1. Scope

To ensure that all new engine parts are painted with the appropriate paint and paint level that is suitable for the engine part's intended use or for further coating at Bergen Engines AS (BEAS).

2. Drawing notes

This document relates to the paint type and paint level for the individual engine part or engine part group. Paint type and paint level is stipulated in Table A and in most of the engine parts drawing *(as either a part group reference or a flag note with a BEAS paint level code on the paint area in question).* Description in Table A is valid unless otherwise specified in the drawing.
BEAS paint level codes and associated paint product are listed in Table B of this document.

2.1. **Part group reference**

Part group reference stated in the engine part drawing is in the form of a note e.g. "To be painted according to DR1130/11 ref. A2." This example indicates that the engine part should be painted according to the corresponding row of Table A of the current document, specifically row A2.
See Annex A for an example of a part group reference drawing note.

2.2. **Flag note designation**

In cases where an engine part is not covered by a specific part group, the paint level and paint type can be given by a flag note with the appropriate BEAS paint level code, listed in Table B of this document.
See Annex B for an example of a flag note drawing note.

Table A; Part group reference

Reference (used in drawing)	**Part group**	**Paint area**	**Paint type** (See details in table B)	**BEAS Paint level code**	**Colour** (See pt. 3)	**Special requirements and Paint system**
A1	**Engine foundations**	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
		Oil sump inside	Two component topcoat (Epoxy)	B04	See pt. 3	Paint system must be able to withstand oil at temperatures of up to 90 °C.
		Underside	Two component topcoat (Acrylic Polyurethane)	B02 (B04)	See pt. 3	Paint system 3
A2	**Engine blocks** (See engine specific surface requirements for; unpainted, primer and topcoat, in DR1053/53).	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5.
		Inside surfaces (Except from water exposed surfaces as marked in DR1053/53)	Two components topcoat (Epoxy)	B04	See pt. 3	Paint system must be able to withstand oil at temperatures of up to 90 °C.
A3	**Cylinder heads**	Outside unmachined surfaces	Two component topcoat (Epoxy)	B04	See pt. 3	
		Inside surfaces	None	-	-	-

I1	Rev. H	Rev. G	Rev. F	Rev. E	Issue:	Original	Bergen Engines		Type:
JHa	JHa	JHa	JHa	HakDa	Sign.:	PHau			KLS no.: 97
201222	281021	120520	04.09.19	09.08.16	Date:	19.06.2013		Scale	Replaced by:
MKj MKj	SOV	HakDa	HS	KASm	Check.:	JHa			Replaces:
ØFB ØFB	KSF	KSF	KSF	KSF	Appr.:	KSF			Ref.:

I1

BERGEN ENGINES
ON LAND. AT SEA.

Title:
Paint type and paint level selection

Drawing no.:
DR 1130/11

A4	**Equipment modules**	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
		Inside surfaces	Two component topcoat (Epoxy)	B04	See pt. 3	
A5	**Housing/Parts with oil exposed inside**	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
		Inside surfaces	Two component topcoat (Epoxy)	B04	See pt. 3	
A6	**Oil exposed parts** (Will not be painted after mounting on engine)	Outside surfaces	Two component topcoat (Epoxy)	B04	See pt. 3	
		Inside surfaces (if applicable)	Two component topcoat (Epoxy)	B04	See pt. 3	
A7	**Brackets and other parts**	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
		Inside surfaces (if applicable)	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
A8	**Gas parts** (pipes, valves, etc.) (Will not be painted after mounting on engine)	Outside surfaces	Two component topcoat (Acrylic Polyurethane)	B02	RAL 1021	Paint system 1 (Top coat without prior priming is accepted by BEAS)
		Inside surfaces	None	-	-	-
A9	**Pipes** (Not gas) (Will not be painted after mounting on engine)	Outside surfaces	Two component topcoat (Acrylic Polyurethane)	B02	See pt. 3	Paint system 1
		Inside surfaces	None	-	-	-
A10	**Pipes** (primed)	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
		Inside surfaces	None	-	-	-
A11	**Flywheel shields and other sheet metal parts**	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
		Inside surfaces (if applicable)	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
A12	**Tools**	Outside surfaces	Two component topcoat (Acrylic Polyurethane) (One component topcoat)	B02 (B05)***	RAL 2009	Paint system 1
		Inside surfaces (if applicable)	Two component topcoat (Acrylic Polyurethane) (One component topcoat)	B02 (B05)***	RAL 2009	Paint system 1
A13	**Turbocharger brackets**	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
		Inside surfaces	Two component primer (Epoxy)	B03	See pt. 3	
A14	**Brackets and other parts** (Will not be painted after mounting on engine)	Outside surfaces	Two component topcoat (Acrylic Polyurethane)	B02	RAL 7035	Paint system 1
		Inside surfaces (if applicable)	Two component topcoat (Acrylic Polyurethane)	B02	RAL 7035	Paint system 1
A15	**Pipes** (grey) (Will not be painted after mounting on engine)	Outside surfaces	Two component topcoat (Acrylic Polyurethane)	B02	RAL 7035	Paint system 1
		Inside surfaces	None	-	-	

A16	**Generators**	Outside surfaces	Std/default: Two component topcoat (Acrylic Polyurethane) Exceptions (for special orders): Two component Epoxy primer	B02 B01	See pt. 3 RAL5012	Paint system 3 (std) Paint system 5 if topcoat is not required
A17	**Flywheels** (Will not be painted after mounting on engine)	Outside surfaces	Two component topcoat (Epoxy) (One component topcoat)	B04 (B05)***	RAL 6019	
A18	**Pumps** (Water, Oil, pre-fuel)	Outside surfaces	Two component primer (Epoxy)	B01	See pt. 3	Paint system 5
A19	**Pumps**(injection) (Will not be painted after mounting on engine)	Outside surfaces	Manufacturer's standard (Industry standard)	-	-	
A20	**Regulators** (Will not be painted after mounting on engine)	Outside surfaces	Manufacturer's standard (Industry standard)	-	-	

3. Colour:

Unless otherwise specified in order, the engine part drawing or in table A, the following colours must be used:

- **Topcoat** *(One and two component paint system)*
  - **RAL9001**(cream white)
    - Optional, order specific colours: RAL5012(light blue) and RAL6019(white green).
- **Primer**
  - **Oxide yellow** (Buff)
    - (Product codes; EPA233 part A for Intercure 202, EPA213 part A for Intercure 200)
    - (Harder: EPA 240 Part B)

  Red oxide can be used if Oxide yellow is not available

4. Special precautions:

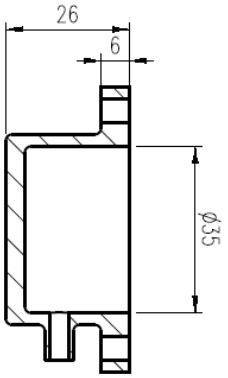
4.1. If not otherwise specified in the drawing, machined surfaces must not be painted and must be masked prior to painting. Masking must be removed when the paint is touch dry and before the paint is hard dry (see paint product datasheet)
4.2. Threaded holes must be blanked off by a plastic plug or a bolt prior to painting.
4.3. Flange contact surfaces must not be painted.
4.4. O-Ring grooves must not be painted.
4.5. Water channels must not be painted.
4.6. The paint product suggestion listed in Table B is based on a specific paint system. This system fulfils special requirements in Table A
4.7. Contact the paint supplier's technical department for assistance if in doubt or if choosing a different paint product to achieve the specified paint system requirements.
4.8. This procedure overrules the requirements set up in former "Production descriptions".

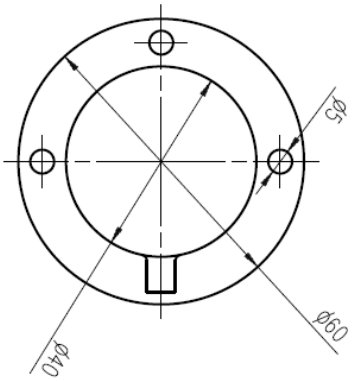
Table B; Paint level				
Type	**Paint type**	**Paint product suggestion**	**BEAS Paint level Code**	**Note**
Two component Epoxy primer	Primer	Intercure 202 (Intercure 200)**	B01	Used in paint system 3 and 5 **200 can be used if 202 is not available in actual country.
Two component paint Acrylic Polyurethane	Topcoat	Interthane 3230 G	B02	Used in paint system 1 and 3
Two components Epoxy primer	Primer	Intergard 269	B03	For use in water exposed areas
Two components Epoxy paint	Topcoat	Intergard 740	B04	The material must be clean and dry before primer/paint is applied. Paint must be applied no later than 3 hours after cleaning. Based on good experience for long time, topcoat without prior priming in this group is acceptable for BEAS if applied directly on the material in 2 coatings as follows: • First a thin coating, and when this has allowed to dry for 30-45 min., the second coating to be applied. Thickness: approximate 100 my (dry film). (Primer can be used if supplier want to stick to paint manufacturers specification)
One component Alkyd top coat	Topcoat	Interlack 645	B05	***If agreed with supplier

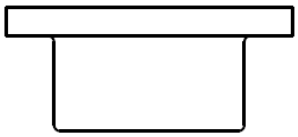
General notes:

- Other two component painting can be accepted/agreed in special cases. Special compatibility test and verification must be done and documented by a qualified company.
- All prior surface treatment and primer must be carried out in compliance with the specific paint product data sheet and DR1128/01, "Requirements for protective paint system - New part production" if nothing else is specified/accepted by BEAS.
- See Appendix C, "Coating System Data Sheet" (CSDS) for applicable **Paint system** and details (Number of coatings, thickness, etc.)

Annex A, Example of a part group reference.







To be painted according to DR1130/11 ref.A5.
Surface treatment and coating requirements according to DR1128/01.

Machining tolerances according to ISO 2768-mK, if otherwise not indicated

Rev. E	Rev. D	Rev. C	Rev. B	Rev. A	Issue:	Original
					Sign.:	
					Date:	120313
					Check.:	
					Appr.:	

Engines Bergen

A3

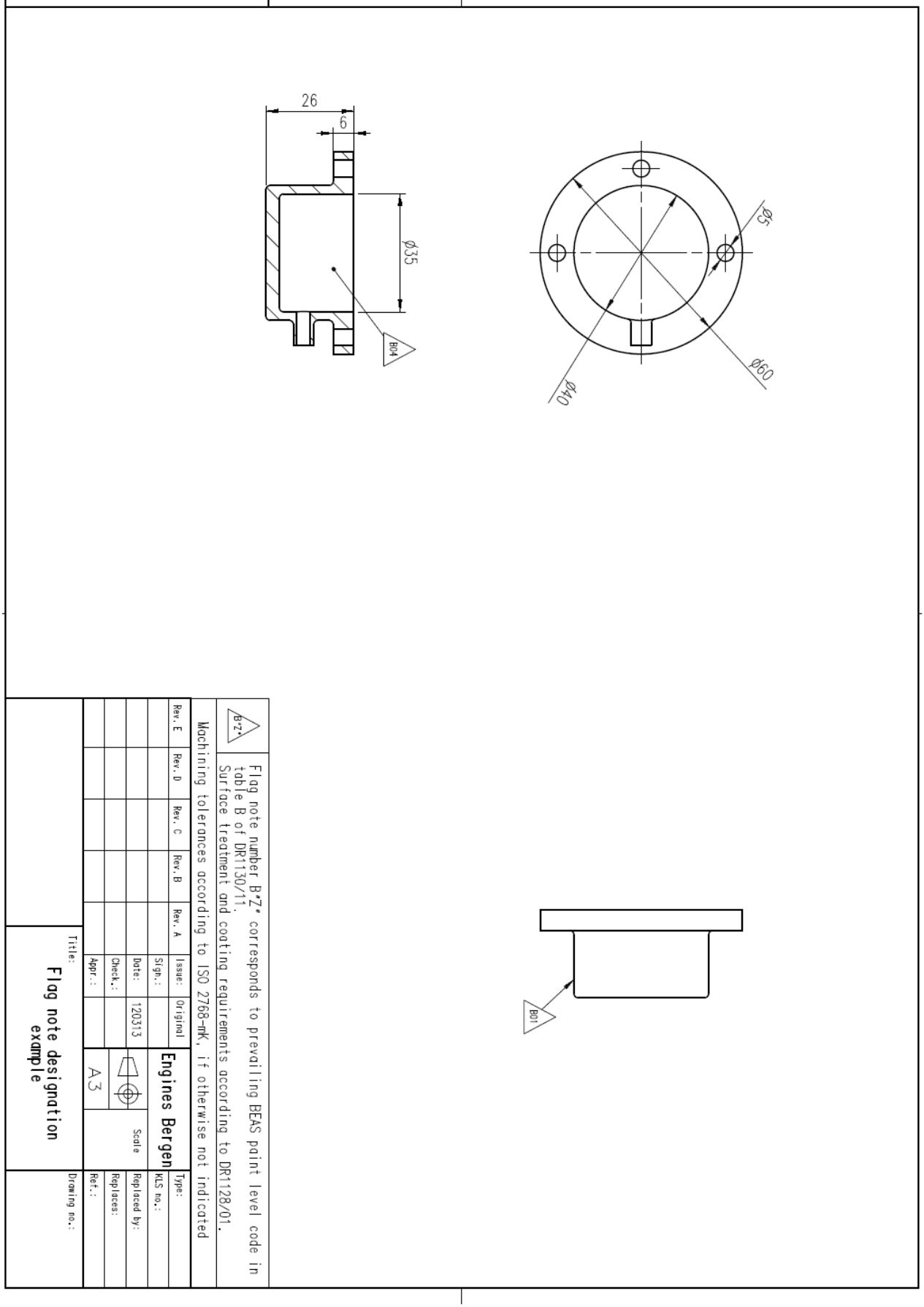
Scale

Title: Part group reference Example

Drawing no.: Annex A

Type:
MLS no.:
Replaced by:
Replaces:
Ref.:

Annex B, Example of a flag note designation.



International

CSDS

	Revision Date:	Produced by:	Checked by:	Approved by:	Client approval sign/ date
	16. september 2019	HB	KTB	PF	#REF!

Project Name:
Doc. No.: ISO 12944-5: 2018
System No.: C3M - C3.05 Main system.
Applicable to: Structures - Exposed areas (Carbon steel with maximum operating temperature <120°C)

Bergen Engines AS, System 1

Part 1 Main System

Pre-treatment	ISO 8501-3 (Steel preparation)	Min. P3	Surface prep:	ISO 12944- 4 (Section 6.1)	Emulsion / alkali / solvent - degrease followed by fresh water wash
Cleanliness: (a):	ISO 8501-1 (Grit Blast)	Min. Sa 2½	Roughness:	ISO 8503-1 (Profile)	Medium (G) 50-85 µm
Cleanliness: (b):	ISO 8502-3 (Dust)	Max. Rating 2	Salt test:	ISO 8502-6/8502-9 (NaCl equ)	Max 20 mg/m²
Alt. Pre-treat.	NA				

Coat No.	Product name	Colour	Vol. Sol %	DFT Min.	DFT Spec.	DFT Max	WFT Spec.	10°C (*) Min.	10°C (*) Max	10°C (*) Final	15°C (*) Min.	15°C (*) Max	15°C (*) Final	20°C (*) Min.	20°C (*) Max	20°C (*) Final	25°C (*) Min.	25°C (*) Max	25°C (*) Final	Spr. rate m²/l.	Thinner (max%)	Cleaner
1	Interthane 3230G	TBA	70	120	120	180	171	17 h	Ext	NA	10 h	Ext	NA	8 h	Ext	NA	6 h	Ext	NA	5,8	GTA713 ~ 5%	GTA713
		Total DFT µm		120	120	180																

Part 2 Minor Damage Repair System when accepted by owners (Normally less than 0,25m²) Pre-treatment MUST be confirmed by project and owners before repair process

Pre-treatment	ISO 8501-3 (Steel preparation)	Min. P3	Surface prep:	ISO 12944- 4 (Section 6.1)	Emulsion / alkali / solvent - degrease followed by fresh water wash
Cleanliness: (a):	ISO 8501-1 (Mech)	Min. St 3 (min profile 25 µm) - when allowed by client	Roughness:	ISO 8503-1 (Profile)	Fine to Medium (G) 25-85 µm
Cleanliness: (b):	ISO 8502-3 (Dust)	Max. Rating 2	Salt test:	ISO 8502-6/8502-9 (NaCl equ)	Max 20 mg/m²
Alt. Pre-treat.	NA				

Coat No.	Product name	Colour	Vol. Sol %	DFT Min.	DFT Spec.	DFT Max	WFT spec	10°C (*) Min.	10°C (*) Max	10°C (*) Final	15°C (*) Min.	15°C (*) Max	15°C (*) Final	20°C (*) Min.	20°C (*) Max	20°C (*) Final	25°C (*) Min.	25°C (*) Max	25°C (*) Final	Spr. rate m²/l.	Thinner (max%)	Cleaner
1	Interthane 3230G	TBA	70	120	120	180	171	17 h	Ext	NA	10 h	Ext	NA	8 h	Ext	NA	6 h	Ext	NA	5,8	GTA713 ~ 5%	GTA713
		Total DFT µm		120	120	180																

NB Refer to additional details as in the latest Product Technical Data Sheet and Product Working Procedure.

For each coat, a stripe coat shall be applied by brush to all welds, corners, edges and difficult areas.

The substrate temperature to be min. 3°C above dew point, measured in the vicinity of coating and with ample ventilation required during application / curing.

(*) Max. and min. recoating intervals only for the specified thickness and for areas not subject to external pressure or mechanical forces (eg. walking on). For excessive dft the intervals will need to be increased.

(*) Overcoating times for the primer and mid coats are times before application of the next coating. Overcoating times for the final top coat are self-self intervals

Times = h /d /m /ext. as hour /day / month / extended

TBA = To Be Advised NA = Not Applicable

Final = Time required before exposure of system to the specified enviroment.

Multi Max = In the case of stripe coats, local repairs and areas of difficult access single dft measurements may be allowed to multi max value, must be reported in the daily log with reason for the variance.

DFT = Dry paint film thickness to be measured as according to ISO 19840 and ISO 12944. Correction value is required for surface profile (eg 25µm for Medium blast profile)

AkzoNobel

BERGEN ENGINES
ON LAND. AT SEA.

Title: Paint type and paint level selection

Drawing no.: DR 1130/11

Revision: I

BERGEN ENGINES
ON LAND. AT SEA.

International

CSDS

Revision Date:	Produced by:	Checked by:	Approved by:	Client approval sign/ date
16. september 2019	HB	KTB	PF	C3H - C3.06

Project Name:
Doc. No.: ISO 12944-5: 2018
System No.: C3M - C3.05 With zinc phosphate primer.
Applicable to: Structures - Exposed areas (Carbon steel with maximum operating temperature <120°C)

Bergen Engines AS, System 3

Part 1 Main System

Pre-treatment	ISO 8501-3 (Steel preparation)	Min. P3	Surface prep:	ISO 12944- 4 (Section 6.1)	Emulsion / alkali / solvent - degrease followed by fresh water wash
Cleanliness: (a):	ISO 8501-1 (Grit Blast)	Min. Sa 2½	Roughness:	ISO 8503-1 (Profile)	Medium (G) 50-85 µm
Cleanliness: (b):	ISO 8502-3 (Dust)	Max. Rating 2	Salt test:	ISO 8502-6/8502-9 (NaCl equ)	Max 20 mg/m²
Alt. Pre-treat.	NA				

Coat No.	Product name	Colour	Vol. Sol %	DFT Min.	DFT Spec.	DFT Max	WFT Spec.	10°C (*) Min.	10°C (*) Max	10°C (*) Final	15°C (*) Min.	15°C (*) Max	15°C (*) Final	20°C (*) Min.	20°C (*) Max	20°C (*) Final	25°C (*) Min.	25°C (*) Max	25°C (*) Final	Spr. rate m²/l.	Thinner (max%)	Cleaner
1	Intercure 200/202	Yellow	67	75	80	125	119	3 h	Ext	NA	2 h	Ext	NA	2 h	Ext	NA	1 h	Ext	NA	8,4	GTA220 ~ 5%	GTA822
2	Interthane 3230G	TBA	70	80	80	150	114	17 h	Ext	NA	10 h	Ext	NA	8 h	Ext	NA	6 h	Ext	NA	8,8	GTA713 ~ 5%	GTA713
		Total DFT µm		160	160	275																

Part 2 Minor Damage Repair System when accepted by owners (Normally less than 0,25m²) Pre-treatment MUST be confirmed by project and owners before repair process

Pre-treatment	ISO 8501-3 (Steel preparation)	Min. P3	Surface prep:	ISO 12944- 4 (Section 6.1)	Emulsion / alkali / solvent - degrease followed by fresh water wash
Cleanliness: (a):	ISO 8501-1 (Mech)	Min. St 3 (min profile 25 µm) - when allowed by client	Roughness:	ISO 8503-1 (Profile)	Fine to Medium (G) 25-85 µm
Cleanliness: (b):	ISO 8502-3 (Dust)	Max. Rating 2	Salt test:	ISO 8502-6/8502-9 (NaCl equ)	Max 20 mg/m²
Alt. Pre-treat.	NA				

Coat No.	Product name	Colour	Vol. Sol %	DFT Min.	DFT Spec.	DFT Max	WFT spec	10°C (*) Min.	10°C (*) Max	10°C (*) Final	15°C (*) Min.	15°C (*) Max	15°C (*) Final	20°C (*) Min.	20°C (*) Max	20°C (*) Final	25°C (*) Min.	25°C (*) Max	25°C (*) Final	Spr. rate m²/l.	Thinner (max%)	Cleaner
1	Intercure 200/202	Yellow	67	75	80	125	119	3 h	Ext	NA	2 h	Ext	NA	2 h	Ext	NA	1 h	Ext	NA	8,4	GTA220 ~ 5%	GTA822
2	Interthane 3230G	TBA	70	80	80	150	114	17 h	Ext	NA	10 h	Ext	NA	8 h	Ext	NA	6 h	Ext	NA	8,8	GTA713 ~ 5%	GTA713
		Total DFT µm		160	160	275																

NB Refer to additional details as in the latest Product Technical Data Sheet and Product Working Procedure.

For each coat, a stripe coat shall be applied by brush to all welds, corners, edges and difficult areas.

The substrate temperature to be min. 3°C above dew point, measured in the vicinity of coating and with ample ventilation required during application / curing.

(*) Max. and min. recoating intervals only for the specified thickness and for areas not subject to external pressure or mechanical forces (eg. walking on). For excessive dft the intervals will need to be increased.

(*) Overcoating times for the primer and mid coats are times before application of the next coating. Overcoating times for the final top coat are self-self intervals

Times = h /d /m /ext. as hour /day / month / extended

TBA = To Be Advised NA = Not Applicable

Final = Time required before exposure of system to the specified enviroment.

Multi Max = In the case of stripe coats, local repairs and areas of difficult access single dft measurements may be allowed to multi max value, must be reported in the daily log with reason for the variance.

DFT = Dry paint film thickness to be measured as according to ISO 19840 and ISO 12944. Correction value is required for surface profile (eg 25µm for Medium blast profile)

Title: **Paint type and paint level selection**

Drawing no.: **DR 1130/11**

Revision: I

AkzoNobel

	Revision Date:	Produced by:	Checked by:	Approved by:	Client approval sign/ date
	16. september 2019	HB	KTB	PF	C3H - C3.06

Project Name:
Doc. No.:
System No.: Coatings System for Sub-Contractors
Applicable to: Structures - Exposed areas (Carbon steel with maximum operating temperature <120°C)

Bergen Engines AS, System 5

Part 1 Main System

Pre-treatment	ISO 8501-3 (Steel preparation)	Min. P3	Surface prep:	ISO 12944- 4 (Section 6.1)	Emulsion / alkali / solvent - degrease followed by fresh water wash
Cleanliness: (a):	ISO 8501-1 (Grit Blast)	Min. Sa 2½	Roughness:	ISO 8503-1 (Profile)	Medium (G) 50-85 µm
Cleanliness: (b):	ISO 8502-3 (Dust)	Max. Rating 2	Salt test:	ISO 8502-6/8502-9 (NaCl equ)	Max 20 mg/m²
Alt. Pre-treat.	NA				

Coat No.	Product name	Colour	Vol. Sol %	DFT Min.	DFT Spec.	DFT Max	WFT Spec.	10°C (*) Min.	10°C (*) Max	10°C (*) Final	15°C (*) Min.	15°C (*) Max	15°C (*) Final	20°C (*) Min.	20°C (*) Max	20°C (*) Final	25°C (*) Min.	25°C (*) Max	25°C (*) Final	Spr. rate m²/l.	Thinner (max%)	Cleaner
1	Intercure 200/202	Yellow	67	75	80	125	119	3 h	Ext	NA	2 h	Ext	NA	2 h	Ext	NA	1 h	Ext	NA	8,4	GTA220 ~ 5%	GTA822
		Total DFT µm		80	80	125																

Part 2 Minor Damage Repair System when accepted by owners (Normally less than 0,25m²) Pre-treatment MUST be confirmed by project and owners before repair process

Pre-treatment	ISO 8501-3 (Steel preparation)	Min. P3	Surface prep:	ISO 12944- 4 (Section 6.1)	Emulsion / alkali / solvent - degrease followed by fresh water wash
Cleanliness: (a):	ISO 8501-1 (Mech)	Min. St 3 (min profile 25 µm) - when allowed by client	Roughness:	ISO 8503-1 (Profile)	Fine to Medium (G) 25-85 µm
Cleanliness: (b):	ISO 8502-3 (Dust)	Max. Rating 2	Salt test:	ISO 8502-6/8502-9 (NaCl equ)	Max 20 mg/m²
Alt. Pre-treat.	NA				

Coat No.	Product name	Colour	Vol. Sol %	DFT Min.	DFT Spec.	DFT Max	WFT spec	10°C (*) Min.	10°C (*) Max	10°C (*) Final	15°C (*) Min.	15°C (*) Max	15°C (*) Final	20°C (*) Min.	20°C (*) Max	20°C (*) Final	25°C (*) Min.	25°C (*) Max	25°C (*) Final	Spr. rate m²/l.	Thinner (max%)	Cleaner
1	Intercure 200/202	Yellow	67	75	80	150	119	3 h	Ext	NA	2 h	Ext	NA	2 h	Ext	NA	1 h	Ext	NA	8,4	GTA220 ~ 5%	GTA822
		Total DFT µm		80	80	150																

NB Refer to additional details as in the latest Product Technical Data Sheet and Product Working Procedure.

For each coat, a stripe coat shall be applied by brush to all welds, corners, edges and difficult areas.

The substrate temperature to be min. 3°C above dew point, measured in the vicinity of coating and with ample ventilation required during application / curing.

(*) Max. and min. recoating intervals only for the specified thickness and for areas not subject to external pressure or mechanical forces (eg. walking on). For excessive dft the intervals will need to be increased.

(*) Overcoating times for the primer and mid coats are times before application of the next coating. Overcoating times for the final top coat are self-self intervals

Times = h /d /m /ext. as hour /day / month / extended

TBA = To Be Advised NA = Not Applicable

Final = Time required before exposure of system to the specified enviroment.

Multi Max = In the case of stripe coats, local repairs and areas of difficult access single dft measurements may be allowed to multi max value, must be reported in the daily log with reason for the variance.

DFT = Dry paint film thickness to be measured as according to ISO 19840 and ISO 12944. Correction value is required for surface profile (eg 25µm for Medium blast profile)