

## 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.

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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 –

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**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

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**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

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<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

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<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

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**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

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**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)



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## 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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