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TECHNICAL SPECIFICATION FOR THE SURFACE PREPARATION OF METALLIC AND NON-METALLIC MATERIALS USED IN THE CONSTRUCTION OF RAILWAY VEHICLES AND CONTAINERS

REVISIONS

Leaflet 842-3, 2nd edition, 1-7-79			
Amendment		Amendment	
No.	date	No.	date

1 - PURPOSE

1-1 - Nature of the work

This specification defines the work involved in the surface preparation of metallic and non-metallic materials used in the construction of railway vehicles and containers.

It applies to the component parts and sub-assemblies, also to vehicles and containers ready built.

1-2 - Classification

The work of surface preparation consists of the following :

- preparation of steel and cast iron surfaces,
- preparation of stainless steel surfaces,
- preparation of light alloy surfaces,
- preparation of surfaces of timber and assimilated materials,
- preparation of surfaces of plastic materials,
- treatment of the surfaces of components already provided with a coat of anti-corrosion priming paint and of components supplied by sub-contractors.

1-3 - Reference documents

Reference is made to the following documents in this specification:

UIC Leaflets 842-4 : Protection against corrosion and painting of wagons and containers,

842-5 : Protection against corrosion and painting of coaches and tractive units,

842-6 : Quality inspection of railway vehicle paint systems.

2 - SURFACE PREPARATION WORK

2 - 1 - Preparation of steel and cast iron surfaces

Before painting, loose or adherent rust, scale and mill scale must be removed from the surfaces of steel or cast iron components by a mechanical cleaning process.

Plates delivered in the cleaned condition must also undergo this treatment in order to facilitate adhesion of the anti-corrosion priming paint.

2.1 1 - Mechanical cleaning by abrasive projection (blast cleaning)

Before cleaning, surfaces coated with oil or grease must be treated with a suitable solvent to avoid polluting the abrasive and transferring oil or grease to surfaces otherwise free from them.

The technical characteristics of the mechanical cleaning (blast cleaning by ordinary compressed air jet, vacuum blasting, centrifugal projection) must enable a degree of roughness to be obtained where the total range of unevenness is less than 40 microns so that the anti-

corrosion protection coat covers the profiles of the cleaned surface continuously (1).

Since the mechanical cleaning procedure most utilised is shot peening, this degree of roughness can normally be obtained with abrasives with the characteristics shown in the following table :

	Nature of the shot or grit	*Grain size*	*Observations*
1	Angular grit : a) chilled cast iron grit b) treated steel grit c) clipped wire	0.4 - 1mm	Particularly suitable for thick layers of oxide
2	Round shot : Shot made up of scrap steel	0.5 - 1.5mm	
3	Mixture of shot 1a and 2		Particularly suitable for thin plates

(1) The surface roughness R_t = 40 microns corresponds roughly to Ra = 12 microns (N 18 degree), i.e. to Rugotest N 10 + A5 degrees for round shot and N10 + B5 for angular shot.

After shot peening, the surfaces must be brushed and dusted by suction.

The cleaning must correspond to one of the following degrees of the Swedish rust degree scale defined by the Swedish standard: SIS 055 900 1967.

- quality Sa 2.5 : metallically pure, at least for general cases

- quality Sa 3 : metallic brilliancy for surfaces which are to be given coverings of a special nature or application process, such as metal spraying, application of glues, etc....

2.12 - Mechanical cleaning by grinding

Thin plates already smoothed, which would be liable to distortion by abrasive projections, and small components, can be cleaned by grinding using grinding wheels and exchangeable abrasive discs with a grain size between 60 and 80.

The surface qualities must be those indicated in 2.11.

2.13 - Other mechanical cleaning processes.

Cleaning processes by hammering, chiselling, scraping ,brushing by hand or mechanically, or flame cleaning, are not allowed.

2-2 - Rust conversion and chemical cleaning

2-21 - Rust conversion

Processes consisting of conversion and stabilizing rust by chemical means are not allowed.

2-22 - Chemical cleaning

Chemical cleaning may be authorised by the purchasing Railway in the following cases only :

- preparation of the surfaces of small components using the immersion process,
- elimination of spots of loose rust,
- elimination of scale from heat shrinkage, if it cannot be eliminated by grinding or blast cleaning.

After cleaning, the cleaning agent must be neutralized and the cleaning residue carefully eliminated.

2-3 - Degreasing

After any painting operation, any stains (oil, grease, traces of condensation, etc.) must be removed.

For this purpose, any traces of oil or grease are first removed from the surfaces by means of clean dry rags or cleaning paper, the surfaces then being cleaned with suitable degreasing products - for example 1.1.1 trichlorethylene, white spirit.

The residue is removed by careful rinsing and the surfaces dried with lint free absorbent materials.

The surfaces of constructional components which have been given temporary protection in the form of a coating of oil or grease, for transport and storage purposes, must be degreased before assembly and painting.

2-4 - Welded assemblies

2-41 - Welding of steel components from which the rust and scale have not been removed

When steel components from which rust and scale have not been removed are required to be assembled by welding, the contact surfaces must be cleaned and painted with a paint approved by the purchasing Railway for spot welding, e.g. zinc powder paint. The thickness of the dry film of this paint must conform to the provisions of Appendix 2 of UIC Leaflet 842-4, or Appendix 5 of UIC Leaflet 842-5.

When cleaning constructional components already assembled, the scale and welding slag are eliminated by blast cleaning and any remaining welding projections removed, as far as possible, by mechancial means.

2.42 - Welding of steel components delivered in cleaned condition

When steel components delivered in cleaned condition are to be assembled by welding, the contact surfaces must be cleaned and painted with a paint approved by the purchasing Railway, as prescribed in 2.41. After assembly, the scale and welding slag are eliminated by blast cleaning or by rotary grinders.

2.43 - Welding of components with a coating of anti-corrosion priming paint

When parts with a coat of anti-corrosion priming paint are to be assembled by welding, the contact surfaces must be cleaned; if these surfaces have been protected by adhesive tape before the anti-corrosion priming paint was applied, after the protective tape has been removed they must be treated as indicated in 2.3, and given a coat of paint approved by the purchasing Railway as prescribed in 2.41. After assembly, the assemblies shall be treated as prescribed in 2.42. The damage to the anti-corrossion priming paint in the weld areas must be made good. This regulation shall not apply if the purchasing Railway deems that the anti-corrosion paint is compatible with welding.

2.44 - Welding of parts made of ordinary steel and stainless steel

Where parts made of ordinary steel and parts made of stainless steel are to be assembled, after the contact surfaces have been cleaned, as prescribed in 3.1, they are given a coat of aluminium welding paint approved by the purchasing Railway. The thicknesses of the coats must conform to the provisions of Appendix 2 of UIC Leaflet 842-4 or Appendix 5 of UIC Leaflet 842-5.

After assembly, any aluminium welding paint remaining on the surface outside the joint must be removed.

Welded assemblies shall be cleaned in accordance with the provisions of 3.2.

2.45 - Use of products to prevent adhering of welding spatter

The use of products for preventing the adhering of welding projections is not allowed.

2.5 - Riveted and bolted assemblies

Before assembly, the contact surfaces must be cleaned, where this has not already been done, and given a coat of anti-corrosion priming paint at least 60 microns in thickness, when wet, in order to guarantee sealing of the joint after assembly. Subject to the agreement of the purchasing Railway, the anti-corrosion priming paint can be replaced by other materials.

These provisions do not apply to machined surfaces which have to be given temporary anti-corrosion protection immediately after machining - temporary varnish, anti-corrosion protective tape, grease, etc. This protection must be removed prior to assembly.

2.6 - Glued assemblies

The surfaces to be glued must be cleaned and degreased and have the degree of roughness prescribed by the glue manufacturer.

The two surfaces forming a glued joint must have the same degree of roughness. Stains, such as dross, oil, grease and traces of condensation must be eliminated with the detergents and solvents recommended by the glue manufacturers. The surfaces prepared for gluing may then only be touched with clean gloves or handling appliances.

3- PREPARATION OF STAINLESS STEEL SURFACES

3-1 - Stainless steel surfaces

If the following are to be applied to stainless steel surfaces:

- aluminium paint in the case of welded assemblies, ordinary steel on stainless steel - see 2.44.
- paint or thermal and acoustic insulation products on the inside of the vehicle bodies,
- labels or marker strips on the outside,

they must be carefully cleaned and degreased, and, where appropriate, mechanically roughened.

To eliminate stains - dross, oil, grease and traces of condensation, only organic solvents may be used or, where appropriate, phosphoric acid detergents approved by the purchasing Railway.

The surfaces must be absolutely dry before any application takes place.

3.2 - Welding on parts made of stainless steel

The weld beads of assemblies involving stainless steel parts, also the heat shrinkage areas, must only be cleaned with stainless steel wire brushes. These brushes must not be used for working on any other material.

3.3 - Decorative work on stainless steel surfaces

Decorative work on stainless steel surfaces, such as peacock motives, may only be effected with stainless steel brushes or synthetic fibres such as nylon cloth.

Matt surfaces can be effected by shot peening with glass shot: The corresponding tools cannot be used for any other purposes:

4 - PREPARATION OF LIGHT ALLOY SURFACES

In the case of welded components, the joints must be ground and welding slag and projections removed by grinding or scraping. Highly polished surfaces shall be roughened by scouring. The coarseness grade of the abrasive paper must be at least 150. The corresponding discs with synthetic felt are allowed.

The use of wire brushes - except stainless steel brushes - is forbidden. The stains shall be removed by means of lint free rags or by a blowing process.

Before painting, all stains, such as oil, grease, dust and condensation, must be removed from light alloy metal surfaces by means of organic solvents or chemical cleaning products approved by the purchasing Railway.

The preparation of surfaces by means of cleaning agents requires the agreement of the purchasing Railway; it is restricted to the outside smooth surfaces of the vehicle bodies and to separate parts before assembly.

5 - PREPARATION OF SURFACES OF TIMBER AND ASSIMILATED MATERIALS

5-1 - Definition

In addition to stakes, blocks, etc. the following shall be regarded as timber materials : plywood panels, timber veneering, reconstructed wooden panels and wood fibre panels.

5-2 - Preparation of the surfaces before painting, gluing or the application of adhesive

Before painting, or the application of adhesive or glue, the timber surfaces must be polished or scoured by means of abrasive paper, and dusted with lint free substances.

Wax and silicon oil must not be applied to timber surfaces before painting.

Wooden parts must only be painted if the humidity of the wood is between 12 and 18%.

In addition to the preparation specified above, bakelite panels impregnated with formophenolic resins may, where appropriate ,and in accordance with the directives of the purchasing Railway, receive a coating of a special product before paint is applied.

6 - PREPARATION OF PLASTIC SURFACES

Before painting or the application of glue or varnish, plastic surfaces must be degreased with suitable solvents, before being roughened with abrasive paper with a coarseness of 240-360, and dusted.

Only absorbent lint free materials may be used for cleaning and degreasing work.

In the event of it being necessary to apply paint, glue or varnish to plastic materials in the polyolefine class, such as polyethylene (PE), polypropylene (PP) or polytetrafluorethylene (PTFE), their polished surfaces must be roughened either by cleaning with sulphochromic acid or by electro-chemical oxidation.

7- TREATMENT OF THE SURFACES OF COMPONENTS ALREADY PROVIDED WITH A COAT OF ANTI-CORROSION PRIMING PAINT AND OF COMPONENTS SUPPLIED BY SUB-CONTRACTORS

Loose parts, assembled components, and components delivered by the manufacturer for assembly in his own workshops or in foreign workshops, must have undergone the surface preparations prescribed in this leaflet, before painting.

The anti-corrosion priming coat ,already applied to the surfaces of parts supplied by sub-contractors, must be compatible with the subsequent coats.

If this is not so, it must be removed and replaced by the anti-corrosion priming coat specified in the paint system.

When assembling parts already possessing an anti-corrosion priming coat , the regulations of Sections 2,3 and 4 must be observed.

8 - INSPECTION OF THE SURFACE PREPARATION

The representative of the purchasing Railway must be able to check ,at any time, that the surface preparation work has been carried out, in accordance with the regulations of this leaflet, in closed premises, where the temperature and relative air humidity correspond to the requirements of the work.

In addition, he shall ensure that the surfaces remain clean and dry between the termination of the surface preparation work and the application of the first coat of paint.

9 - GUARANTEE

The guarantee period shall be fixed at 2 years.

APPLICATION

As from 1st July 1979.

All Railways in the Union.

RECORD REFERENCES

Headings under which the question has been dealt with :

- Preparation of specifications for paints for vehicles.
  (Sub-Committee for Specifications: Paris, January, 1975).
- Revision of UIC Leaflet 842-3 "Surface preparation of metallic and non-metallic materials used in the construction of railway vehicles and containers".
  (Sub-Committee for Specifications : Paris, January, 1979).