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Form No. 2038

उत्पाद मानक

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PRODUCT STANDARD

TRANSFORMER

SHOP/ENGG INSTRUCITONS

TR 10265P

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TITLE: - Painting System of Transformer Tank & Accessories, Radiators, Cooler Control Cabinets / RTCC Panels etc.

This instruction applies to the painting application procedure for Transformer Tanks, Conservators and other fittings, Radiators, Marshalling Box, and Cooler Control Cabinet etc. This instruction also includes surface preparation and pretreatment for painting of the fabricated parts.

1.0 MATERIALS:

1.1. For Painting on Transformer Tank & Accessories.

- 1.1.1. Epoxy Base Zinc Phosphate Primer. TRE/166
- 1.1.2. Polyurethane Finishing Paint TRE/165
- 1.1.3. Thinners for above as recommended.
- 1.1.4. Emery paper no 220, Wire Brush, Clean Cloth etc.
- 1.1.5. Nitro- Cellulose/Synthetic resin (epoxy) putty.
- 1.1.6. White Epoxy Paint. TRE/168

1.2. For Painting on Marshalling Box and Control cabinets

- 1.2.1. Epoxy Base Zinc Phosphate Primer. TRE/166
- 1.2.2. Polyurethane Finishing Paint TRE/165
- 1.2.3. Thinners for above as recommended.
- 1.2.4. Emery paper, Wire Brush, Clean Cloth etc.
- 1.2.5. White Epoxy Paint. TRE/168

1.3. For Painting on Radiators.

- 1.3.1. Epoxy Base Zinc Phosphate Primer TRE/166 or AA56105
- 1.3.2. Polyurethane Paints TRE/165 or AA 56142
- 1.3.3. Etch Primer. AA 56103
- 1.3.4. White Spirit. AA 56701
- 1.3.5. Emery paper, Wire Brush, Clean Cloth etc.
- 1.3.6 Oil resistant low viscosity varnish TRE/382/03

2.0 MEASURING APPARATUS:

- 2.1 Alco meter for checking the Dry Film Thickness.
- 2.2 Ford Cup No 4 for measuring the Viscosity of the paint.
- 2.3 Cutter and Cello-tape for adhesion test.

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3.0 PROCEDURE FOR PAINTING

3.1 GENERAL

- 3.1.1 Paint used for primer, under coat and top or finish coat should be from the same manufacturer and compatible to each other.
- 3.1.2 Store the paints and thinners in original sealed containers with clear identification marks indicating manufacturer's name, shade, designation and instruction for mixing & application.
- 3.1.3 Do not use paints after the shelf life has expired.
- 3.1.4 Open the containers just before application.
- 3.1.5 Thoroughly examine steel surface to be coated prior to commencement of work. Correct any condition that will adversely affect cleaning and coating application.
- 3.1.6 Inspect and test at each step of the painting operation before proceeding with the next step.
- 3.1.7 Verify that all painted surfaces are free from defects. If any defective area is found, repair and re-inspect before next operation.

3.2 SURFACE PREPARTION FOR INTERANAL AND EXTERNAL SURFACES :

3.2.1 For Transformer Tank, Turrets, Conservator, Header, A-Frame, Pipe Work above 80 NB, External surface of pipe work upto 80 NB etc.

Remove all the lamination, weld spatters, slag by scraping. Chamfer all the edges and remove sharp corners that cannot be properly painted. Remove oil, grease, dirt, dust etc. by using suitable degreasing agent and fresh water cleaning. Allow it to dry. After cleaning, check for any traces on substrate visually and re-clean if any traces are found.

Sand, Shot or Grit blast the surface to Sa 2.5 in accordance with ISO 8501 Part 1 or Swedish standard SIS 055900. The flanges, angles, concealed areas shall be blast cleaned prior to fabrication & paint with one coat of primer prior to fabrication.

After adequate blast cleaning of each large surface where blasting time is more than 3 hours, an overall blast cleaning is to be done on the entire surface once more so that entire surface areas is exposed as fresh for 1st coat of primer paint.

Compressed air used for the purpose must be dry and free from oil. Remove dust abrasive carefully by clean brush, by hosing with dry air. The first coat of primer or paint should be applied not later than 3-4 hours after surface preparation to avoid oxidation. Machined areas, Threaded components studs etc should be suitably protected during blast cleaning.

Note : Internal surface of pipe work upto 80 NB shall be cleaned by pickling process.

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3.2.2 For Radiators				
3.2.2.1 Radiator Element				
3.2.2.1.1 Dressing & Grinding :				
After welding, welds and flame cut edges shall be dressed and any major surface imperfections removed by grinding if necessary.				
3.2.2.1.2 Degreasing and cleaning :				
Single radiator element after air pressure testing under water shall be wiped with clean dry cloth piece to remove water and shall be degreased and cleaned to make the surface free from visible oil, grease & dirt, mill scale, rust, paint and other foreign matter using suitable chemicals.				
3.2.2.2 Other parts of Radiator Assembly				
All support and bracing details including header and header cover etc. shall be sand, shot or grit blasted in accordance with ISO 8501 part 1 or Swedish standard SIS 055900 Sa 2.5 to make the surface free from visible oil, grease & dirt, mill scale, rust, paint and other foreign matter. Compressed air used for blasting should be dry and free from oil.				
3.2.2.3 Application of Etch Primer				
One coat of Etch Primer shall be applied with in 3-4 hours after shot blasting/chemical cleaning. Before application of Etch Primer coat, compressed dry air should be passed through the opening of radiator element as well as outside surface to remove dust etc. if any				
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3.3 PAINT APPLICATION

3.3.1 General

Perform mixing of paints as per manufacturers published instructions. Maintain the ratio of two components critically. Follow these instructions.

1. Painting to be carried out in closed and dust free area.
2. Paint used for primer, under coat and top or finish coat should be from the same paint manufacturer and compatible to each other.
3. Stir each component separately and then mix the hardener into resin and stir till uniform consistency is obtained. After mixing, the paint shall be allowed to mature for 30 minutes before use.
4. Consistency of the primer and finishing paint shall be maintained as per manufacturer's recommendations. Suitable thinner shall be used to achieve required consistency.
5. Set air pressure and volume of painting gun to achieve proper atomisation.
6. Apply a wet coat in parallel passes; overlap 50% to avoid bare areas and pinholes.
7. The time gap between any two successive coats shall not be more than 7 days.
8. When oven drying facility for coatings is available painted surface after each coat shall be allowed to air dry for 20 min at room temp there after forced dried in an oven at 90 ± 10 deg C for one hour.
9. In case oven drying facility is not available, painted surface shall be allowed to air dry for 16 hrs after each coat.
10. The number of coats shall be such that the minimum dry film thickness (DFT) specified is achieved.
11. The painted surface shall be allowed to air dry at shop temperature for 4 days before shipping.

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3.3.2 Painting of external surface of Transformer Tank, Turrets Conservator, Headers, A-Frames, Pipe Work, and Supporting Structures etc.

- [A] **Application of Epoxy base zinc Primer:** - Primer paint as prepared shall be applied by spraying / brushing over the sand, shot or grit blasted surface. DFT of the coat shall be 50 microns(min).
- [B] **Finishing Coat:** - Air hose the entire surface to remove loose paint, dust etc. Polyurethane finishing paint shall be applied by spraying / brushing. DFT of finishing coat shall be 50 microns (min).
Total DFT of all the three coats shall be 100 microns (min).

3.3.3 Painting on internal surface of Transformer Tank, Turrets, Conservator, Headers, Pipe Work above 80 NB, Core Clamping Parts & all internal parts

Internal surface of tanks and other items shall be painted not later than 3-4 hours after preparation of the surface. White Epoxy Paint to be applied by spraying / brushing. DFT of the coat shall be 40 microns (min).

3.3.4 Painting on External Surface of Marshalling Box, RTCC Panels and Control Cabinet

- [A] **Application of Epoxy base zinc Primer:** - Primer paint as prepared shall be applied by spraying / brushing.
DFT of the coat shall be 50 microns(min).
- [B] **Finishing Coat:** - Air hose the entire surface to remove loose paint, dust etc. Polyurethane finishing paint shall be applied by spraying / brushing. DFT of finishing coat shall be 50 microns (min).
Total DFT for Marshalling Box & Control Cabinet shall be 100 microns (min).

3.3.5 Painting on internal surface of Marshalling Box, RTCC Panels and Control Cabinets

Internal surface shall be painted by Epoxy primer followed by White Epoxy Paint by spraying / brushing. DFT of total coats shall be 50 microns (min).

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3.3.6 Painting on Internal Surface of Radiators and pipe work upto 80 NB

Internal surface of the radiators and pipes upto 80 NB shall be flushed with oil proof low viscosity varnish.

3.3.7 Painting on External Surface of Radiators.

3.3.7.1 Brush / Spray painting of support and bracing detail for radiator elements and radiator header and outside of header cover

Epoxy Primer shall be applied by brush at the surface between the flutes before welding elements with header. Drying time for the coat shall be 16 hours.

3.3.7.2 Assembly of Radiators

The radiator shall be assembled after application of Etch Primer and Epoxy Primer Paints between flutes on radiator elements. Degreasing and rust removal shall be done of all support & bracing details for radiator elements as well as radiator header & outside of header.

3.3.7.3 Painting of Assembled Radiators

[A] First coat of Epoxy base zinc primer

First coat of Epoxy base zinc primer shall be applied by brushing / spraying. Thickness of the coat shall be 30-40 microns. The painted surface shall be allowed to air dry for 16 hours.

[B] Second coat of Epoxy base zinc primer

The second coat of epoxy base zinc primer shall be applied by brushing / spraying. The painted surface shall be allowed to air dry for 16 hours before the first coat of finishing paint is applied. Thickness of the coat shall be 30-40 microns.

[C] Final Coat of Aliphatic Polyurethane Paints

Aliphatic Polyurethane Finishing Paint shall be applied at the appropriate viscosity by brushing / spraying. The painted surface shall be allowed to air dry for 16 hours. Thickness of the coat shall be 50 microns (min).

Total DFT of primer and finish coats shall be 110 microns (min).

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4.0 Testing

1. Painted surfaces shall be visually checked for defects like rundown, bubbles, blisters wrinkles etc. and for any area not covered by the coat.
2. Dry film thickness (DFT) shall be checked after every coat as per ASTM D1186.
3. Adhesion test shall be carried out as per ASTM D 3359-83.

4.1 Maintenance & touch up paint (External Surface)

In case any area of paint is damaged during handling / transport or is rectified by welding / heating after painting, following procedure shall be carried out on damaged areas.

4.1.1 Clean the surface thoroughly by convenient tools . No trace of oil / carbon should be left on the surface. If rusting has taken place, it should be removed by emery paper.

4.1.2 Apply Surface Tolerant Epoxy Priming Paint to give a DFT of 50 microns.

4.1.3 Apply finish coat of Aliphatic Polyurethane paint to get total paint thickness of 155 microns minimum.

5.0 GENERAL INSTRUCTION

5.1 Painting after dye penetrant test:

When jacking and lifting tests are to be performed on the transformers, load bearing welds, these areas are not painted immediately after sand / shot / grit blasting of the tank. Following procedure is to be adopted for painting in this area.

- 5.1.1 Whenever any area is to be left unpainted for DP test, apply adhesive tape on that area after blasting & before painting.
- 5.1.2 After completing the dye penetration test, remove tape and apply cleaner over the entire area and remove the dye and developer from that area.
- 5.1.3 Clean the area with general purpose thinner.

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- 5.1.4 Clean the entire surface with a wire brush and do the painting as per given system procedure.
- 5.2 It is very essential to remove all the abrasives and dust generated by abrasive blasting. It may otherwise lead to premature failure of paint.
- 5.3 If minimum specified thickness is not achieved with one coat additional coat to be given after drying to achieve desired thickness.
- 5.4 Mix only sufficient quantity of paint required for immediate use. Do not use the paint once the pot life indicated is over, even after thinning.
- 5.5 Acceptance criteria for Dry film thickness measurement (90-10 rule)
For each area
 - less than 10% of the reading may be below the specified total dry film thickness.
 - No reading must be below 90% of the DFT specified.
- 5.6 All the earthing pads and bosses (if not protected during painting) should be cleaned free of paint before dispatch.

6.0 PRECAUTIONS:-

- 6.1 Mix only a sufficient quantity of paint required for immediate use for 2 hours.
- 6.2 Do not use leftover paint, which progressively hardens, and become unusable by adding thinner.
- 6.3 For wiping or cleaning the dust or loose particles from painted surface, use cotton rags only. Do not use cotton waste as it will leave loose fibers on the surface.
- 6.4 Painted surface if damaged, should be retouched up with similar procedure depending upon the extent of film exposed.

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