FACTORY STANDARD

COATING

Broetje-Automation GmbH

BN 30.050

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Status of change

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03	Changes points 4, 5, 6	Garn	13.02.14
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01	Creator	Muschard	25.06.13

Release

This factory standard is only valid and approved on the intranet of Broetje Automation. Printouts and locally stored copies must be checked. They are not subject to the modification service. The www.broetje-automation.de website serves as an additional source of factory standards for external parties.

1 Scope and Purpose

To avoid corrosion damage, the components must be coated in such a way that they offer few opportunities for aggressive media to attack.

The standard, through the correct application of the coating, is intended to help ensure the visual and technical equivalence of the coating of suppliers through the proper application of the coating. The aim is to evenly protect Broetje-Automation's products from corrosion by means of wet painting or powder coating and to maintain their value in the long term.

Deviations from this standard require the approval of the quality assurance department of Broetje-Automation and are documented separately.

2 Standards and corrosion protection

2.1 Standards

DIN EN ISO 12944	Corrosion protection of steel structures by
	Coating systems
DIN 55633	Corrosion protection of steel structures by
	Powder Coating System
DIN EN ISO 8501	Preparation of steel surfaces prior to the application of coating materials (comparable to SSPC)
DIN EN ISO 2409	Paints and varnishes - cross-section testing
DIN EN ISO 4624	Tear-off test to determine adhesion strength
Shades	RAL 840-HR for Wet Paints
	VDL RL-10 for powder coatings
Processing	according to the specifications of the coating manufacturer

2.2 Corrosion claim

Atmosphere type II: Industry in closed, dry hall C2

Atmosphere type III: Industry in a closed hall with a nearby coastal area C3

3 Surface Preparation

The surface preparation must have a purity and roughness suitable for the intended coating in order to allow good adhesion of the coating. All surface preparation work must be supervised and controlled. A subsequent coating may not be applied until the surface to be coated has been prepared in accordance with the principles of this specification.

All surfaces must be dry and free of adhesion-hindering substances, such as:

- Natural material surface coating
  - Rust
  - Tinder
  - Rolled skin

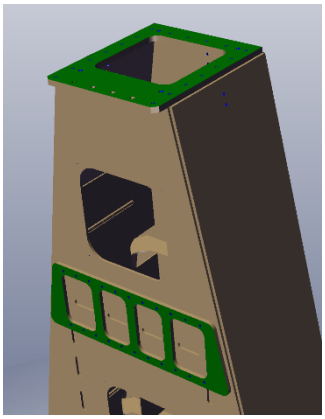
- Foreign objects and layers
  - Oils
  - Fats
  - Preservative
  - Dirt
  - Dust
  - Dew moisture
  - Detergent residues

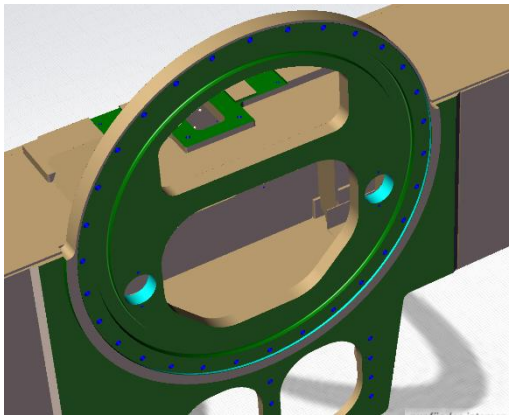
- Acceptable cleaning procedures are:
  - Radiate
  - Sanding (avoidance of sanding marks in the surface)
  - Steam off
  - Wet Dry Cleaning

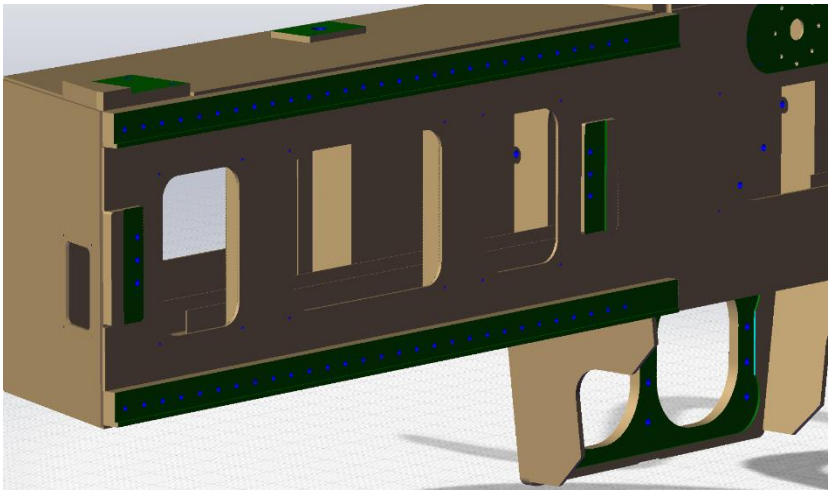
3.1 Drill holes, fits, threaded holes and mounting surfaces must be produced without paint

Drill holes, fits, threaded holes and mounting surfaces must be left unpainted and protected from coating by appropriate measures (e.g. stripping varnish and plastic or rubber caps). At the same time, corrosion protection must be ensured in accordance with Section 3.4. The relevant surfaces are color-coded in the respective 3D model (.stp) for orientation. (See example in accordance with BN10.030 BA-CATIA Guideline).

Objects	Color	RGB Values
Steelwork	Gray	210-210-255
Tapped holes	Blue	000-000-255
Drill holes for threaded inserts	Burgundy	128-064-064
Fittings	Cyan	000-255-255
Milling and functional areas	Dark green	000-128-000
E-parts	Yellow	255-255-000
Welded finished part (CATPart)	Sandy brown	211-178-125







3.2 Steel surfaces

The cleaned steel surfaces must be cleaned at the latest:

- 6 hours at relative humidity <70%
- 3 hours at a relative humidity of 70% to 85%

be protected by a base coat or a metallic protective layer.

3.3 Surface treatment

The base material can be ordered blasted or blasted after welding. Scale, rust and coatings must be removed to such an extent that residues remain visible only as slight shading due to tinting of the pores (surface quality SA 2 1/2 according to DIN EN ISO 8501-1 or SSPC-SP10).

The surface treatment of metallic materials to be painted and welded shall be carried out as follows:

Range	Request
Welds	The surface in the area of the weld seams must be smooth and also free of: Weld spatter, welding slag, edge notches, visible pores, visible end craters (EN ISO 8501-3, P3 Table 1).
Edges	For all steel, sheet metal and plastic parts, the edges must be broken in accordance with DIN ISO 13715 and absolutely burr-free. The edges must be smooth and must not have an irregular profile (EN ISO 8501-3, P2 Table 1).
General Interface	The surface must be free of: Holes and craters, visible scales, visible rollovers, rolled in foreign matter, indentations and markings from rolling (EN ISO 8501-3, P3 Table 1). The following surface roughness is to be achieved: › for wet painting Rz = 25 µm › for powder coating Rz = 30-40 µm

3.4 Bare surfaces

Uncoated surfaces must be **protected against corrosion with** Anticorit CPX 3373, DWF8301, Blasoprotect OV31 or comparable products.

3.5 Corrosivity category C3 and higher

If the corrosivity category C3 or higher is required in the order, open edges must be sealed with **Sikaflex-522® or comparable** so that crevice corrosion cannot occur.

4 Wet painting

4.1 Coating system

The following coating system according to the order is to be used:

Corrosivity Category		C2		C3		C4		C5	
Kind	Basis	Number of layers	NDFT µm	Number of layers	NDFT µm	Number of layers	NDFT µm	Number of layers	NDFT µm
Undercoat	EP	**1**	**80**	**1**	**80**	**1**	**100**	**1**	**120**
Top coat	PUR	**1**	**80**	**2**	**80**	**2**	**100**	**2**	**120**
Total		**2**	**160**	**3**	**240**	**3**	**300**	**3**	**360**

The maximum total dry layer thickness must not exceed 300 µm for C2 to C3 or 400 µm for C4 and C5.

The corresponding manufacturers and article numbers can be found in Chapter 9.

4.2 Coating process

According to DIN EN ISO 12944, both the base coat and the top coat are to be applied by spraying process, preferably by airless.

Paint application by rollers is not permitted.

The manufacturer's processing information must be observed.

5 Powder coating

5.1 Coating system

The following coating system should be used:

Corrosivity category C2-C5

Kind	Base	Number of layers	NDFT µm
Undercoat	EP	1	60
Top coat	PUR	1	60
	Total Layer Thickness	2	120

The corresponding manufacturers and article numbers can be found in Chapter 9.

5.2 Coating process

Both the base coat and the top coat must be applied in accordance with DIN 55633.

The **primer** is to be applied electrostatically or using the tribo method.

According to the technical specifications, the powder coating system must be completely baked:

› 15 minutes at 180°C / 350 F
› 10 minutes at 200°C / 400 F

The **top coat** must also be applied electrostatically or using the tribo method.

According to the technical specifications, the powder coating system must be completely baked:

› 15 minutes at 180 °C / 350 F (alternatively, see manufacturer's technical data sheet)
› Softening mechanisms for aluminium components must be taken into account.

6 Coating requirements

a)	Gloss level:	25 – 50 GE	at viewing angle 60°
b)	Cross-section:	max. Gt 1	DIN EN ISO 2409
c)	Pull-off force	min. 7 MPa	DIN EN ISO 4624
d)	Salt Spray Test:	480 h	DIN EN ISO 9227
e)	Condensation test:	240 h	DIN EN ISO 6270-2
f)	Colour accuracy:	see RAL 840-HR	for wet paints
		see VDL RL-10	for powder coatings

6.1 Inspection of the coating before delivery

The gloss level, the shade, the overall layer thickness and the surface structure must be checked after drying. The appropriate reference plate is to be used for the visual assessment, and the cross-section inspection is to be made, evaluated and documented on a reference surface on request (see Downloads - Broetje Automation (broetje-automation.de) → Quality assurance).

Inadmissible surface defects are shown in the following table:

No.	Criteria	Request
1	Structure and course	Visually visible deviations (e.g. orange peel, brush strokes, roller impressions, shading, etc.) are not permitted.
2	Visible material defects, rolling cracks, scars, sanding marks in the surface	Not allowed
3	Material scratches, burr formation, other damage	Not allowed
4	Bishop	Not allowed
5	Pinpricks, open pores	Not allowed
6	Blistering	Not allowed

6.2 Deviation from the Broetje-Automation standard

For reasons of colour accuracy, only the prescribed lacquer materials should be used. If, however, coating materials from other manufacturers are used for compelling reasons, the requirements a to f listed above, as well as the coating thicknesses specified in sections 4.1 or 5.1, must be ensured. This requires special approval from BA.

7 Control

The following tests must at least be carried out and documented by the coating company at appropriate intervals:

Test criterion	Test Preparation	Circumference	Documentation
Incoming Goods Coatings/Powder Coatings	Verification of the conformity of article no. on goods and delivery note	Each delivery	Note on delivery note, proof on request
Thickness	Measurement	Any order line	Note minimum and maximum values on the coating protocol
Adhesion	Cross-cut / pull-off test	On request	Evaluation from the measuring device
Thermal curing	Furnace Measurement	1/4 annually	Proof on request

8 Repair of damage

Transport and assembly damage must be repaired immediately with appropriate wet paints. Depending on the application and corrosivity category, different systems must be used here.

The following repair matrix provides an overview of the different options.

	Action
Pretreatment	Cleaning with
Dilution	None
Undercoat	a) Touch-up pen b) 2K PUR lacquer

Before using an appropriate repair system, suitability tests must be carried out on the component in advance.

The information in the current technical data sheets of the material manufacturer must generally be observed!

9 Supplier and contact person

If possible, all wet paints and powder coatings used are to be obtained from the approved supplier listed below. Commercial and technical support is provided by the paint manufacturers. Changes can be made by submitting an application to Broetje-Automation.

Link to the application::

BA-Group_QA_FO_Application_for_rework_BA_deu_eng (broetje-automation.de).

9.1 Europa

Wet coating:

OSNATOL-Werk GmbH u. Co. KG

Bahnhofstraße 14

49191 Belm-Vehrte

Ihr Ansprechpartner: Herr Boris Vetter

vetter@osnatol.de

Overview of the items to use:

Kind	Material description
Primer	OSNAPOX 2K-ZP-Grund SBA Item 72009-Shade-72240-0060 Pebble Grey **Alternatively**: OSNACRYL Aquaprime SBArticle 72508 Shade Pebble Grey
Top coat	OSNACRYL PUR SBA SDM40 Lack Item 52040-xxxx-0011 (s. table below)

Overview of article numbers for wet paint:

Manufacturer Product no. Wet paint (Osnatol)	Article title	RAL
52040-97240-0011	Jet black	9005
52040-97220-0011	Signal white	9003
52040-79830-0011	Agate Grey	7038
52040-79840-0011	Dusty Grey	7037
52040-79850-0011	Concrete Grey	7023
52040-57890-0011	Dove Blue	5014
52040-35500-0011	Signal red	3001
52040-22780-0011	Reinorange	2004
52040-22790-0011	Rapeseed yellow	1021
52040-97230-0011	Pure white	9010
52040-79810-0011	Light Grey	7035
52040-79820-0011	Anthracite Grey	7016
52040-69760-0011	Resedagrün	6011
52040-57850-0011	Sky Blue	5015
52040-57840-0011	Light blue	5012
52040-57830-0011	Gentian Blue	5010
52040-18240-0011	Daffodil yellow	1007
52040-97340-0011	Creamy white	9001
52040-18280-0011	Traffic yellow	1023

Powder coating:

CENARIS GmbH

Industriestraße 20

28199 Bremen / Germany

Ihr Ansprechpartner: Herr Thomas Hock

thomas.hock@cenaris.com

Overview oft he items to use:

Art	Material description
Primer	Cenaris Megaprimer Article 110 01 15000
Top coat	Cenaris Polyester Article 140 04 xxxx Broetje

Overview of article numbers for powder coating:

Manufacturer Reference: Powder Coating (Cenaris)	Article title	RAL
140 04 9005 Broetje	Jet black	9005
140 04 9003 Broetje	Signal white	9003
140 04 7038 Broetje	Agate Grey	7038
140 04 7037 Broetje	Dusty Grey	7037
140 04 7023 Broetje*	Concrete Grey	7023
140 04 5014 Broetje*	Dove Blue	5014
140 04 3001 Broetje*	Signal red	3001
140 04 2004 Broetje*	Reinorange	2004
140 04 1021 Bug*	Rapeseed yellow	1021
140 04 9010 Broetje	Pure white	9010
140 04 7035 Broetje	Light Grey	7035
140 04 7016 Broetje	Anthracite Grey	7016
140 04 6011 Broetje	Resedagrün	6011
140 04 5015 Broetje	Sky Blue	5015
140 04 5012 Broetje	Light blue	5012
140 04 5010 Broetje	Gentian Blue	5010
140 04 1007 Broetje	Daffodil yellow	1007
	Creamy white	9001
	Traffic yellow	1023

9.2 North America

Wet painting:

SHERWIN WILLIAMS.

The Sherwin Williams Co. PCG #4387

5111 Dansher Road

Countyside, IL 60525

(P) 708-482-8131

Type	Material designation
Primer	2.8 VOC Catalyzed Epoxy Primer E61A280
Top coat	Polane® 8890 Polyurethane Enamel F63T105C

Powder coating:

SHERWIN WILLIAMS.

The Sherwin Williams Co. PCG #4387

5111 Dansher Road

Countyside, IL 60525

(P) 708-482-8131

Type	Material designation
Primer	POWDURA® Epoxy Powder Coating EAS6-C0000
Top coat	POWDURA® Superdurable TGIC Free Polyester Powder Coating RAS3-*****

9.3 Asia

Wet painting:

Type	Material designation
Primer	Interseal 670HS, International Jotun, Primer Penguard EXA II Hempel, Primer Multi 500
Top coat	Interthane 870, International Jotun, Hardtop XPL Hempel, Hempathane 55190