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1. Scope and purpose

This standard applies for Bühler Alzenau as well as all suppliers.

The standard defines paint finishes that are applied to surfaces outside the vacuum chamber for the purpose of corrosion protection and product design aimed at ensuring an appealing device and system design for Bühler Alzenau products.

For new developments of devices and systems, the Design & Development department must be consulted regarding colour design. The colour codes defined by Bühler Alzenau are arranged in colour code palettes in points [3.1.1](#) and [3.2.1](#).

The only permissible painting methods are "spray painting" and "roller painting", with "smooth" and "textured" paint types possible for spray painting, and only "smooth" paint types permitted for roller painting.

The factory standard LHH-N 120.016 applies to the painting of surfaces within the vacuum chamber.

2. Other applicable standards and guidelines

- Manufacturer's instructions must be taken into account
- ISO 2768 mK
- DIN EN ISO 2813
- DIN 67530
- DIN EN ISO 2409
- DIN EN ISO 2811
- DIN EN ISO 2808
- DIN EN ISO 1519
- DIN 2360

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3. Application

3.1. Roller and spray painting with smooth paint

For production reasons, all systems and their parts are given a smooth paint coating during the rolling or spraying process. This kind of procedure is always necessary when systems or system parts have to be painted during assembly—in the workshop or on site—and potentially repaired (repainted) later.

This applies exclusively to Bühler Alzenau with the exception of the applications listed under [3.2.1](#)

3.1.1. Colour and application table for smooth paint (roller and spray painting)

Code	RAL/NCS	Colour	Preferred area
Primer:			
3.1.1.1	RAL 1001 (NCS 2020-Y40R)	Beige	Standard primer for all components that receive a top coat.
Top coat:			
BU Leybold Optics colour code palette			
3.1.1.2	RAL 7035 (NCS S2502-Y)	Light grey	All parts painted for corrosion protection or design reasons, except for parts according to 3.2.1.2
3.1.1.3	RAL 9005	Jet black	See point 3.2.1.3
3.1.1.4	RAL 2002 (NCS 1080-Y80R)	Blood orange	See point 3.2.1.4
Bühler colour code palette (preferred usage!)			
3.1.1.5	NCS S2060-B70G	Bühler turquoise	See point 3.2.1.5
3.1.1.6	NCS S0502-B	White	See point 3.2.1.6
3.1.1.7	NCS S2502-B	Light grey	See point 3.2.1.7
3.1.1.8	NCS S6502-B	Dark grey	See point 3.2.1.8
3.1.1.9	RAL 1003 (NCS 0580-Y30R)	Signal yellow	See point 3.2.1.9

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3.2. Spray painting with textured paint

Textured spray paints have a high-quality surface finish and are mainly used in the construction of equipment and small systems.

As textured paint is difficult to repair, its use in assembly parts is limited to surfaces that are not subject to any further mechanical stress in the usual production process, i.e. that are neither drilled, welded nor otherwise processed afterwards.

For Bühler Alzenau, textured paint is specified for use on switch cabinets, desks, terminal boxes, front panels, panels in the desk area, smaller product groups and repair work on vacuum pumps etc.

3.2.1. Colour and application table for spray painting with textured paint

Code	RAL/NCS	Colour	Preferred area
Primer:			
3.2.1.1	RAL 1001 (NCS 2020-Y40R)	Beige	Standard primer for all components that receive a topcoat.
Top coat:			
BU Leybold Optics colour code palette			
3.2.1.2	RAL 7035 (NCS S2502-Y)	Light grey	- Smaller products in special cases (in consultation with the Design & Development department and paint shop) - Repair work on vacuum pumps - Switch cabinets, desks, terminal boxes
3.2.1.3	RAL 9005	Jet black	- Base frames and racks - Front panels of plugin and partial plugin systems of table and floor units - Fixed base plates with control devices for system operation - Switchboard base plates, desk panels and control panels - As an accent colour mainly in combination with blood orange
3.2.1.4	RAL 2002 (NCS 1080-Y80R)	Blood orange	As an accent colour mainly in combination with black

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Bühler colour code palette (preferred usage!)			
3.2.1.5	NCS S2060-B70G	Bühler turquoise	Logo, accents, enclosing elements
3.2.1.6	NCS S0502-B	White	Panels in the hygienic area
3.2.1.7	NCS S2502-B	Light grey	Panels in dirty areas
3.2.1.8	NCS S6502-B	Dark grey	System racks and base frames
3.2.1.9	RAL 1003 (NCS 0580-Y30R)	Signal yellow	Lifting devices (LHH-N-090.206)

3.2.2. General information on adjusting the parameters

The texture can be controlled by the following parameters:

Texture	Viscosity	Spray pressure	Nozzle diameter
Coarser	Higher	Smaller	Larger
Finer	Lower	Larger	Smaller

4. Application

4.2. Pretreatment and preparation (in accordance with UAB 24004)

The surfaces of the components to be coated must be free of grease, oil, rust and scale. No labels must be applied to them.

Threaded holes, fittings and sealing surfaces must be covered before starting work. The specifications on the drawing must be observed. The main visible areas must not have any signs of unevenness, scratches or other damage. Parts must be protected against damage for transport, both during inbound delivery before surface treatment and especially during outbound delivery.

4.3. Application of the paint

The exact application of the paint can be found in the manufacturer's application description.

All paints meeting the quality requirements of this standard are accepted.

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5. Assessing the quality of coated surfaces (derived from UZB-34100)

No.	Characteristics	Permissibility
1	Gloss level differences	See point 5.3
2	Colour deviation	Comparisons with colour palette, visual assessment (colour samples can be requested)
3	Dirt entrapment	<1 mm, 10 mistakes per m ²
4	Crater inclusions	<1 mm, 10 mistakes per m ²
5	Gradient colour (orange skin)	Finely textured is permitted
6	Scratches (no gradient)	<0.5 mm wide and <20 mm long 2 mistakes per m ² (fingernail sample)
7	Mechanical damage after coating (e.g.: spalling, detachment)	Not acceptable
8	Mechanical damage prior to coating (e.g. tool imprint, unevenness during bending, dents, ghost lines, material scarring)	Permitted if not defined on the drawing
9	Paint accumulation	Permitted in a non-visible space if corners are closed
10	Thinning at edges/drip edges	Not acceptable
11	Rough and misted spots	Not acceptable
12	Seal joints	According to the drawing
13	Combination of mistakes from 3,4,6	10 mistakes per m ²

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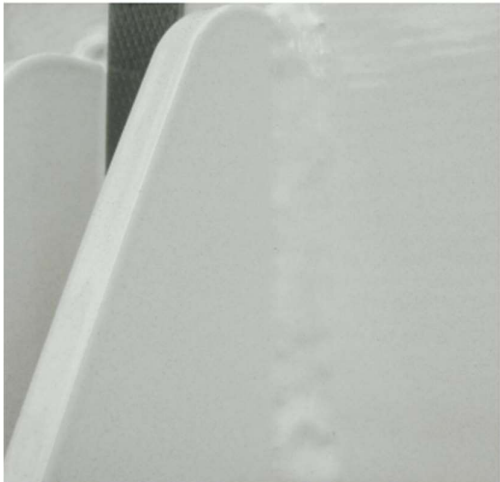
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5.2. Detailed assessment of mechanical damage to fully assembled machines and individual parts

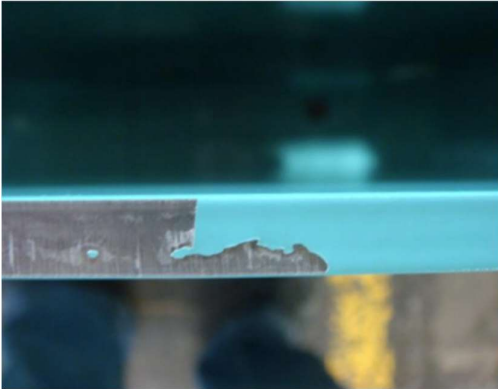
No.	Characteristics	Permissibility	Photos
14	Individual parts with unacceptable paint damage - Paint chipping along edges and surfaces throughout the paint layer - Scratches that cannot be removed by polishing - Paint repair with dust entrapment, wave formation, varnish tears	Repaint → unacceptable damage - Remove the paint layer (by sanding or using a lye solution) - Then evaporate the part or pre-treat it in a bath - Repaint according to the drawing	See point 5.2
15	Fully assembled machine with unacceptable paint damage - Paint chipping along edges and surfaces throughout the paint layer - Scratches that cannot be removed by polishing - Paint repair with dust entrapment, wave formation, varnish tears	Unacceptable damage → continuously repaint visible surface - Cover the surface not to be painted with masking material and adhesive tape - Clean, sand and dust the surface to be painted so that it is clean - 1. Base coat - Possibly filling and sanding - Possibly second base coat - Sanding - Top coat	
16	Fully assembled machine and individual parts with acceptable paint damage - Light, superficial scratches that can be removed by polishing - Paint damage that is considered normal wear and tear due to age - Repairs or minor scratches that are not visible from a distance of 1 m and do not show rust	Acceptable scratches → polish - Clean and polish the surface around the scratch	

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5.3. Examples for assessing mechanical damage after painting

<u>Not acceptable</u>	<u>Acceptable</u>
<u>Orange skin</u> 	
<u>Varnish tears/wave formation</u>  	

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<u>Not acceptable</u>	<u>Acceptable</u>
<u>Rough and misted spots</u>  <u>Paint chipping along edges and surfaces throughout the paint layer</u>  	

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5.4. Gloss level

Depending on the procedure, the gloss levels are as follows:

Gloss levels in accordance with DIN 67530 or ISO 2813			
Surface structure	Gloss assessment using the reflectometer		Gloss description
	Measuring angle	Gloss level	
Smooth (for smooth paint)	20°	70–100%	gloss
	20°	50–80%	satin-gloss
	60°	25–40%	semi-matte
	60°	15–30%	matte
Fine structure	60°	70–90%	gloss
	60°	40–70%	satin-gloss
	60°	35–45%	semi-matte
	60°	10–30%	matte
Coarse (for textured paint)	60°	70–90%	gloss
	85°	45–60%	satin-gloss
	85°	25–45%	semi-matte
	85°	10–30%	matte

These need to be verified using the following measuring set-up.

20° measuring angle for primarily **high-gloss** test specimens

60° measuring angle for primarily **medium-gloss** test specimens

85° measuring angle for primarily **matte** test specimens

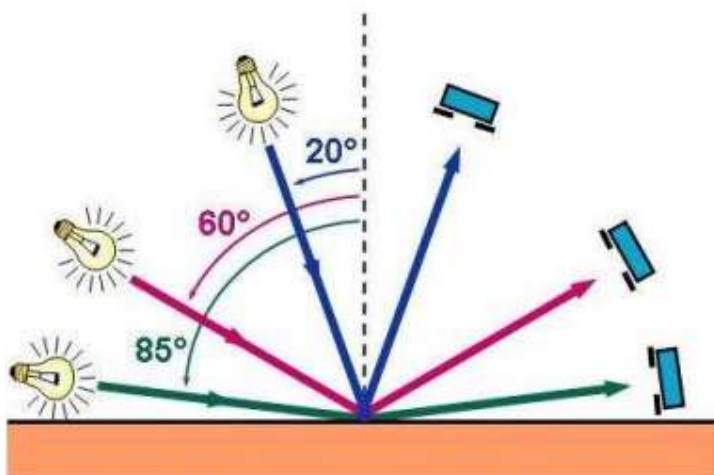


Figure 1 — Schematic drawing of three-angle gloss measuring device

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5.5. Adhesive strength

General requirement GT 0-1 in accordance with DIN EN ISO 2409

Approx. 1.4 g/cm³ at 20°C in accordance with DIN EN ISO 2811

5.6. Layer thickness

Primer: 40 + 15 µm (measured when dry)

Top coat: 40 + 15µm (measured when dry)

6. Information in design documentation

In the drawings, the parts or part surfaces to be painted must be marked according to the surface symbols.



Example: Paint type "Smooth paint", colour "light grey"

Example: "Painted in accordance with LHH-N 120.010 point 3.1.1.2"



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7. Inspection

7.2. Ordering instructions:

Conformity with specifications in the manufacturing documents or order instructions.

7.3. Visual inspection:

[See 5 — Surface quality](#)

- Visual inspection
- A well-illuminated, well-defined inspection place with an illumination of 800 to 1400 lux must be chosen.

7.4. Gloss level:

[See 5.3 — Gloss level](#)

Reflectometer values according to requirements

7.5. Adhesion test:

[See 5.4 - Adhesion](#)

- Cross-cut adhesion test in accordance with DIN EN ISO 2409
- Mandrel bend test in accordance DIN EN ISO 1519
- Similar tests according to requirements

7.6. Layer thickness test:

[See 5.5 — Layer thickness](#)

The layer thickness test is performed by arrangement. On even surfaces, it is measured at least 20 mm from the edge and at three different points. Greater thicknesses can result at radii and circumferential edges, in case of doubt, these must be agreed upon.

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