3: high build reinforced epoxy coating system
- Specification 4: high solids epoxy mastic coating system
- Specification 5: alkyd coating system
- Specification 6: chlorinated rubber/modified acrylic coating system

**GENERAL ASPECTS**

Decks on ships are constantly exposed to the environment (UV in sunlight, rain, wind) and periodically washed with seawater. They are subject to foot and mechanical traffic and sometimes chemical spillage. Their aesthetic properties are always important, but they also have a strong protective element (both anticorrosive and safety).

The main requirements for such coating systems are:

- good anticorrosive properties
- excellent adhesion
- flexibility
- good impact resistance
- resistance against spillage of hydrocarbons, aromatics, chemicals and detergents
- easy to maintain
- non slippery

Non-skid properties can be obtained by adding 10% by weight of a special silica (such as Minigrain No. IV), or fine coconut shells to the last coat of a paint system. In case of contamination with oil or lubricants a very coarse material like Minigrain No. 1 can be used to further enhance non-skid properties. In this case an extra coat is necessary to ensure adhesion of the embedded anti-skid material and the dft of the total system should be increased in order to give the correct anticorrosive protection.

**SURFACE PRETREATMENT**

Best results are obtained on ISO-Sa2½ blast cleaned steel. If the surface has been treated with a suitable shop primer, sweep blasting is required to a minimum of SPSS-Ss or power tool cleaning to SPSS-Pt3. Rusty areas should be blast cleaned to ISO-Sa2½. Also possible is cleaning by hydrojetting to VIS WJ2 L or ISO Wa 2½ L.

## SYSTEMS FOR DECKS

3103

January 2010

<b>SPECIFICATION 1</b>	multi-purpose epoxy coating with good resistance to abrasion, spillage of oils and mild chemicals	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 700	125 µm
	SigmaCover 456	125 µm
notes	<ul style="list-style-type: none"> <li>– SigmaPrime 700 can be replaced by SigmaCover 435</li> <li>– if a durable topcoat is required, an extra coat of PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss) can be applied</li> <li>– at temperatures below 5°C, SigmaPrime 700 can be replaced by SigmaPrime 700 LT</li> </ul>	
maintenance	should preferably be carried out to this specification	
pretreatment	in case of hydrojetted to VIS WJ2/3 L or ISO Wa 2/2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see sheet 1498)	

<b>SPECIFICATION 2</b>	multi-purpose epoxy coating with good resistance to abrasion, spillage of oils and mild chemicals	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaPrime 200	125 µm
	SigmaCover 456	125 µm
notes	<ul style="list-style-type: none"> <li>– SigmaPrime 200 can be replaced by SigmaCover 435</li> <li>– if a durable topcoat is required, an extra coat of PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss) can be applied</li> <li>– at temperatures below 5°C, SigmaPrime 200 can be replaced by SigmaPrime 200 LT</li> </ul>	
maintenance	should preferably be carried out to this specification	
pretreatment;	in case of hydrojetted to VIS WJ2/3 L or ISO Wa 2/2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see sheet 1498)	

## SYSTEMS FOR DECKS

3103

January 2010

<b>SPECIFICATION 3</b>	reinforced high build epoxy coating with excellent abrasion resistance and good resistance to spillage of oils and mild chemicals	
pretreatment	steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, or power tool cleaned to SPSS-Pt3	
paint system	SigmaShield 220	125 µm
	SigmaShield 420	125 µm
	SigmaCover 456	75 µm
notes	<ul style="list-style-type: none"> <li>– SigmaShield 220 can be replaced by SigmaPrime 200 or 700</li> <li>– if a durable topcoat is required, SigmaCover 456 can be replaced by PSX 700 (gloss), SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss)</li> <li>– at temperatures below 5°C, SigmaPrime 200 or 700, SigmaShield 220 and 420 can be replaced by the LT versions</li> </ul>	
maintenance	should preferably be carried out to this specification	
pretreatment	in case of hydrojetted to VIS WJ2/3 L or ISO Wa 2/2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see sheet 1498)	

<b>SPECIFICATION 4</b>	high solids epoxy mastic system for maintenance with good resistance to abrasion, spillage of oils and mild chemicals	
pretreatment	steel; blast cleaned to ISO-Sa2½ I steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3	
paint system	SigmaCover 630	125 µm
	SigmaCover 630	125 µm
notes	<ul style="list-style-type: none"> <li>– if a durable topcoat is required, an extra coat of SigmaDur 1800 (gloss), SigmaDur 550 (gloss) or SigmaDur 520 (semi gloss) can be applied</li> <li>– if a recoatable epoxy system is required, SigmaCover 456 should be specified as topcoat</li> </ul>	
maintenance	should preferably be carried out to this specification	

## SYSTEMS FOR DECKS

3103

January 2010

<b>SPECIFICATION 5</b>	one component alkyd based system for maintenance	
pretreatment	steel; blast cleaned to ISO-Sa2½ or power tool cleaned to ISO-St3 steel with approved shop primer; power tool cleaned to SPSS-Pt3	
paint system	Sigmarine 28	75 µm
	Sigmarine 48	35 µm
	Sigmarine 48	35 µm
notes	<ul style="list-style-type: none"> <li>– Sigmarine 48 can be replaced by Sigma Vikote 56</li> <li>– one coat of Sigmarine 28 can be replaced by 2 coats of Sigmarine 24 at dft of 35 µm each</li> <li>– not suitable for decks where spillage of oils and/or solvents can be expected</li> </ul>	
maintenance	should preferably be carried out to this specification	

<b>SPECIFICATION 6</b>	one component chlorinated rubber/modified acrylic system	
pretreatment	steel; blast cleaned to ISO-Sa2½ or power tool cleaned to ISO-St3 steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3	
paint system	Sigma Vikote 18	75 µm
	Sigma Vikote 46	75 µm
note	not suitable for decks where spillage of oils and/or solvents can be expected	
maintenance	should preferably be carried out to this specification or with Sigmarine 28 as first coat (dft of 75 µm)	
note	Sigma Vikote 46 has good overcoating and good drying characteristics (to below 0°C) which simplifies maintenance	

## SYSTEMS FOR DECKS

3103

January 2010

**MAINTENANCE**

The system to be used for maintenance will depend on the size of repair, possibilities of surface preparation and the weather conditions.

The removal of oil, grease and contamination can be achieved by high pressure water cleaning in combination with the use of suitable detergents. This should be followed by a thorough fresh water wash and drying before blast cleaning and/or repainting.

For major areas of breakdown maintenance is normally carried out by a fresh water wash followed by reblasting to ISO-Sa2½ and recoating with the original system. Minor areas can be power tool cleaned to SPSS-Pt3.

When blast cleaning (dry or wet) is impossible or not tolerated the surface should be derusted by means of power tool cleaning to a minimum of SPSS-Pt2 and primed with SigmaCover 280 (dft of 50 µm) followed by the build coat and top coat as described in the specification.

## SYSTEMS FOR DECKS

3103

January 2010

## REFERENCES

PSX 700	see product data sheet 7546
Sigma Vikote 18	see product data sheet 7318
Sigma Vikote 46	see product data sheet 7350
Sigma Vikote 56	see product data sheet 7355
SigmaCover 280	see product data sheet 7417
SigmaCover 456	see product data sheet 7466
SigmaCover 630	see product data sheet 7430
SigmaDur 1800	see product data sheet 7529
SigmaDur 520	see product data sheet 7524
SigmaDur 550	see product data sheet 7537
SigmaPrime 200	see product data sheet 7416
SigmaPrime 200 LT	see product data sheet 7931
SigmaPrime 700	see product data sheet 7930
SigmaPrime 700 LT	see product data sheet 7946
Sigmarine 24	see product data sheet 7135
Sigmarine 28	see product data sheet 7117
Sigmarine 48	see product data sheet 7238
SigmaShield 420	see product data sheet 7951
SigmaShield 420 LT	see product data sheet 7955
SigmaShield 220	see product data sheet 7922
SigmaShield 220 LT	see product data sheet 7926
Cleaning of steel and removal of rust	see information sheet 1490
Hydrojetting	see information sheet 1498
prefabrication primers	see system sheet 3015

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## SYSTEMS FOR INTERIOR(S)

3105

a five page issue

January 2010  
revision of May 2008

Application areas: wet and dry accommodation spaces, service spaces.

Contains the following specifications:

- Specification 1: multi-purpose epoxy system with an alkyd finish
- Specification 2: multi-purpose epoxy system with an alkyd finish
- Specification 3: recoatable polyurethane/epoxy system
- Specification 4: alkyd system
- Specification 5: waterborne acrylic coating system
- Specification 6: emulsion paint system

**GENERAL ASPECTS**

Paint systems for wet accommodation spaces, such as bath rooms, showers, galleys and toilets must be corrosion inhibiting, water, soap and scratch-resistant, easy to clean and non yellowing. For reasons of hygiene they should be light coloured.

Paint systems for dry accommodation spaces among which engine room, provision store, cabins, hospital, etc. should have long lasting adhesion to the various substrates, be easily recoatable and usually decorative.

**VENTILATION**

Adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434)

<b>SPECIFICATION 1</b>	multi-purpose epoxy system with an alkyd finish system is certified for low flame spread, see sheet 1883B	
pretreatment	steel without mill scale; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-St3 steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt2	
paint system	SigmaPrime 700 Sigmarine 48	75 µm 35 µm
maintenance	should preferably be carried out to this specification	



## SYSTEMS FOR INTERIOR(S)

3105

January 2010

<b>SPECIFICATION 2</b>	multi-purpose epoxy system with an alkyd finish system is certified for low flame spread, see sheet 1883B	
pretreatment	steel without mill scale; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-St3 steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt2	
paint system	SigmaPrime 200 Sigmarine 48	75 µm 35 µm
maintenance	should preferably be carried out to this specification	

<b>SPECIFICATION 3</b>	recoatable polyurethane/epoxy system with excellent hygienic properties for wet and dry accommodation and service spaces system is certified for low flame spread, see sheet 1883B	
pretreatment	steel without mill scale; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-St3 steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt2 galvanised steel and aluminium; degreasing and removal of salts by means of mechanical cleaning and rinsing e.g. by brushing with nylon brushes and use of abundant clean fresh water, followed by roughening up surface must be allowed to dry completely polyester and other plastics (to be specified and checked); degreased and freed of contaminants by means of mechanical cleaning wood, hard board, chip board; to be sanded before and after application of the first primer coat	
paint system	SigmaCover 280 SigmaCover 456 SigmaDur 550	50 µm 75 µm 50 µm
maintenance	should preferably be carried out to this specification	

## SYSTEMS FOR INTERIOR(S)

3105

January 2010

<b>SPECIFICATION 4</b>	alkyd system for dry accommodation spaces when fully cured and not permanently exposed to water system is certified for low flame spread, see sheet 1883B	
pretreatment	steel without mill scale; power tool cleaned to ISO-St3 steel with approved shop primer; power tool cleaned to SPSS-Pt2 wood, hard board, chip board; to be sanded before and after application of the first primer coat	
paint system	Sigmarine 28	75 µm
	Sigmarine 48	35 µm
notes	<ul style="list-style-type: none"> <li>– for wood, hard board and chip board Sigmarine 28 can be replaced by Sigmarine 40 if a very smooth surface is required, a knifing filler should be applied after application of the (thinned) primer</li> <li>– one coat of Sigmarine 28 can be replaced by 2 coats of Sigmarine 24 at a dft of 35 µm each</li> </ul>	
maintenance	should preferably be carried out to this specification	

<b>SPECIFICATION 5</b>	water borne acrylic coating system for dry accommodation spaces system is certified for low flame spread, see sheet 1883B	
pretreatment	steel without mill scale; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-St3 steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt2	
paint system	Sigma AquaCover 25	75 µm
	Sigma AquaCover 45	50 µm
maintenance	should preferably be carried out to this specification	

## SYSTEMS FOR INTERIOR(S)

3105

January 2010

**SPECIFICATION 6**

emulsion paint system for soft board ceilings, plastered pipelines, fibre cement plates and insulating materials with good resistance to wet scrubbing

system is certified for low flame spread, see sheet 1883B

pretreatment

all substrates; removal of contaminants

highly absorbent surfaces, to be impregnated with a strong diluted extra coat

paint system

Sigmatex

40 µm

Sigmatex

40 µm

maintenance

should preferably be carried out to this specification

## SYSTEMS FOR INTERIOR(S)

3105

January 2010

## REFERENCES

Sigma AquaCover 25	see product data sheet 7150
Sigma AquaCover 45	see product data sheet 7250
SigmaCover 280	see product data sheet 7417
SigmaCover 456	see product data sheet 7466
SigmaDur 550	see product data sheet 7537
SigmaPrime 200	see product data sheet 7416
SigmaPrime 700	see product data sheet 7930
Sigmarine 24	see product data sheet 7135
Sigmarine 28	see product data sheet 7117
Sigmarine 40	see product data sheet 7213
Sigmarine 49	see product data sheet 7240
Sigmarine 48	see product data sheet 7238
Sigmatex	see product data sheet 8215
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Certificates for low-flame spread	see information sheet 1883B
prefabrication primers	see system sheet 3015

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## SYSTEMS FOR POLLUTED WATER TANKS

3109

a three page issue

May 2012  
revision of January 2010

Application areas: internal areas of polluted water tanks.

For application instructions, careful attention should be given to the relevant working procedures and product data sheets.

Contains the following specifications:

Specification 1: phenolic epoxy system  
 Specification 2: solvent free epoxy coating system

For recommended application instructions

– see working procedure –

<b>SPECIFICATION 1</b>	phenolic epoxy system for POLLUTED WATER TANKS	
pretreatment	steel; blast cleaned in situ to at least ISO-Sa2½ blasting profile (Rz); 50 - 100 µm	
paint system	PhenGuard 930	100 µm
	PhenGuard 935	100 µm
	PhenGuard 940	100 µm
notes	<ul style="list-style-type: none"> <li>- for more info see sheet 3322 and 3329</li> <li>- PhenGuard 930/935/940 can be replaced by 3 coats of 100 µm of PhenGuard 965</li> </ul>	
min. and max. dft for the system	min. dft is 300 µm; average max. dft is 500 µm, and locally the max dft should not exceed 600 µm, see further sheet 3322	
maintenance	should preferably be carried out according to this specification for maintenance of minor defects SigmaGuard 795 can be used	

<b>SPECIFICATION 2</b>	solvent free epoxy system for POLLUTED WATER TANKS	
pretreatment	steel; blast cleaned in situ to at least ISO-Sa2½ blasting profile (Rz); 50 - 100 µm	
paint system	NovaGuard840	300 µm
Note	In case of complicated tank structures it is recommended to apply 2 coats of 250 µm of NovaGuard 840	
min. and max. dft for the system	min. dft is 300 µm; max. dft in critical areas is 600 µm	
maintenance	should preferably be carried out according to this specification	

**VENTILATION**

Adequate ventilation must be maintained during application and curing (please refer to sheet 1433 and 1434)

May 2012

### REFERENCES

NovaGuard 840	see product data sheet 7462
PhenGuard 930	see product data sheet 7409
PhenGuard 935	see product data sheet 7435
PhenGuard 940	see product data sheet 7436
PhenGuard 965	see product data sheet 7959
SigmaGuard 795	see product data sheet 7455
Explanation to product data sheets	see information sheet 1411
Safe working in confined spaces	see information sheet 1433
Directives for ventilation practice	see information sheet 1434
Cleaning of steel and removal of rust	see information sheet 1490
Recognized corrosion control coating (Lloyd's Register)	see information sheet 1886

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**SYSTEMS FOR SUPERSTRUCTURE AND DECK FITTINGS****3104**

a six page issue

February 2011  
revision of January 2010

Application areas: all ferrous and non ferrous metal surfaces of superstructure and deck fittings.

Contains following specifications:

- Specification 1: recoatable polyurethane/epoxy coating system
- Specification 2: recoatable polyurethane/epoxy coating system
- Specification 3: alkyd coating system
- Specification 4: chlorinated rubber/modified acrylic coating system
- Specification 5: water based acrylic coating system

**GENERAL ASPECTS**

With superstructures on vessels, aesthetic considerations are very much to the fore. Well maintained superstructures are a reflection of the care and attention enjoyed by the vessel.

Superstructure coating systems should have:

- good anticorrosive properties
- resistance to wind, rain, seawater
- non-yellowing properties
- good gloss retention
- easy to maintain

**SURFACE PRETREATMENT**

Steel: the quality of the secondary surface pretreatment affects the performance of the recommended paint systems.

It is not common practice to reblast a superstructure and deck fittings despite the fact that this pretreatment results in the best performance.

In general most types of shop primers are accepted provided that the surface is cleaned of all contamination and rust.

Sigmarine 24, Sigmarine 28 and SigmaCover 280 in particular have a good tolerance for substrates which are pretreated by means of mechanical cleaning.

Galvanised steel and aluminium; degreasing with a suitable detergent and removal of (zinc)salts by means of mechanical cleaning (e.g. by brushing with nylon brushes) followed by fresh water washing, drying and roughening up of the surface.



## SYSTEMS FOR SUPERSTRUCTURE AND DECK FITTINGS

3104

February 2011

**SPECIFICATION 1**

recoatable polyurethane/epoxy system for SUPERSTRUCTURE with excellent durability and gloss retention

## pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-St3

steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or SPSS-Pt2

galvanised steel and aluminium; degreasing with suitable detergent and removal of (zinc)salts by means of mechanical cleaning (e.g. by brushing with nylon brushes) followed by freshwater washing, drying and roughening up of the surface

## paint system

SigmaPrime 700

100 µm

SigmaCover 456

75 µm

SigmaDur 550

50 µm

## note

at temperatures below 5°C, SigmaPrime 700 can be replaced by SigmaPrime 700 LT

## maintenance

should preferably be carried out to this specification

both SigmaCover 456 and SigmaDur 550 have good overcoating and good curing characteristics also below 0°C, which simplifies maintenance

For maintenance on board SigmaDur One can also be used as the final finish coat.

## pretreatment

in case of hydrojetted to VIS WJ2/3 L or ISO Wa 2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see sheet 1498)

## SYSTEMS FOR SUPERSTRUCTURE AND DECK FITTINGS

3104

February 2011

**SPECIFICATION 2**

recoatable polyurethane/epoxy system for SUPERSTRUCTURE with excellent durability and gloss retention

## pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-St3

steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or SPSS-Pt2

galvanised steel and aluminium; degreasing with suitable detergent and removal of (zinc)salts by means of mechanical cleaning (e.g. by brushing with nylon brushes) followed by freshwater washing, drying and roughening up of the surface

## paint system

SigmaPrime 200

100 µm

SigmaCover 456

75 µm

SigmaDur 550

50 µm

## note

at temperatures below 5°C, SigmaPrime 200 can be replaced by SigmaPrime 200 LT

## maintenance

should preferably be carried out to this specification

both SigmaCover 456 and SigmaDur 550 have good overcoating and good curing characteristics also below 0°C, which simplifies maintenance

For maintenance on board SigmaDur One can also be used as the final finish coat.

## pretreatment

in case of hydrojetted to VIS WJ2/3 L or ISO Wa 2½ L SigmaCover 280 should be applied as first coat at a dft of 50 µm (for more info see sheet 1498)

## SYSTEMS FOR SUPERSTRUCTURE AND DECK FITTINGS

3104

February 2011

**SPECIFICATION 3**

alkyd system for SUPERSTRUCTURE and DECK FITTINGS

## pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-St3

steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3 or SPSS-Pt2

galvanised steel and aluminium; degreasing with suitable detergent and removal of (zinc)salts by means of mechanical cleaning (e.g. by brushing with nylon brushes) followed by fresh water washing, drying and roughening up of the surface

## paint system

Sigmarine 28	75 µm
Sigmarine 48	35 µm
Sigmarine 48	35 µm

## notes

- for galvanised steel and aluminium substrates, Sigmarine 28 should be replaced by SigmaCover 280 (dft of 75 µm)
- one coat of Sigmarine 28 can be replaced by 2 coats of Sigmarine 24 at a dft of 35 µm each

## maintenance

should preferably be carried out to this specification  
For an upgrade of the finish performance during on board maintenance SigmaDur One can be used as a final coat.

**SPECIFICATION 4**

chlorinated rubber/modified acrylic system for SUPERSTRUCTURE and DECK FITTINGS

## pretreatment

steel; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-Pt3

steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt3

## paint system

Sigma Vikote 18	75 µm
Sigma Vikote 46	75 µm
Sigma Vikote 56	35 µm

## note

for galvanised steel and aluminium substrates Sigma Vikote 18 must be replaced by SigmaCover 280 (dft of 75 µm)

## maintenance

should preferably be carried out with Sigmarine 28 as first coat (dft of 75 µm) or to this specification  
Sigma Vikote 46 and 56 have good overcoating and good drying characteristics also below 0°C, which simplifies maintenance

## SYSTEMS FOR SUPERSTRUCTURE AND DECK FITTINGS

3104

February 2011

<b>SPECIFICATION 5</b>	water based acrylic coating system for SUPERSTRUCTURE and DECK FITTINGS	
pretreatment	steel without mill scale; blast cleaned to ISO-Sa2½, blasting profile 40 - 70 µm or power tool cleaned to ISO-St3 steel with approved shop primer; sweep blasted to SPSS-Ss or power tool cleaned to SPSS-Pt2	
paint system	Sigma AquaCover 25	50 µm
	Sigma AquaCover 25	50 µm
	Sigma AquaCover 45	50 µm
maintenance	should preferably be carried out to this specification	

**MAINTENANCE**

The system to be used for maintenance will depend on the size of repair, possibilities of surface preparation and the weather conditions.

The removal of oil, grease and contamination can be achieved by high pressure water cleaning in combination with the use of suitable detergents. This should be followed by a thorough fresh water wash and drying before blast cleaning and/or repainting.

For major areas of breakdown maintenance is normally carried out by a fresh water wash and reblasting to ISO-Sa2½ and recoating with the original system. Minor areas can be power tool cleaned to SPSS-Pt3.

When blast cleaning (dry or wet) is impossible or not tolerated the surface should be derusted by means of power tool cleaning to a minimum of SPSS-Pt2 and primed with SigmaCover 280 (dft of 50 µm) followed by the build coat and top coat as described in the specification.

## SYSTEMS FOR SUPERSTRUCTURE AND DECK FITTINGS

3104

February 2011

## REFERENCES

Sigma AquaCover 25	see product data sheet 7150
Sigma AquaCover 45	see product data sheet 7250
Sigma Vikote 18	see product data sheet 7318
Sigma Vikote 46	see product data sheet 7350
Sigma Vikote 56	see product data sheet 7355
SigmaCover 280	see product data sheet 7417
SigmaCover 456	see product data sheet 7466
SigmaDur One	see product data sheet 7533
SigmaDur 550	see product data sheet 7537
SigmaPrime 200	see product data sheet 7416
SigmaPrime 200 LT	see product data sheet 7931
SigmaPrime 700	see product data sheet 7930
SigmaPrime 700 LT	see product data sheet 7946
Sigmarine 24	see product data sheet 7135
Sigmarine 28	see product data sheet 7117
Sigmarine 48	see product data sheet 7238
Cleaning of steel and removal of rust	see information sheet 1490
Hydrojetting	see information sheet 1498

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**TANKLINING SELECTION TABLE****3310**

a four page issue

January 2010  
revision of April 2009**INTRODUCTION**

Shipowners and managers should very carefully consider the generic type tanklinings on offer as their choice will affect the trading program of the vessel. A number of factors should be borne in mind:

- Which IMO classification does the vessel structure conform to?  
The IMO class defines which cargoes a particular vessel may transport - irrespective of the suitability of a vessels tanklinings for those cargoes.
- Will the vessel operate on fixed trade or charter?  
Or will it be operated on the chemical spot market and therefore require maximum operational flexibility.
- Does the vessel conform with the requirements of the system to be applied?  
This is especially valid if a hot cure is required, as then it will be essential that the vessel has heating coils fitted, or the tanker is provided with means of fulfilling this requirement.
- What restrictions are apparent at the application site?  
Are the application and extraction equipment suitable for the materials proposed.

Many other factors like minimum application temperature, economics, cleanability and even personal preferences can play a decisive role. It is clear that selecting the proper tanklining for specific vessels is not an easy job and requires understanding of the various aspects involved. Based on many years experience in this complex market PPG Protective & Marine Coatings can provide technical expertise when required, please contact the nearest sales office.

In the review on the next page Sigma's tanklinings, supplied by PPG Protective & Marine Coatings are typified. This review will give you an impression of the various tanklinings available, as well as outlining the chemical resistance properties of the tanklining systems.

## TANKLINING SELECTION TABLE

3310

January 2010

## TANKLININGS

Name	Pretreatment	Nr. of coats	Total min. dft	Generic Type
PhenGuard (3322)	ISO-Sa2½ Blasting profile (Rz) 50-100 µm	3	300 µm	amine cured phenolic epoxy
NovaGuard (3328)	ISO-Sa2½ Blasting profile (Rz) 50-100 µm	2	300-450 µm	amine cured solvent free epoxy
SigmaGuard 720 (3320)	ISO-Sa2½ Blasting profile (Rz) 40- 70 µm	2	250 µm	amine cured high build epoxy
SigmaGuard 750 (3323)	ISO-Sa2½ Blasting profile (Rz) 40- 70 µm	1	75-100 µm	zinc silicate
SigmaGuard CSF 650 (7443)	ISO-Sa2½ Blasting profile (Rz) 50-100 µm	1	300 µm	amine cured solvent free epoxy

Optimum chemical resistance can only be achieved when the system is applied to bare blast cleaned steel. For chemical resistance properties see the latest issue of the Tankcoating Resistance List (TRIS) .

## TANKLINING SELECTION TABLE

3310

April 2009

## GENERAL REVIEW OF CHEMICAL RESISTANT PROPERTIES

+ = suitable

+ R = suitable subject to reference notes in Tankcoating Resistance List (TRIS)

- = unsuitable/not recommended

	PhenGuard	NovaGuard	Sigma-Guard 720	Sigma-Guard 750	Sigma-Guard CSF 650
Alcohols above C-4	+	+	+	+	+ R
Aliphatic hydrocarbons	+	+	+	+	+
Benzene, toluene	+	+ R	+ R	+	-
Xylene and higher aromatics	+	+	+	+	+
Crude oils 70°C	+	+ R	+ R	+ R	+ R
Lub oils	+	+	+	+	+
Lub oil additives	+	+ R	+ R	+ R	+ R
Styrene monomer	+	+ R	+ R	+ R	-
Water	+	+	+	+	+
Ammonia-stabilized latex	+	-	-	-	-
Fatty oils, animal or vegetable	+	+ R	+ R	+ R	+ R
Glycols	+	+	+	+	-
Molasses	+	+ R	+ R	-	+ R
Phthalate plasticizers	+	+	+	+	-
Caustic soda	+ R	+ R	+ R	-	+ R
Higher esters above C-3	+ R	+ R	+ R	+ R	+ R
Vinyl acetate monomer	+ R	-	-	+ R	-
Organic acids above C-10	+ R	-	-	-	-
Organic acids C-6 / C-10	+ R	-	-	-	-
Higher ketones (linear above C-6)	+	-	-	+	-
Acrylate monomers	+	-	-	+	-
Concentrated ammonia	+	-	-	-	-
Ethers	+ R	-	-	+	-
Low esters (ethylacetate)	+ R	-	-	+ R	-
Low ketones (MEK, MIBK)	+ R	-	-	+	-
Acetone	+ R	-	-	+ R	-
Glycoethers	+ R	-	-	+	-
Lower alcohols (methanol, propanol)	+ R	-	-	+	-
Chlorinated hydrocarbons	+ R	-	-	+ R	-
Amines	-	-	-	-	-
Phenols/Cresols	-	-	-	+ R	-
Organic acids below C-6	-	-	-	-	-

For complete resistance see Tankcoating Resistance List (TRIS)



## TANKLINING SELECTION TABLE

3310

April 2009

## REFERENCES

NovaGuard tankcoating system	see system sheet	3328
PhenGuard tankcoating system	see system sheet	3322
SigmaGuard CSF 650	see product data sheet	7443
SigmaGuard 720 tankcoating system	see system sheet	3320
SigmaGuard 750 tankcoating system	see system sheet	3323
Safe working in confined spaces	see information sheet	1433
Directives for ventilation practice	see information sheet	1434
Cleaning of steel and removal of rust	see information sheet	1490
Recognized corrosion control coating (Lloyd's register)	see information sheet	1886

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