## BLAST CLEANING

All cast components are blast cleaned according to ISO 12944-4, SA 2½.
The components are cleaned in a shot-blasting plant. The cleaned parts are held with fibre-free gloves and are transported to the oven without delay according to GSK specifications.

When viewed, the surface shall be visibly free from oil, grease, dirt, mill scale, rust, paint and foreign objects. Any remaining traces of contamination shall show only as slight stains in the form of spots or stripes. The surface shall have a uniform metallic colour, visually and compared with test plates.

The process ensures an optimum bonding of the coating, which is essential for corrosion resistance.

## EPOXY COATING

The valve bodies and bonnets and other components are epoxy coated according to DIN 30677-2 and GSK guidelines.

The high quality epoxy coating is GSK approved and applied manually or using a fluidized bed epoxy coating system. After the valve components have been blast cleaned, the clean and preheated components are submerged in epoxy powder. The powder melts when in contact with the preheated components and cures when the components enter the cooling tunnel shortly after the coating process.

### Test procedure

- Coating thickness

The coating layer thickness shall be no less than 150 µm.

- Pore-free coating

The coating must be completely free of penetrating pores to avoid subsequent corrosion of the casting underneath. A 3V holiday detector with a brush electrode is used to electrically reveal and locate any pores in the coating.

- Impact resistance

The impact resistance test is carried out at room temperature right after the coating process by means of a stainless steel cylinder dropped on the coating surface through a one meter long tube corresponding to an impact energy of 5 Nm. After each impact the component is electrically tested, and no electrical breakthrough shall occur.

- Cross linkage

One drop of methyl isobutyl ketone are put on a horizontal epoxy resin coated surface of the test piece at room temperature. After 30 seconds the test area is wiped with a clean white cloth. It is checked that the test surface has not become neither matt nor smeared, and that the cloth remains clean. The test is carried out 24 hours after the coating process.



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- Adhesion

The adhesion of the powder coating is tested on one side of a test plate four times a year for each coating plant according to GSK guidelines using the punch separation method according to DIN 24624. The coating thickness over a dispersed area of the test item shall be within the range 150 µm to 400 µm.

The test pieces are immersed for seven days in deionised water at 90ºC, and then dried in an oven for 3 hours. A conditioning phase of 3 to 5 days in normal atmosphere is then allowed to elapse. No blisters may arise during the period immersed in the water bath.

The surface of the test piece is degreased and then roughened with abrasive paper. The roughened surface is cleaned from dust with oil-free compressed air and recleaned. The adhesion is tested with a minimum pulling force of >12 N/mm².

- Cathodic disbanding

Cathodic disbonding tests are carried out on one of each type of component at least twice a year. No bubbles in the coating may develop during the test for cathodic disbonding.
For this test, the coating thickness over a dispersed area of the test item shall be within the range 150 µm to 400 µm.

## Approvals

The coating is approved for use in drinking water systems, meeting all specified toxicological conditions, by the following institutes:

- Hygiene Institute, Germany
- KIWA, the Netherlands
- WRC, UK
- CARSO L.S.E.H.L., France

## INTERNAL ENAMEL

Internal enamel is an alternative to internal epoxy, when extra protection against aggressive fluids is needed. Enamel is a ceramic coating with a completely smooth surface, and a durability and resistance like glass against aggressive fluids making it resistant to abrasive, corrosive and chemical media.

At high temperatures the enamel is applied on the valve surface, and the valves are put in the furnace. A chemical fusion of the enamel and the ductile iron takes place offering an excellent protection against creeping corrosion. The smooth surface makes it difficult for impurities and microorganisms to root.

The layer thickness is 200 µm - 600 µm according to DEV.

## Approvals

The coating is approved for use in drinking water systems, meeting all specified toxicological conditions, by the following institutes:

- Hygiene-Institute, Germany
- KIWA, the Netherlands



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**Table 1.** The examples listed are informative and might occasionally be misleading. Only the actual measurement of mass or thickness loss will give the correct classification.

**NOTE** Corrosivity categories can also be estimated by considering the combined effect of the following environmental factors: yearly time of wetness, yearly mean concentration of sulfur dioxide and yearly mean deposition of chloride (see ISO 9223) .

**Table 1 — Atmospheric-corrosivity categories and examples of typical environments**

| Corrosivity category | Mass loss per unit surface/thickness loss (after first year of exposure) | | | | Examples of typical environments (informative only) | |
|---|---|---|---|---|---|---|
| | Low-carbon steel | | Zinc | | Exterior | Interior |
| | Mass loss g/m² | Thickness loss µm | Mass loss g/m² | Thickness loss µm | | |
| C1 very low | ≤ 10 | ≤ 1,3 | ≤ 0,7 | ≤ 0,1 | — | Heated buildings with clean atmospheres, e.g. offices, shops, schools, hotels |
| C2 low | > 10 to 200 | > 1,3 to 25 | > 0,7 to 5 | > 0,1 to 0,7 | Atmospheres with low level of pollution: mostly rural areas | Unheated buildings where condensation can occur, e.g. depots, sports halls |
| C3 medium | > 200 to 400 | > 25 to 50 | > 5 to 15 | > 0,7 to 2,1 | Urban and industrial atmospheres, moderate sulfur dioxide pollution; coastal areas with low salinity | Production rooms with high humidity and some air pollution, e.g. food-processing plants, laundries, breweries, dairies |
| C4 high | > 400 to 650 | > 50 to 80 | > 15 to 30 | > 2,1 to 4,2 | Industrial areas and coastal areas with moderate salinity | Chemical plants, swimming pools, coastal ship and boatyards |
| C5 very high | > 650 to 1 500 | > 80 to 200 | > 30 to 60 | > 4,2 to 8,4 | Industrial areas with high humidity and aggressive atmosphere and coastal areas with high salinity | Buildings or areas with almost permanent condensation and with high pollution |
| CX extreme | > 1 500 to 5 500 | > 200 to 700 | > 60 to 180 | > 8,4 to 25 | Offshore areas with high salinity and industrial areas with extreme humidity and aggressive atmosphere and subtropical and tropical atmospheres | Industrial areas with extreme humidity and aggressive atmosphere |
| NOTE The loss values used for the corrosivity categories are identical to those given in ISO 9223. | | | | | | |

## Categories for water and soil

For structures immersed in water or buried in soil, corrosion is normally local in nature and corrosivity categories are difficult to define. However, for the purpose of this document, various environments can be described. In Table 2. four different environments are given together with their designations. See 4.2 for more details



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## C4 – C5 – C5M Typical coating system

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Condition:** | **A high durability coating system for environmental conditions classified as C4-high corrosivity.** | | | | | | | | |
| Substrate: | Steel | | | | | | | | |
| | C4 - high corrosivity according to ISO 12944 | | | C5 I - very high corrosivity according to ISO 12944 | | | C5 M - very high corrosivity according to ISO 12944 | | |
| Expected durability (acc. ISO 12944) | **Low** | **Medium** | **High** | **Low** | **Medium** | **High** | **Low** | **Medium** | **High** |
| | | | | | | | | | |

| | |
|---|---|
| Surface preparation: | Blast cleaning to Sa 2½ according to ISO 8501-1.<br>The substrate must be dry and free from salts and other contaminants. Prior to blast cleaning, oil and grease should be removed by solvent cleaning according to SSPC-SP1. Remove weld spatter and smooth weld seams and sharp edges as applicable. Sharp edges, weld seams, corners and other areas that are likely to receive less dry film thickness than specified, should be stripe coated. Please read the actual product datasheet for more information. |

**Paint system**

| Layer | Product name | Description | Volume solids (%) | DFT (µm) | Theor. spreading rate (m2/l) | Recoating times at 23°C. | |
|---|---|---|---|---|---|---|---|
| | | | | | | Min. | Max. |
| 1 | Transozinc Epoxy primer | Epoxy polyamide | 55 | 50 | 11.0 | 6 hrs. | Indefinite |
| 2 | Transpoxy Masterbond | Epoxy polyamine | 83 | 120 | 6.9 | 12 hrs. | Indefinite |
| 3 | Transurethane Finish | Polyurethane | 50 | 40 | 12.5 | 12 hrs. | Indefinite |
| | | **Total system DFT** | | 210 | | | |





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