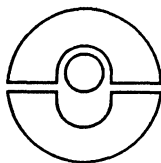


INTERNATIONAL



UNION OF RAILWAYS

U I C CODE

Leaflet to be classified in Volumes :

V - TRANSPORT STOCK

VIII - TECHNICAL SPECIFICATIONS

842-5
R

1st edition, 1-7-75

Brought up-to-date on

**TECHNICAL SPECIFICATION
FOR THE PROTECTION AGAINST CORROSION
AND PAINTING OF COACHES
AND TRACTIVE UNITS**

(Reprint, 01-11-1989)

1 - PURPOSE

1-1 - Nature of the work

This specification defines the paint products, systems and methods to be used for the protection against corrosion and painting of rolling stock other than wagons and containers.

These provisions shall apply to single components, sub-assemblies and assemblies used in the construction of a vehicle and also to complete vehicles.

This specification applies to the following vehicles :

- standard coaches,
- special coaches,
- luggage vans in passenger trains,
- electric locomotives,
- Diesel locomotives,
- light rail motor tractors,
- electric motor coaches, vehicles with reversible driving cabs, and trailers of electric motor train units,
- railcars, vehicles with driving cabs and trailers of thermal engine trainsets,
- service vehicles.

This specification defines the minimum requirements to ensure the protection of passenger coaches and motor units for a suitable length of time.

1-2 - Classification

The work of anti-corrosion protection and painting of rolling stock shall consist of :

- preparation of the surfaces before painting,
- application of the paints,
- lettering and markings.

1-3 - Reference documents

Reference is made to the following documents in the text of this specification :

UIC Leaflets 842-1 : Supply of paint products for the protection of railway vehicles and containers,

842-2 : Methods for testing for paint products,

842-3 : Surface preparation of metallic and non-metallic materials used in the construction of railway vehicles and containers,

842-6 : Quality inspection of paint systems for railway vehicles,

842-7 : Recommendations for the design, methods of assembly and selection of the materials for the construction of passenger rolling stock built of metal,

ISO/R 1461 : Hot galvanizing on iron products,

ISO/R 2085 : Treatment of metal surfaces -
Anodizing of aluminium and alloys,
Inspection of the continuity of thin coats,
copper sulphate test,

ISO/R 2128 : Treatment of metal surfaces.
Anodizing of aluminium and its alloys.
Measuring of the thickness of oxide coatings.
Non-destructive method by optical section
microscope.

2 - MATERIALS

2-1 - Paints

The products to be used for painting are given in Appendices 1 to 4. They must conform to the provisions of UIC Leaflet 842-1.

This conformity shall be checked by applying the test methods described in UIC Leaflet 842-2.

The system of protection of a vehicle or vehicle component may normally include only products from the same supplier. This clause may be waived only with the prior agreement of the purchasing Railway.

2-12 - Suitability of the products

Before use, the paints and auxiliary agents must have passed, not only checks and tests completed in accordance with the provisions of UIC Leaflets 842-1 and 842-2 at the manufacturer's works and by the laboratories, but also the test of suitability for application described in Appendix 5.

Materials which do not comply with the conditions of this final acceptance test must not be used.

2-13 - Compatibility of the products

For systems of protection where the top coat is a bituminous solution or a thermal and sound insulating product, the mutual compatibility of all the paints and insulating materials must be checked.

2-3 - Anodized light alloy parts

Anodized light alloy parts are not generally painted. The thickness of the anodized coats is measured in accordance with ISO Standard R 2128, and must be greater than 15 μ m.

In addition, its thickness must be verified in accordance with ISO Standard R 2085 and must be continuous.

2-4 - Galvanized parts

Galvanized parts must meet the requirements of ISO Recommendation R 1461.

3 - PROVISIONS RELATING TO PROTECTION AGAINST CORROSION AND THE APPLICATION OF THE PAINTS

3-1 - Preparation of the surfaces before application of a paint

3-11 - Preparation of surfaces before application of a first coat

Before application of the first coat of paint, the surface must be prepared in accordance with the provisions of UIC Leaflet 842-3.

3.12 - Preparation of surfaces during application

Those parts of surfaces already painted, which become soiled with grease, weld spatter, condensation, etc., should be cleaned and degreased, using a solvent compatible with the product already applied, before any fresh application of paint, in order to ensure that the following coats are applied under satisfactory conditions.

3-2 - Application of the paint systems

3-21 - Paint system, process and thickness of the coats

3.211 - Paint system and process

The products used and the process adopted to provide the system of protection of the various types of vehicles and their component parts, are given in Appendices 1 to 4.

Any modifications to these processes must be approved by the purchasing Railway.

3-212 - Thickness of the layers and drying time

The thickness of the dry film and the drying times of the various protective products are given in Appendix 5.

During application, the builder must check the thicknesses of the wet film, to avoid rejection when the vehicle is finished. The thicknesses of the wet film must be fixed by the purchasing Railway.

The limit values of the dry film, shown in the table in Appendix 5 for each coat of paint, must not be exceeded either above or below. The total thickness when dry of the complete system adopted by the purchasing Railway, must not be less than the values shown in Appendix 5 (see 6.1).

These total thicknesses when dry shall apply equally in the case of systems with one or more coats.

3-213 - Parts which have been given an anti-corrosion priming coat before transport and storage

When components made of sectional or sheet steel have been coated with anti-corrosion primer before transport and storage, this coat shall not be taken into consideration in the system of protection to be applied.

In the case of doubtful adherence or risk of incompatibility of the anti-corrosion priming coat with the following coats, the existing coat must be completely removed.

Temporary protective products must be removed, unless they are compatible with the other paints of the protective systems.

The same applies to the painting of other types of parts, irrespective of their origin.

3-22 - Colours

3-221 - Colours of products forming the system of protection

Unless otherwise stipulated, the products forming the system of protection must be of different colours.

3-222 - Colours of top coats

The colours of top coats must conform to those indicated by the purchasing Railway.

Components not included specially in the order or its appended documents, except those mentioned in 3.251, must be painted in the same colour as the surrounding area when they are painted.

3-23 - Technical conditions of application*3-231 - Atmospheric conditions of the painting premises*

The application and drying of the various coats of paint must be completed in a dust-free atmosphere, and the ambient temperature and that of the object to be painted must not be less than + 12°C. When two-component paints are used, this temperature must not be less than + 18°C.

In all cases, the relative humidity in the paint shop must not be greater than 75%.

The vehicle must not be taken outside while the successive coats of the system of protection are being applied. However, when this working procedure is not possible, and if the purchasing Railway so authorises, vehicles may be placed outside between the application of two successive coats of paint, but provided that the paint has reached the point where it is "dry to the touch" defined in 3-242 of UIC Leaflet 842-2.

3-232 - Stirring and straining of the paint

The paint must be stirred before being decanted. If mechanical agitators are used, the formation of air pockets must be avoided.

In cases where the purchasing Railway accepts products with a flash point of less than + 21°C, as a concession, the builder must take all the necessary safety measures.

After stirring and after making up the mixture in the case of two-component paints, the materials must be strained to ensure smooth working and a good quality of application.

3-233 - Application processes

One or more of the processes listed below must be used to apply the coats of paint. These processes must be approved by the purchasing Railway :

- spraying by air gun, if necessary with heating of the paint or one of its components,
- electrostatic spray,
- spraying with high pressure equipment without air (Airless system), if necessary with heating of the paint or one of its components.

When two-component products are used, account must be taken of the prior reaction times and the "pot life" indicated by the paint supplier.

Any prior reaction time, any inaccuracy in the proportion of the mixture and any air infiltration can be avoided by using a device enabling the mixing of the two components to take place directly as soon as the spray leaves the gun.

Small parts can also be treated by a dip process, provided that the paint to be applied consists of one component only.

3-24 - Details relating to paint products in general

3-241 - Reactive priming paints (wash primer)

Reactive priming paints (wash primer) are delivered as materials in either one or two separate components. Except for the special indications in Appendices 1 to 4, two-component reactive priming paints (wash primer) should be used.

Generally speaking, reactive priming paints (wash primer) consist of a polyvinylbutyral based binder, zinc chromate based pigments, and free phosphoric acid in organic solution. In the case of reactive priming paints delivered as two separate components, the dissolved free phosphoric acid constituting one of the components is added to the other component in the proportion prescribed, just before application. The chemical reaction of the mixture begins immediately after addition of the catalyst. (Even the metal object to be painted participates in the reaction, thus giving very good adhesion).

One-component reactive priming paint (wash primer) must be delivered ready for use.

Two-component reactive priming paint (wash primer) must be used in accordance with the instructions supplied by the manufacturer.

3.242 - Zinc powder paint

Zinc powder paint is an anticorrosion priming paint for steel structures. It can be applied in one or two coats, without a finishing paint. It is also used for assemblies (steel/steel) where spot welding is employed, but which are not sealed. The pre-scribed thinner must be used to obtain the correct spraying consistency.

3-243 - Zinc chromate anticorrosion priming paint

Zinc chromate anticorrosion primer is the standard anticorrosion priming paint. It exists in the form of one or two components. To obtain the correct consistency for use, the specific thinners prescribed for the respective binders (alkyd resin, epoxy resin, polyurethane resin) must be used. With regard to the two-component paint, see also 3-247 (two-component paint). Unless otherwise agreed beforehand by the purchasing Railway, two-component paints may not be applied to anticorrosion priming paints with an alkyd resin base.

3-244 - Alkyd resin paints

Alkyd resin paints are delivered ready for use. For painting by spraying, white spirit or another suitable solvent is generally used to obtain correct consistency for application. The same applies for obtaining the correct application consistency for painting by other methods.

3-245 - Bituminous paints

Bituminous solutions are delivered ready for use and must not be diluted. In the case of thickening of the product due to storage at low temperature or for a prolonged period, the paint should be heated in a water-bath before application, at a temperature of + 30 to 35°C.

Bituminous emulsion is delivered ready for use. The paint may only be diluted with water in a maximum proportion of 2%, in the event of thickening due to prolonged storage.

3-246 - Dispersion paints

Dispersion paints, intended for the painting of the insides of vehicle bodies and for separation purposes when inscriptions are to be placed on bituminous paints, are applied

as delivered. In the event of thickening due to prolonged storage, they can be diluted with water in a maximum proportion of 2%. Dispersion paints intended for the painting of the outsides of vehicle bodies are delivered ready for use. To obtain the correct spray, the paint is diluted, if necessary, with water in a maximum proportion of 2%.

3-247 - Epoxy or polyurethane resin based two-component paints

Epoxy or polyurethane resin based two-component paints are products which are generally not delivered ready for use. They consist of a basic component and a hardening agent which must be mixed before use in a prescribed proportion. The instructions of the manufacturer must be observed when mixing and using these products.

To obtain the correct consistency for use, a special thinner must be used.

The chemical reaction of the mixture begins immediately after the addition of the hardening agent. The service life in the paint pot - i.e., the time elapsing between suitability for application of the base-hardening mixture until thickening occurs - varies according to the composition of the product and the manufacturers. Application must cease as soon as the "pot life" indicated by the manufacturer is exceeded.

The paint prepared in this way may only be applied after elimination of air introduced when mixing the two components. Generally speaking, a waiting time of 30 minutes is sufficient. This waiting time is eliminated when the paint is mixed away from the air (gun with two heads, equipment with a premixing chamber).

3-248 - Aluminium paint

Aluminium paint is delivered ready for application. When the paint is to be applied by spraying, it is brought to the required spraying consistency by using a suitable thinner. Due to

its tendency to settle, it must be stirred continually even during use.

3-249 - Coverings applied as a thick coat

Thick coverings consist of two-component products with a polyester, epoxy resin or polyurethane base, used to fill the largest hollows.

They are in the form of a base and a hardener, which when mixed, give a coating ready for use without adding any thinner.

These thick coatings must be prepared and used in accordance with the instructions of the manufacturer.

3-2410 - Smoothing coatings

To correct defects in the surface smoothness in the paint on the outside of vehicle bodies, only two-component smoothing coverings with a base of polyester resin, epoxy resin or polyurethane are allowed.

When preparing the smoothing covering, the proportions of components fixed by the manufacturer and the pot life must be observed.

Depending on the particular provisions of the purchasing Railway, the smoothing coating shall be applied in successive coats with a knife or gun as indicated in Appendix 5. The builder must ensure, before applying a coat, that the previous coat is "hard" dry.

After rubbing down the smoothing coverings, the water used for rubbing down and rinsing must be removed from uneven points where it has accumulated, by means of dry oil-free compressed air.

Following coats may not be applied until after complete evaporation of the water used for rubbing down and total drying of the surface.

Coverings with an alkyd resin base can also be used for interior painting work.

These coverings are delivered ready for use. The conditions of application, drying and rubbing down of these coverings are identical to those of the coverings used for exterior painting.

3-2411 - Varnish

Varnishes with a base of polyester resins or acid-hardening polyurethane resins are not generally delivered ready for use.

The rulings applicable to them are the same as those contained in 3-247.

3-2412 - Products for thermal and acoustic insulation

Liquid products for thermal and acoustic insulation must be prepared and used by observing the instructions of the manufacturer. These products may only be applied to a complete paint system which is absolutely dry, consisting of a coat of anti-corrosion priming paint, where applicable an intermediate coat and a top coat.

Direct application to a coat of anti-corrosion priming paint is tolerated when the insulation characteristics and the finishing qualities of the product are verified by tests of long duration.

Insulating products with a dispersion base must not be applied to bitumens, or to mist-type sprays.

These products are delivered ready for use. In the event of thickening due to prolonged storage, depending on their nature they may be thinned in a maximum proportion of 2%, with water or a suitable solvent.

The thickness of the wet coats must allow a thickness of 10 mm of the dry coats to be obtained.

The insulating coat must be completely dry before facings or top coats are applied.

Solid products for thermal and acoustic insulation must be applied to a complete paint system which is absolutely dry.

When dispersion-based soundproof products are applied to the underframe, a protective paint must be applied after drying is complete.

Any zones of application, and the thickness of the insulating products, must be specified in the order or its appended documents by the purchasing Railway.

3-25 - Provisions to be observed during construction*3-251 - Surfaces and parts not to be painted*

The following surfaces and parts must not be painted :

- sides of tyres or rims of solid wheels,
- running surfaces of wheels,
- brake-blocks, shoes and brake discs,
- rigging components requiring greasing,
- front faces of buffers,
- functional components which are threaded, sliding or telescopic,
- parts made of elastomers,

and, at the request of the purchasing Railway :

- axles,
- centres of solid wheels,

These surfaces and parts must be protected against any splashes of paint.

3-252 - Painting of parts in contact in overlapping zones of assemblies

The painting of parts in contact in overlapping zones of assemblies :

- steel/steel,
- steel/stainless steel,

- stainless steel/stainless steel,
- light alloy/light alloy,
- light alloy/steel (see 3-254).

spot welded or not continuously welded, shall be carried out in accordance with the provisions of UIC Leaflet 842-3.

In order to prevent the penetration of dampness, gaps existing between superimposed components and two consecutive spot welds must be filled with paint or with an insulating spray product approved by the purchasing Railway, the whole then being covered with the prescribed coats of paint, applied to ensure perfect sealing of the joint.

When this process cannot be used, sealing of the assembly must be ensured by means of a suitable product approved by the purchasing Railway.

3-253 - Painting of sealed welded assemblies

In the case of sealed welded assemblies, the coat of anti-corrosion priming paint must only be applied after welding is completed.

3-254 - Painting of mixed steel/light alloy assemblies

In the case of mixed steel/light alloy assemblies, the contact surfaces, previously covered with a coat of reactive priming paint (wash primer), shall be given a coat of anti-corrosion priming paint and waterproof insulating compound.

Light alloy rivets must only be given the coat of reactive priming paint (wash primer).