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| |  | PRODUCT STANDARD TME DIVISION, BHOPAL | | TM 94217 REV.06 | | | |
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| COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company | <u>SPECIFICATION FOR AIR DRYING PAINT FINISH FOR TRACTION MACHINES</u> (THIS SPEC. SUPERSEEDS SPEC. NO. BP0674184) | | | | | | |
| | <p>1. GENERAL:</p> <p>This standard details the process to be followed to provide the standard paint finish for traction motors, traction generators/alternators, motor generators, motor alternators & ECC, Auxiliary machines, oil rig motors & alternators for application in Indian Railways/Oil Rigs. This standard also covers the painting requirements of traction machines/oil rig machines for coastal areas/export. The finishing of the outer surfaces of the field coils and armature, including commutators and creepage surfaces, is covered by the appropriate Insulation Process Specifications where a special finish is required, it will be called for on the appropriate drawings and specification sheets.</p> <p>2. COMPLIANCE WITH STANDARDS:</p> <p>This standard to be used along with corporate standard AA0674123.</p> <p>3. MATERIALS:</p> <p>3.1 Materials Required:</p> <p>The finish painting of different traction machines/oil rig machines shall be as per table-4 of the specification unless otherwise mentioned in the drawing/work order/MID.</p> <p>Note: The materials shall be used after ensuring that material TC's is as per the requirement of paint specification & expiry date of paint is not crossed.</p> <p>3.1.1 Primer Paint:</p> <p>i) Anti Corrosive priming paint to AA56101 (Red). ii) Inorganic ethyl zinc silicate primer to AA56113.</p> <p>3.1.2 Intermediate Paint:</p> <p>i) High build intermediate epoxy paint to AA56112.</p> <p>3.1.3 Finish Paints:</p> <p>i) Polyurethane finishing paint to AA56142: For requirements of Industrial, Oil rigs & Traction machines including for coastal areas & export. ii) Paint to AA56128 (Aluminum): For blower motors.</p> | | | | | | |
| Revision : 06 Date: 14.05.2021 | | Distribution TXM TAM TGM/TNX QTM TME | Qty. 1 1 1 1 2 | Approved :  (M. Verma) | Prepared:  (J. Kumar) | Checked:  (R. Chaudhry) | Date: 14.05.21 |

| | |  <p>PRODUCT STANDARD TME DIVISION, BHOPAL</p> <p>TME/2021</p> | <p>TM 94217 REV.06</p> <p>PAGE 02 OF 09</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------------------------|--|--|---------|-----------|---------------------------------|---------------|--------------|-------|----------------------|--------------------|--------------|-------|----------------------|---------|----------------------------|-------|----------------------|-------------------------|--------------|-------|----------------------|---------|--------|-------|----------------------|---------------------------------------|-------------------------|-------|-------------|
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">COPYRIGHT AND CONFIDENTIAL</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.</p> | | <p>iii) Oil Resistant Air Drying Synthetic Enamel to AA56132 (Jasmine Yellow shade): For surfaces in contact with lubricant.</p> <p>iv) Epoxy Red Gel Coat (Base, Hardner & Diluent) to BP27476 or Anti Tracking Red Insulating Varnish to BP 27599 or Becktol Red- Prop of M/s Dr Beck & Co.Pune: For coils & insulation.</p> <p>v) Anti Tracking Epoxy based finishing paint to CIT-033: For interior surfaces of frame & pole pads.</p> <p>vi) Silicone based finishing paint to CIT-064: For field coils & pole assy. and connections.</p> <p>vii) Grey Insulating Enamel to BP 27595: For terminal box interiors.</p> <p>3.1.4 Thinners:</p> <p>The application of thinners for different primer/finish paints are as given in clause 3.2.</p> <p>i) White Spirit Gr. 145/205 to AA56701.</p> <p>ii) Xylole-Industrial Solvent Grade to AA56703.</p> <p>iii) Special Thinner for Epoxy Red Gel Coat/MEK.</p> <p>iv) Derusting Solution (hydrochloric acid/sulphuric acid) to BP0690086.</p> <p>3.2 Consistency of Materials at normal shop temperature in cup No.4 of IS:3944:</p> <table border="1" data-bbox="280 1153 1445 1778"> <thead> <tr> <th>Paint</th> <th>Thinner</th> <th>Applicant</th> <th>Consistency in Seconds to 27° C</th> </tr> </thead> <tbody> <tr> <td>AA56101 (Red)</td> <td>White spirit</td> <td>Spray</td> <td>30₊₂ sec</td> </tr> <tr> <td>AA56128 (Aluminum)</td> <td>White spirit</td> <td>Spray</td> <td>30₊₂ sec</td> </tr> <tr> <td>AA56142</td> <td>As recommended by supplier</td> <td>Spray</td> <td>30₊₂ sec</td> </tr> <tr> <td>AA56132(Jasmine Yellow)</td> <td>White Spirit</td> <td>Spray</td> <td>30₊₂ sec</td> </tr> <tr> <td>BP25795</td> <td>Xylole</td> <td>Spray</td> <td>30₊₂ sec</td> </tr> <tr> <td>BP27476/ BP2799 Becktol Red.</td> <td>Special Thinner/ MEK</td> <td>Spray</td> <td>30 – 40 sec</td> </tr> </tbody> </table> <p>For application by spray, the paints shall be obtained ready for use or thinned down to the flow time shown on the chart when measured at the shop temperature. The consistency of the paint require adjustment, the appropriate thinner given in the above chart shall be used.</p> | Paint | Thinner | Applicant | Consistency in Seconds to 27° C | AA56101 (Red) | White spirit | Spray | 30 ₊₂ sec | AA56128 (Aluminum) | White spirit | Spray | 30 ₊₂ sec | AA56142 | As recommended by supplier | Spray | 30 ₊₂ sec | AA56132(Jasmine Yellow) | White Spirit | Spray | 30 ₊₂ sec | BP25795 | Xylole | Spray | 30 ₊₂ sec | BP27476/ BP2799 Becktol Red. | Special Thinner/ MEK | Spray | 30 – 40 sec |
| Paint | Thinner | Applicant | Consistency in Seconds to 27° C | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AA56101 (Red) | White spirit | Spray | 30 ₊₂ sec | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AA56128 (Aluminum) | White spirit | Spray | 30 ₊₂ sec | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AA56142 | As recommended by supplier | Spray | 30 ₊₂ sec | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AA56132(Jasmine Yellow) | White Spirit | Spray | 30 ₊₂ sec | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BP25795 | Xylole | Spray | 30 ₊₂ sec | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BP27476/ BP2799 Becktol Red. | Special Thinner/ MEK | Spray | 30 – 40 sec | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| <p style="writing-mode: vertical-rl; transform: rotate(180deg);"> COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED It must not be used directly or indirectly in any way detrimental to the interest of the company </p> | <p>3.3 <u>Compatibility chart for Primer Paint, Intermediate Paint & Finish Paint:</u></p> <table border="1" data-bbox="354 497 1311 638"> <thead> <tr> <th>Primer Paint</th> <th>Intermediate Paint</th> <th>Finish Paint</th> </tr> </thead> <tbody> <tr> <td>AA56113</td> <td>AA56112</td> <td>AA56142</td> </tr> <tr> <td>AA56101</td> <td>-</td> <td>AA56128</td> </tr> </tbody> </table> <p>For achieving better quality of painting, the combinations of primer paint, intermediate paint & finish paint as mentioned in above table shall be used.</p> <p>3.4 <u>MIXING OF PAINTS:</u></p> <p>3.4.1 Before application, any skin formed on the paint in the tin shall be carefully removed, any settled pigment broken up and loosened, and the paint shall be thoroughly stirred to ensure complete and uniform mixing of the constituents. Care shall be taken to avoid air entry into the paint whilst stirring.</p> <p>3.4.2 <u>AA56113 PRIMER:</u></p> <p>AA56113 primer as supplied consists of two separate ingredients viz primer base and accelerator. Shortly before use mix together primer base and accelerator in the proportion 1:1 by volume or as recommended by supplier, care being taken not to entrain air while mixing. It is important that only small quantity of primer which can be consumed within 4 hours can be mixed. Further thinning of the paint prepared as above is not required for application by spraying.</p> <p>3.4.3 <u>EPOXY RED GEL COAT (BP27476):</u></p> <p>This consist of 3 parts viz Epoxy red gel coat, Hardner EH411 and Diluent C. These to be mixed in the ratio 100:40:10 by weight. Should the consistency of the paint require adjustment the same to be done by using special Thinner/MEK.</p> <p>4. <u>APPLICATION :</u></p> <p>A complete paint (as per Table 1, 2, 3 & 4) should be applied so that the equipment has a well finished appearance & adequate protection against corrosion. It is important that each coat of paint is completely dry before the next is applied. The paint shall be applied by spraying/air less spraying only.</p> <p>5. <u>PROCESS FOR PAINTING OF TRACTION/OIL RIG/INDUSTRIAL MACHINE COMPONENTS:</u></p> <p>For the painting of Traction/Oil rig/Industrial machines components, the process mentioned in painting scheme no. 8 of annexure-II(a) of corporate standard AA0674123 shall be followed.</p> | Primer Paint | Intermediate Paint | Finish Paint | AA56113 | AA56112 | AA56142 | AA56101 | - | AA56128 |
| | Primer Paint | Intermediate Paint | Finish Paint | | | | | | | |
| AA56113 | AA56112 | AA56142 | | | | | | | | |
| AA56101 | - | AA56128 | | | | | | | | |

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TABLE NO. 1


FINISHING PAINT FOR NON-ROTATING PARTS OF TRACTION MACHINES

| Part | Traction Motors | | Other Machines | |
|--|---|-------|--------------------------|-------|
| | Paint | Coats | Paint | Coats |
| Exterior surfaces of machines including gearcase | AA56142 (Black) | 2 | AA56142 (Traffic Green) | 2 |
| | AA56142 (Traffic Green) | 2 | AA56142 (Light Grey) | 2 |
| | AA56142 (Light Grey) | 2 | | 2 |
| Interior Surface of machines | CIT-033 (See note-2) | 2 | CIT-033 (See note-2) | 2 |
| Surface in contact with Lubricant | AA56132 (Jasmine Yellow) | 2 | AA56132 (Jasmine Yellow) | 2 |
| | | 2 | | 2 |
| Terminal Box Interiors | BP27476/ BP27599 Becktol Red. | 2 | BP 27595 | 2 |
| Field coils & pole assy. and Connections | CIT-064 | 2 | CIT-064 | 2 |
| Brush gear and brush gear Insulators | Plant Standard BP0674183 to be followed | | | |

NOTES:

1. Light alloy & glass fibre cover and other readily detachable parts in the traction machines shall not be painted.
2. Interior surface of frames & pole pads to be painted with CIT-033 for adjacent coils, cable etc.
3. Epoxy bonded components must not be painted prior to bonding.
4. The paint/colour of finish painting in different traction machines/oil rig machines is mentioned in table-4 of this specification.

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| COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED It must not be used directly or indirectly in any way detrimental to the interest of the company |  PRODUCT STANDARD TME DIVISION, BHOPAL TME/2021 | TM 94217 REV.06 | | | | | | | | | | | | | | | | | |
|--|---|----------------------------------|---------|-----------------|---------------|--|----------------|----------------------------|----------------|-------------------|----------------------------|----------|----------------------|-------------------------------|-------------------------|---|------------------------|---|--|
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| | | | | | | | | | | | | | | | | | | | |
| | TABLE-2 FINISHING PAINT FOR ROTATING PART OF TRACTION MACHINES | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Part</th> <th>Paint</th> <th>Coats</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>Steel Fans:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>1) TM4601, TM4603</td> <td>AA56142 (Traffic Green)</td> <td>2</td> <td>-</td> </tr> <tr> <td>2) AG3101, AG2702, TA10102</td> <td>AA56142 (Light Grey)</td> <td>2</td> <td></td> </tr> </tbody> </table> | Part | Paint | Coats | Remarks | Steel Fans: | | | | 1) TM4601, TM4603 | AA56142 (Traffic Green) | 2 | - | 2) AG3101, AG2702, TA10102 | AA56142 (Light Grey) | 2 | | | |
| Part | Paint | Coats | Remarks | | | | | | | | | | | | | | | | |
| Steel Fans: | | | | | | | | | | | | | | | | | | | |
| 1) TM4601, TM4603 | AA56142 (Traffic Green) | 2 | - | | | | | | | | | | | | | | | | |
| 2) AG3101, AG2702, TA10102 | AA56142 (Light Grey) | 2 | | | | | | | | | | | | | | | | | |
| | TABLE-3 FINISHING PAINT FOR MISCELLANEOUS EQUIPMENT | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Equipment</th> <th>Part</th> <th>Paint</th> <th>Coats</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Eddy Current Clutch and gear boxes surface</td> <td>Steel surfaces</td> <td>AA56142 (Traffic Green)</td> <td>2</td> </tr> <tr> <td>Coil</td> <td>See Insulation Spec.</td> <td>-</td> </tr> <tr> <td>Interior of gear box</td> <td>AA56132</td> <td>2</td> </tr> </tbody> </table> | Equipment | Part | Paint | Coats | Eddy Current Clutch and gear boxes surface | Steel surfaces | AA56142 (Traffic Green) | 2 | Coil | See Insulation Spec. | - | Interior of gear box | AA56132 | 2 | | | | |
| Equipment | Part | Paint | Coats | | | | | | | | | | | | | | | | |
| Eddy Current Clutch and gear boxes surface | Steel surfaces | AA56142 (Traffic Green) | 2 | | | | | | | | | | | | | | | | |
| | Coil | See Insulation Spec. | - | | | | | | | | | | | | | | | | |
| | Interior of gear box | AA56132 | 2 | | | | | | | | | | | | | | | | |
| | TABLE-4 PAINT/COLOUR FOR FINISH PAINTING OF DIFFERENT TRACTION/OIL RIG MACHINES | | | | | | | | | | | | | | | | | | |
| | Note: The finish painting of different traction machines/oil rig machines shall be as per table-4 of the specification unless otherwise mentioned in the drawing/work order/MID. | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Type of machine</th> <th>Paint/Colour*</th> </tr> </thead> <tbody> <tr> <td colspan="2">A) Traction Motors:</td> </tr> <tr> <td>TM4906AZ</td> <td rowspan="6">AA56142(Black)</td> </tr> <tr> <td>TM4907BZ</td> </tr> <tr> <td>TM4603AZ</td> </tr> <tr> <td>HS15250A</td> </tr> <tr> <td>TM3701AZ</td> </tr> <tr> <td>TM4605AZ</td> </tr> <tr> <td>TM5002AZ</td> <td>AA56142 (Light grey) (631 export) & Black for WDP2</td> </tr> <tr> <td>TM4303CZ/BY & TM4303DY</td> <td>AA56142 Traffic Green for CZ/BY (EMU & MEMU application) & Black for DY (DEMU application)</td> </tr> </tbody> </table> | | | Type of machine | Paint/Colour* | A) Traction Motors: | | TM4906AZ | AA56142(Black) | TM4907BZ | TM4603AZ | HS15250A | TM3701AZ | TM4605AZ | TM5002AZ | AA56142 (Light grey) (631 export) & Black for WDP2 | TM4303CZ/BY & TM4303DY | AA56142 Traffic Green for CZ/BY (EMU & MEMU application) & Black for DY (DEMU application) | |
| Type of machine | Paint/Colour* | | | | | | | | | | | | | | | | | | |
| A) Traction Motors: | | | | | | | | | | | | | | | | | | | |
| TM4906AZ | AA56142(Black) | | | | | | | | | | | | | | | | | | |
| TM4907BZ | | | | | | | | | | | | | | | | | | | |
| TM4603AZ | | | | | | | | | | | | | | | | | | | |
| HS15250A | | | | | | | | | | | | | | | | | | | |
| TM3701AZ | | | | | | | | | | | | | | | | | | | |
| TM4605AZ | | | | | | | | | | | | | | | | | | | |
| TM5002AZ | AA56142 (Light grey) (631 export) & Black for WDP2 | | | | | | | | | | | | | | | | | | |
| TM4303CZ/BY & TM4303DY | AA56142 Traffic Green for CZ/BY (EMU & MEMU application) & Black for DY (DEMU application) | | | | | | | | | | | | | | | | | | |

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| Type of Machine | Paint/Colour* |
|--|---|
| IM3601AZ | AA56142(Light Grey) |
| IM3301AZ/IM3302AZ | |
| TAO-659 | |
| OIM5101AZ | |
| IM4504AZ | |
| IM4506AZ | |
| 6FRA6068 | As per customer/BHEL drawing |
| 6FXA7059 | |
| OM4903BX/CX | AA56142(Traffic Green) |
| TM4601BY/BX | |
| IM4507AZ/BZ | AA56142(Black) |
| B) Traction Alternators & Generators: | |
| All traction alternators, Generators, AG's & Gear boxes | AA56142(Light Grey) |
| ECC9005/2/M | AA56142(Traffic Green) |
| BM2101AZ | AA56128 (Aluminium) |
| DY3423/M | |
| MG51BX/CW | AA56142(Black) |
| AG903CW | |
| AG1404AZ | |
| NA5105AZ (490KW) | IS:14209 (Colour: Pista green shade 216 of IS:5) |
| TG5005AZ (500KW MMG) | |
| TG10932AZ (1MW MMG) | |
| NA6401AZ (1350KW) | |


Note:-


(*) – Latest customer PO/specification/drawing/Engineering information/MID shall be referred for any changes in paint grade/colour of a machine.

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| |  <p style="text-align: center;">PRODUCT STANDARD TME DIVISION, BHOPAL</p> | <p style="text-align: center;">TM 94217 REV.06</p> <p style="text-align: center;">PAGE 07 OF 09</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|---------|---------------|---------------------|----|---|--|-----|------------------------------|------------------------------------|------|---|--|---------|-----------|---------------------|----|--|--------------------------------|-----|--|-----------------------------|------|--|---|-----|---|---|----|---|-------------------------------------|-----|---|
| | TME/2021 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);">COPYRIGHT AND CONFIDENTIAL</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.</p> | <u>Annexure-I</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p style="text-align: center;"><u>Acceptance criteria for Painting of Traction Machines</u></p> <p>The acceptance criteria for the check points, which are to be ensured during painting of Traction Machines as per the requirements of specification TM94217, are as given below. The supplier to furnish below mentioned check points for each component in the format as per annexure-II along with consignment.</p> <p>1) <u>Checking of Painting Material:</u></p> <table border="1" data-bbox="331 725 1473 979"> <thead> <tr> <th>Sl. no.</th> <th>To be checked</th> <th>Acceptance criteria</th> </tr> </thead> <tbody> <tr> <td>i.</td> <td>Expiry date of primer & intermediate paint.</td> <td>Primer & intermediate paint shall be within expiry date.</td> </tr> <tr> <td>ii.</td> <td>Expiry date of finish paint.</td> <td>Paint shall be within expiry date.</td> </tr> <tr> <td>iii.</td> <td>Verification of supplier's TC as per paint specification.</td> <td>Painting material shall be used only after verification of TC.</td> </tr> </tbody> </table> <p>2) <u>Surface Preparation (Before Primer Painting):</u></p> <table border="1" data-bbox="331 1079 1473 1904"> <thead> <tr> <th>Sl. no.</th> <th>Operation</th> <th>Acceptance criteria</th> </tr> </thead> <tbody> <tr> <td>i.</td> <td>Dressing & grinding of all flame-cut edges, welds & any major imperfections.</td> <td>No sharp edges or protrusions.</td> </tr> <tr> <td>ii.</td> <td>Degreasing by using white sprite to AA56701 & removal of varnish in wet condition.</td> <td>Free from grease & varnish.</td> </tr> <tr> <td>iii.</td> <td>Removal of light rust by hydrochloric acid/sulphuric acid to BP0690086 and removal of heavier localized rust by using emery cloth, steel scratch brush or portable power tool with abrasive tool & then applying hydrochloric acid/sulphuric acid.</td> <td>Surface should exhibits grey colour in place of red rust.</td> </tr> <tr> <td>iv.</td> <td>In case surface is widely rusted to such an extent that pitting with hard rust flakes is exhibited, the surface shall be sand/shot blasted.</td> <td>Surface should exhibits clean & grey colour in place of red rust.</td> </tr> <tr> <td>v.</td> <td>Visual inspection of condition of surface of components before application of primer paint.</td> <td>As per the requirement of clause 5.</td> </tr> <tr> <td>vi.</td> <td>Checking of surface finish of the components.</td> <td>Surface finish shall be as per IS:3073.</td> </tr> </tbody> </table> | | Sl. no. | To be checked | Acceptance criteria | i. | Expiry date of primer & intermediate paint. | Primer & intermediate paint shall be within expiry date. | ii. | Expiry date of finish paint. | Paint shall be within expiry date. | iii. | Verification of supplier's TC as per paint specification. | Painting material shall be used only after verification of TC. | Sl. no. | Operation | Acceptance criteria | i. | Dressing & grinding of all flame-cut edges, welds & any major imperfections. | No sharp edges or protrusions. | ii. | Degreasing by using white sprite to AA56701 & removal of varnish in wet condition. | Free from grease & varnish. | iii. | Removal of light rust by hydrochloric acid/sulphuric acid to BP0690086 and removal of heavier localized rust by using emery cloth, steel scratch brush or portable power tool with abrasive tool & then applying hydrochloric acid/sulphuric acid. | Surface should exhibits grey colour in place of red rust. | iv. | In case surface is widely rusted to such an extent that pitting with hard rust flakes is exhibited, the surface shall be sand/shot blasted. | Surface should exhibits clean & grey colour in place of red rust. | v. | Visual inspection of condition of surface of components before application of primer paint. | As per the requirement of clause 5. | vi. | Checking of surface finish of the components. |
| Sl. no. | To be checked | Acceptance criteria | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| i. | Expiry date of primer & intermediate paint. | Primer & intermediate paint shall be within expiry date. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ii. | Expiry date of finish paint. | Paint shall be within expiry date. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| iii. | Verification of supplier's TC as per paint specification. | Painting material shall be used only after verification of TC. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sl. no. | Operation | Acceptance criteria | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| i. | Dressing & grinding of all flame-cut edges, welds & any major imperfections. | No sharp edges or protrusions. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ii. | Degreasing by using white sprite to AA56701 & removal of varnish in wet condition. | Free from grease & varnish. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| iv. | In case surface is widely rusted to such an extent that pitting with hard rust flakes is exhibited, the surface shall be sand/shot blasted. | Surface should exhibits clean & grey colour in place of red rust. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| v. | Visual inspection of condition of surface of components before application of primer paint. | As per the requirement of clause 5. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| vi. | Checking of surface finish of the components. | Surface finish shall be as per IS:3073. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED It must not be used directly or indirectly in any way detrimental to the interest of the company |  | PRODUCT STANDARD TME DIVISION, BHOPAL | TM 94217 REV.06 | | | | | | | | | | | | | | | | | | |
|---|--|---|----------------------------------|----------|----------------------|---------------------|----|--|---|----------|--|--|---|-----------|---|------------|----|------------|----|------------|----|
| | | | PAGE 08 OF 09 | | | | | | | | | | | | | | | | | | |
| | TME/2021 | | | | | | | | | | | | | | | | | | | | |
| 3) Measurement of Primer & Intermediate Paint Thickness (As per AA0674105): | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Sl. no.</th> <th>Description of Paint</th> <th>Acceptance criteria</th> </tr> </thead> <tbody> <tr> <td>i.</td> <td>Measurement of primer paint thickness after one coat of primer paint as per clause 2.1.1, 2.1.2 & 2.1.3 of AA0674105.</td> <td>60-90 microns</td> </tr> <tr> <td>ii.</td> <td>Measurement of total paint thickness (primer + intermediate) after one coat of intermediate paint as per clause 2.1.1, 2.1.2 & 2.1.3 of AA0674105.</td> <td>120-180 microns</td> </tr> </tbody> </table> | | | | Sl. no. | Description of Paint | Acceptance criteria | i. | Measurement of primer paint thickness after one coat of primer paint as per clause 2.1.1, 2.1.2 & 2.1.3 of AA0674105. | 60-90 microns | ii. | Measurement of total paint thickness (primer + intermediate) after one coat of intermediate paint as per clause 2.1.1, 2.1.2 & 2.1.3 of AA0674105. | 120-180 microns | | | | | | | | | |
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| 4) Inspection for Process Control (After Finish Painting): | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Sl. no.</th> <th>Type of inspection</th> <th>Acceptance criteria</th> </tr> </thead> <tbody> <tr> <td>i.</td> <td>Visual inspection of finished components for various paint film defects such as gloss, uniformity of shade, wrinkle, orange peel effect, blistering etc.</td> <td>Free from paint film defects.</td> </tr> <tr> <td>ii.</td> <td>Measurement of total thickness of paint as per clause 2.1.1, 2.1.2 & 2.1.3 of AA0674105.</td> <td>160-220 microns with high spots of 250 microns</td> </tr> </tbody> </table> | | | | Sl. no. | Type of inspection | Acceptance criteria | i. | Visual inspection of finished components for various paint film defects such as gloss, uniformity of shade, wrinkle, orange peel effect, blistering etc. | Free from paint film defects. | ii. | Measurement of total thickness of paint as per clause 2.1.1, 2.1.2 & 2.1.3 of AA0674105. | 160-220 microns with high spots of 250 microns | | | | | | | | | |
| Sl. no. | Type of inspection | Acceptance criteria | | | | | | | | | | | | | | | | | | | |
| i. | Visual inspection of finished components for various paint film defects such as gloss, uniformity of shade, wrinkle, orange peel effect, blistering etc. | Free from paint film defects. | | | | | | | | | | | | | | | | | | | |
| ii. | Measurement of total thickness of paint as per clause 2.1.1, 2.1.2 & 2.1.3 of AA0674105. | 160-220 microns with high spots of 250 microns | | | | | | | | | | | | | | | | | | | |
| 5) Adhesion by Tape Test (As per AA0674105): | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Sl. no.</th> <th>Description of Test</th> <th>Acceptance criteria</th> </tr> </thead> <tbody> <tr> <td>i.</td> <td>Test is carried out by the application of a cross-cut test in accordance with BHEL Standard AA0674105.</td> <td>Detachment of small flakes of the coating at the intersections of the cuts. A cross cut area not significantly greater than 5% is affected.</td> </tr> </tbody> </table> | | | | Sl. no. | Description of Test | Acceptance criteria | i. | Test is carried out by the application of a cross-cut test in accordance with BHEL Standard AA0674105. | Detachment of small flakes of the coating at the intersections of the cuts. A cross cut area not significantly greater than 5% is affected. | | | | | | | | | | | | |
| Sl. no. | Description of Test | Acceptance criteria | | | | | | | | | | | | | | | | | | | |
| i. | Test is carried out by the application of a cross-cut test in accordance with BHEL Standard AA0674105. | Detachment of small flakes of the coating at the intersections of the cuts. A cross cut area not significantly greater than 5% is affected. | | | | | | | | | | | | | | | | | | | |
| <p>Note: The sample size for quality checking of painting of traction machines should be as per IS: 2500 Part-2, Level 4 and AQL 1% as mentioned below:-</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Lot size</th> <th>Sample size</th> </tr> </thead> <tbody> <tr><td>2 to 8</td><td>3</td></tr> <tr><td>9 to 15</td><td>3</td></tr> <tr><td>16 to 25</td><td>4</td></tr> <tr><td>26 to 50</td><td>5</td></tr> <tr><td>51 to 100</td><td>7</td></tr> <tr><td>101 to 150</td><td>10</td></tr> <tr><td>151 to 300</td><td>15</td></tr> <tr><td>301 to 500</td><td>20</td></tr> </tbody> </table> <p>Imp.: When sample size equals or exceeds lot size, every item in the lot shall be inspected.</p> | | | | Lot size | Sample size | 2 to 8 | 3 | 9 to 15 | 3 | 16 to 25 | 4 | 26 to 50 | 5 | 51 to 100 | 7 | 101 to 150 | 10 | 151 to 300 | 15 | 301 to 500 | 20 |
| Lot size | Sample size | | | | | | | | | | | | | | | | | | | | |
| 2 to 8 | 3 | | | | | | | | | | | | | | | | | | | | |
| 9 to 15 | 3 | | | | | | | | | | | | | | | | | | | | |
| 16 to 25 | 4 | | | | | | | | | | | | | | | | | | | | |
| 26 to 50 | 5 | | | | | | | | | | | | | | | | | | | | |
| 51 to 100 | 7 | | | | | | | | | | | | | | | | | | | | |
| 101 to 150 | 10 | | | | | | | | | | | | | | | | | | | | |
| 151 to 300 | 15 | | | | | | | | | | | | | | | | | | | | |
| 301 to 500 | 20 | | | | | | | | | | | | | | | | | | | | |

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|  TME/2021 | PRODUCT STANDARD TME DIVISION, BHOPAL | TM 94217 REV.06 | |
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| | <u>Annexure-II</u> | | |
| COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED It must not be used directly or indirectly in any way detrimental to the interest of the company | <u>Checklist for Painting of Traction Machines</u> | | |
| | Machine type: _____ Machine/Component no.: _____ | | |
| | Date of Painting: _____ | | |
| | Sl. No. | Check points as per the requirement of annexure-I | Checking Remark (100%TP & 20%QC) |
| | 1. | Checking of Painting Material: i. Expiry date of primer & intermediate paint ii. Expiry date of finish paint iii. Verification of supplier's TC as per paint specification | (ok/not ok) (ok/not ok) (ok/not ok) |
| | 2. | Surface Preparation (Before Primer Painting): i. Visual inspection for absence of sharp edges or protrusions ii. Visual inspection for absence of grease & varnish iii. Visual inspection for absence of light rust iv. Visual inspection for absence of widely spread rust v. Visual inspection for condition of surface as per the requirement of clause 5 vi. Surface finish of the component | (ok/not ok) (ok/not ok) (ok/not ok) (ok/not ok) (ok/not ok)microns (ok/not ok) |
| | 3. | Measurement of Primer & Intermediate Paint Thickness: i. Paint thickness after one coat of primer paint ii. Total paint thickness (primer + intermediate) after one coat of intermediate paint |microns (ok/not ok)microns (ok/not ok) |
| | 4. | Inspection for Process Control (After Finish Painting): i. Visual inspection of finished component for absence of paint film defects ii. Total thickness of paint | (ok/not ok)microns (ok/not ok) |
| | 5. | Adhesion by Tape Test (As per AA0674105): i. Adhesion by tape test | (ok/not ok) |
| | <u>Abbreviations:-</u> TP – Task Performer, QC – QTM/BHEL Authorized Quality Inspection Agency <u>Note:</u> 1) For the components supplied by the supplier in finish painted condition, the supplier to furnish dully filled checklist for each component along with consignment. 2) The acceptance criteria shall be as per annexure-I. | | |
| (Task performer's signature) | | (QC's signature) | |



CORPORATE PURCHASE SPECIFICATION

AA 195 11

Rev. No. 09

PREFACE SHEET

CARBON STEEL CASTINGS - FUSION WELDING QUALITY

FOR INTERNAL USE ONLY
REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS

Comparable Standards:

1. AMERICAN : ASTM A 216 - 1993
Gr: WCC

Suggested/Probable Suppliers and Grades:

Use plant's vendor list.

User Plant References:

1. BHOPAL : PS 10 202
2. HEEP, HARDWAR : 0550.41, GR: 15Ω; 20Ω; 25Ω & 30Ω
CSW - C 20 \$ CSW - C 25.
3. HYDERABAD : ASTM A 216, Gr: WCA
: CSN 422641.1
: CSN 422643.1
: CSN 422650.2
: IS : 2986
: γ 87 - 30, Type L
4. TRICHY : ASTM A 216, Gr: WCB
: ASTM A 216, Gr: WCC

Revisions :

36th MOM of MRC – FCF+HTM

APPROVED :

INTERPLANT MATERIAL RATIONALISATION
COMMITTEE-MRC (FCF+HTM)

Rev. No. 09

Amd.No.

Reaffirmed

Prepared

Issued

Dt. of 1st Issue

Dt: 01.10.2005


Dt :

Year:04-11-2011


HYDERABAD

Corp. R&D

MARCH, 1978

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|  | CORPORATE PURCHASING SPECIFICATION | | AA 195 11 | | |
| | | | Rev. No. 09 | | |
| | | | PAGE 1 OF 6 | | |
| CARBON STEEL CASTINGS-FUSION WELDING QUALITY | | | | | |
| 1.0 GENERAL | | | | | |
| <p>This specification governs the quality requirements of Carbon Steel Castings-Fusion Welding Quality.</p> | | | | | |
| 2.0 APPLICATION | | | | | |
| <p>For pressure containing parts for high temperature service and of quality suitable for assembly with other castings or wrought steel parts by fusion welding.</p> | | | | | |
| 3.0 CONDITION OF DELIVERY | | | | | |
| <p>Normalised / Normalised & tempered</p> | | | | | |
| <p>Rough machining of the castings shall be carried out, unless otherwise specified in BHEL order/drawing.</p> | | | | | |
| <p>Castings shall not be painted</p> | | | | | |
| 4.0 COMPLIANCE WITH NATIONAL STANDARDS | | | | | |
| <p>There is no Indian standard covering this material. However, assistance has been derived from ASTM A 216-1993, Gr: WCC, in preparing this specification.</p> | | | | | |
| 5.0 DIMENSIONS AND TOLERANCES | | | | | |
| <p>The castings shall be true to the pattern/drawing.</p> | | | | | |
| <p>Holes for machining up to and including 50 mm in diameter are to be cast solid, unless otherwise stated in BHEL order/drawing.</p> | | | | | |
| <p>Unless otherwise specified in BHEL order/drawing, untoleranced dimensions for the castings shall be as per tolerance class 4 of BHEL standard AA 023 04 02.</p> | | | | | |
| Revisions : 36th MOM of MRC-FCF+HTM | | | APPROVED : INTERPLANT MATERIAL RATIONALISATION COMMITTEE-MRC (FCF+HTM) | | |
| Rev. No. 09 | Amd.No. | Reaffirmed | Prepared | Issued | Dt. of 1st Issue |
| Dt: 01.10.2005 | Dt : | Year:04-11-2011 | HYDERABAD | Corp. R&D | MARCH, 1978 |

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| AA 195 11 | CORPORATE PURCHASING SPECIFICATION |  |
| Rev. No. 09 | | |
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6.0 MANUFACTURE

The steel for the castings shall be made by basic electric furnace process or such other process as may be agreed to between BHEL and the manufacturer.

The steel shall be fully killed.

7.0 HEAT TREATMENT

Heat treatment shall be carried out at suitable temperatures to give the properties specified.

Any flame or arc cutting which may have to be done, shall be carried out before heat treatment.

Test pieces shall also be heat treated along with the castings they represent.

8.0 FINISH

All castings shall be properly fettled and dressed and all surfaces shall be thoroughly cleaned.

Machined surfaces shall have the surface finish as indicated in the drawing

9.0 FREEDOM FROM DEFECTS


Castings shall be free from defects such as porosity , blow holes, sand inclusion, shrinkage, cavities, hard spots, cold shuts, cracks, etc., which may adversely affect machining and utility of castings.

When it is necessary to remove risers by flame cutting, care shall be taken to make the cut at a sufficient distance from the body of the casting so as to prevent any defect being introduced into the casting due to local heating.

10.0 CHEMICAL COMPOSITION

The melt analysis of steel and the permissible variation in the composition of the castings from the melt analysis shall be as specified below:

| Element | Melt analysis, Percent, max | Permissible Variation, percent |
|------------|--------------------------------|-----------------------------------|
| *Carbon | 0.25 | 0.02 |
| Silicon | 0.60 | 0.05 |
| *Manganese | 1.20 | 0.06 |
| Sulphur | 0.045 | 0.008 |
| Phosphorus | 0.040 | 0.008 |

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Note: 1. In the interest of uniform welding, the concentration of the unspecified alloying elements shall not exceed the limits specified below. Whenever specified in the enquiry/order, the test results of these elements shall also be included in the test certificate. However, the manufacture shall ensure that these elements are within the limits specified.

| Element | Percent, Max. |
|------------|---------------|
| Copper | 0.30 |
| Nickel | 0.50 |
| Chromium | 0.50 |
| Molybdenum | 0.20 |
| Vanadium | 0.03 |

1. Total content of these unspecified elements 1.00

2. For each reduction of 0.01% below the specified maximum carbon content, an increase of 0.04% Mn above the maximum specified will be permitted up to a maximum of 1.40%.

11.0 TEST SAMPLES


Manufacturers shall carryout mechanical testing as per following sampling plan.

11.1 Unless otherwise specified for castings weighting up to 500 kg. piece weight one keel block, separately cast per melt per heat treatment batch shall be supplied according to the sketch given below:

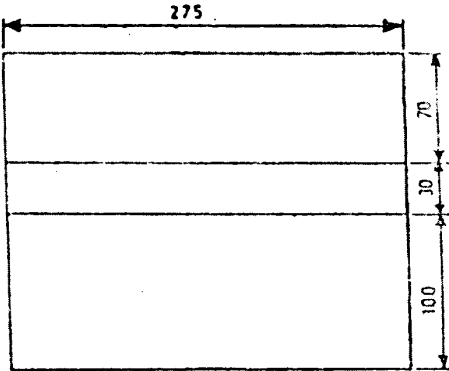
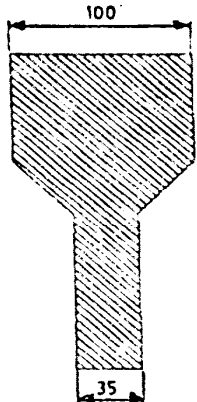
11.2 Unless otherwise specified castings weighing more than 500 kg shall be provided with integrally cast keel block.

11.3 Retests shall be carried out as per IS : 8800

11.4 Keel blocks with proper identification and representative of the castings shall be supplied along with the consignment for testing at BHEL works.

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DETAIL OF KEEL BLOCK

ALL DIMENSIONS IN mm

12.0 MECHANICAL PROPERTIES:

The test pieces, after being heat treated as per clause Cl.7.0 above, shall show the following properties:

12.1 Tensile

The test pieces shall show the following properties when tested in accordance with ASTM A 370

| | | |
|---------------------------------|---|------------------------------|
| Tensile strength | : | 485 - 655 N/mm ² |
| Yield strength | : | 275 N/mm ² , min. |
| Elongation on 50mm gauge length | : | 22 percent, min. |
| Reduction in area | : | 35 percent, min. |

12.2 Hardness (Brinell): for information only:

150 - 205 HB.

13.0 NON-DESTRUCTIVE TESTS:

The following tests shall be conducted:

- 1) Ultrasonic examination to BHEL standard AA 085 01 04 / AA 085 01 05
- 2) Liquid penetrate examination to BHEL standard AA 085 0131.
- 3) Magnetic particle examination to BHEL standard AA 085 01 33 and norms of acceptance as per BHEL standard AA 085 01 34.

Norms of acceptance shall be as specified in BHEL order/drawing



CORPORATE PURCHASING SPECIFICATION

AA 195 11

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14.0 REPAIR OF CASTINGS

The manufacturer without the prior permission of BHEL shall not carry out repair of castings.

15.0 SCOPE OF THIRD PARTY INSPECTION:

Wherever, separate quality plan is not attached, the scope of third party inspection shall be as follows:

1. Review of supplier's declared chemical composition.
2. Selection of test samples for mechanical tests and witness of mechanical tests.
3. Witness of Non-destructive tests as applicable.
4. Review of HT charts.
5. Dimensional inspection.

16.0 TEST CERTIFICATES

Three copies of test certificates shall be supplied unless otherwise stated in BHEL order, preferably in the test certificate format annexed to this specification (Annexure -1).

In addition, the supplier shall ensure to enclose one copy of the test certificate along with their dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

- i) Dimensional inspection.
- ii) Detail of heat treatment
- iii) Chemical composition & unspecified alloying elements whenever called for
- iv) Results of mechanical tests
- v) Results of NDT tests.

17.0 PACKING AND MARKING

Castings shall be suitably packed to prevent corrosion and damage during transit. Machined surfaces shall be properly protected with anticorrosive compounds. Each package or casting (when supplied separately) shall be legibly marked with the following information.

AA 195 11: C.S. Castings - F.W. Quality
 BHEL Order No.
 Consignment/Identification No.
 Melt No.
 Weight
 Supplier's Name

18.0 REFERRED STANDARDS (Latest Publications Including Amendments):

- | | | | |
|-----------------|-----------------|-----------------|-----------------|
| 1. AA 023 04 02 | 2. AA 085 01 04 | 3. AA 085 01 05 | 4. AA 085 01 31 |
| 5. AA 085 01 34 | 6. ASTM A 216 | 7. ASTM A 370 | 8. IS : 8800 |

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ANNEXURE 1 - RECOMMENDED TEST CERTIFICATE FORMAT FOR CASTINGS

| SUPPLIERS'S NAME AND ADDRESS | | | | | | | | | | | | |
|---|---------------------------|---|-------------------------|---------------|-------------------------------|-------------------------|------|----------------|-------------------|--|--|--|
| 1. Customer : | | | | | | 6. Cast No. & Date : | | | | | | |
| 2. TC No. & Date : | | | | | | 7. Batch No. : | | | | | | |
| 3. PO No. : | | | | | | 8. Heat Code : | | | | | | |
| 4. Process of Melting : | | | | | | 9. Spec.. No. : | | | | | | |
| 5. Deoxidisation Process | | | | | | 10. Test Bar Size | | | | | | |
| II. CASTING COVERED BY T.C. | | | | | | | | | | | | |
| Sl. No. | Drawing No. & Item No. | | | | | Description | | | Quantity & Weight | | | |
| | | | | | | | | | | | | |
| 12. CHEMICAL COMPOSITION (PERCENT) | | | | | | | | | | | | |
| Element | C | Si | Mn | S | P | | | | | | | |
| As per Min. | | | | | | | | | | | | |
| Spec. Max. | | | | | | | | | | | | |
| Actual Values. | | | | | | | | | | | | |
| 13. HEAT TREATMENT (To be accompanied by Recorder Chart, wherever called for) | | | | | | | | | | | | |
| Condition | Temp. °C | | | | Soaking Time. Hrs.. | | | Cooling Medium | | | | |
| | | | | | | | | | | | | |
| 14. MECHANICAL PROPERTIES | | | | | | | | | | | | |
| | T.S. N/mm ² | Y.S. 0.5/0.2% Proof N/mm ² | % E on GL 5.65 SO | % R.A. Min | Hardness BHN Min. 3 Values | Impact Value, Joules | Bend | | | | | |
| As per Min. | | | | | | | | | | | | |
| Spec. Max. | | | | | | | | | | | | |
| Actual Values. | | | | | | | | | | | | |
| 15. Surface Finish (When called for in the order/drg) | | | | | | | | | | | | |
| 16. DIMENSIONAL INSPECTION | | | | | | | | | | | | |
| 17. NON-DESTRUCTIVE TESTS | | | | | | | | | | | | |
| Nature of Test | Acceptance Level | Instrument used | Range | Results | Any other details | | | | | | | |
| Ultrasonic | | | | | | | | | | | | |
| Radiographic | | | | | | | | | | | | |
| Dye Penetrant/ Magnetic Particle | | | | | | | | | | | | |
| 18. OTHER TESTS, IF ANY (MICRO- Scopic, Hydraulic, Etc.) | | | | | | | | | | | | |
| 19. IDENTIFICATION ON CASTING AS PER CPS. | | | | | | | | | | | | |
| <p style="text-align: center;">We hereby certify that the items mentioned above have been tested and inspected in our presence and are found to be in accordance with the drawings, specifications and purchase order.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Signature & Seal of the Inspecting Officer (Purchase Representative)</p> <p>Date :</p> </div> <div style="width: 45%;"> <p>Signature and Seal of the Chief of Quality Control Chief Metallurgist of the Supplier.</p> <p>Date :</p> </div> </div> <p>INSTRUCTION:</p> <p>a) If steel is produced by LD or Oxygen process, Nitrogen content should be furnished and shall not exceed 0.009%</p> <p>b) Test Certificates are to be furnished as per Purchase Order and Specifications, in A4 Size transparent paper.</p> <p>c) All the entries including signature should be in black ink.</p> <p>d) If testing is done by outside agencies, the original TCs shall be furnished.</p> <p>e) The actual Test Certificate may run into more than one A4 size paper, if needed, to facilitate filling up of details.</p> | | | | | | | | | | | | |



TME 2019

PRODUCT STANDARD

TME DIVISION, BHOPAL

TM 12548

Rev. No. 01

PAGE 01 OF 04

Specification for Identification Marking of Traction Machines Components

1.0 Scope: This specification governs the requirements for identification marking of all components of traction machines (except electrical items, hardwares & bearings) either manufactured in-house or outsourced in raw material, semi-finished or fully finished condition.

2.0 Identification marking of components: The component manufacturer shall provide the identification marking depending upon the type of component (raw material/semi-finished castings, raw material/semi-finished forgings & fabricated components, fully finished components or sheet metal components) manufactured by it as per guidelines given below:-

A) CASTED COMPONENTS:

| Sl. No. | Condition of supply | Identification marking requirement |
|---------|----------------------------------|---|
| 1. | Castings/ semi-finished castings | <p>a) Method of marking in castings: Each casting shall be embossed & punched on un-machined surface/ etched on machined surface legibly and indelibly with following details:-</p> <p>i) Supplier's name initial , Heat no. ← To be embossed. (Example: SAIL/341)</p> <p>ii) xxxxx , MM-YY ← To be embossed/punched on cast surface or etched on machined surface.</p> <p style="margin-left: 40px;">└── 4 digits of date of manufacturing in MM-YY format</p> <p style="margin-left: 40px;">└── Manufacturer's unique job serial no.</p> <p>(Example: 00345/0319)</p> <p>b) Method of marking in semi-finished castings: Each casting shall be embossed & punched on un-machined surface/ etched on machined surface legibly and indelibly with following details:-</p> <p>i) Supplier's name initial , Heat no. ← To be embossed. (Example: SAIL/341)</p> <p>ii) xxxxx , MM-YY ← To be embossed/punched on cast surface or etched on machined surface.</p> <p style="margin-left: 40px;">└── 4 digits of date of manufacturing in MM-YY format</p> <p style="margin-left: 40px;">└── Manufacturer's unique job serial no.</p> <p>(Example: 00345/0319)</p> <p>c) Size & location: For size and location of identification marks, supplier to take prior approval from BHEL unless otherwise specified in the drawing.</p> |

Rev. No. 01

Distribution

Prepared

Checked

Approved


Date: 16/03/2019


TME - 2 MNX - 1
TXM - 1 TAM - 1
QTM - 1


J. Kumar
(J. Kumar)


R. Chaudhry
(R. Chaudhry)

M. Verma
(M. Verma)


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| | | | | <p>Rev. No. 01</p> |
| | | | | <p>PAGE 02 OF 04</p> |
| <p>2.</p> | <p>Machined castings on labour basis</p> | <p>a) Method of marking after finish machining:</p> <p>i) When embossed marking is not removed: In case the embossed marking is not removed during finish machining of the component, the component shall be punched with following details below the already existing embossed marking:-</p> <p>Supplier's name intial , xxxxx , MM-YY</p> <div style="margin-left: 150px;"> <p>4 digits of date of manufacturing in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/341) ← Already embossed.</p> <p>ABCD/00345/0319 ← To be punched.</p> | | |
| | | <p>ii) When embossed marking is removed: In case the component is machined all over & the embossed marking is removed, the same shall be re-punched on fully finished component. Date of finish machining in MM-YY format & manufacturer's details shall be punched below the above punched marking as per details given below:-</p> <p>Supplier's name intial , xxxxx , MM-YY</p> <div style="margin-left: 150px;"> <p>4 digits of date of manufacturing in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/341) ← To be punched.</p> <p>ABCD/00345/0319 ← To be punched.</p> <p>b) Size & location: For size and location of identification marks, supplier to take prior approval from BHEL unless otherwise specified in the drawing.</p> | | |
| <p>3.</p> | <p>Fully finished casted components</p> | <p>a) Method of marking in finished components:</p> <p>i) When embossed marking is not removed during machining: Each component shall be embossed & punched on un-machined surface/ etched on machined surface legibly and indelibly with following details:-</p> <p>Supplier's name initial , Heat no. ← To be embossed/already embossed.</p> <p>(Example: SAIL/341)</p> <p>xxxxx , MM-YY ← To be embossed/punched.</p> <div style="margin-left: 150px;"> <p>4 digits of date of manufacturing in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: 00345/0319)</p> | | |

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| | <p>ii) When embossed marking is removed during machining: In case the component is machined all over & the embossed marking is removed, the same shall be re-punched on fully finished component. Date of finish machining in MM-YY format & manufacturer's details shall be punched below the above punched marking as per details given below:-</p> <p>Supplier's name intial , xxxxx , MM-YY</p> <div style="margin-left: 400px;"> <p>4 digits of date of manufacturing in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/341) ← To be punched.</p> <p>ABCD/00345/0319 ← To be punched.</p> <p>b) Size & location: For size and location of identification marks, supplier to take prior approval from BHEL unless otherwise specified in the drawing.</p> | | | | | | | |
| | <p>B) FORGING / FABRICATED COMPONENTS:</p> <table border="1"> <tr> <td>1.</td> <td>Raw material/ semi-finished forgings and fabricated components</td> <td> <p>a) Method of marking in forgings & fabrications: Each component shall be punched legibly and indelibly with following details:-</p> <p>Supplier's name initial , xxxxx , MM-YY , xxx</p> <div style="margin-left: 400px;"> <p>Heat no.</p> <p>4 digits of date of manufacturing (forging/fabrication) in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/00345/0319/341)</p> <p>b) Size & location: For size and location of identification marks, supplier to take prior approval from BHEL unless otherwise specified in the drawing.</p> </td> </tr> <tr> <td>2.</td> <td>Machined forgings/ fabrications on labour basis</td> <td> <p>a) Method of marking after finish machining:</p> <p>i) When punched marking is not removed: In case the punched marking is not removed during finish machining of the component, the component shall be punched with following details below the already existing punched marking:-</p> <p>Supplier's name intial , xxxxx , MM-YY</p> <div style="margin-left: 400px;"> <p>4 digits of date of manufacturing in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/00345/0319/341) ← Already punched.</p> <p>ABCD/00345/0319 ← To be punched.</p> </td> </tr> </table> | | | 1. | Raw material/ semi-finished forgings and fabricated components | <p>a) Method of marking in forgings & fabrications: Each component shall be punched legibly and indelibly with following details:-</p> <p>Supplier's name initial , xxxxx , MM-YY , xxx</p> <div style="margin-left: 400px;"> <p>Heat no.</p> <p>4 digits of date of manufacturing (forging/fabrication) in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/00345/0319/341)</p> <p>b) Size & location: For size and location of identification marks, supplier to take prior approval from BHEL unless otherwise specified in the drawing.</p> | 2. | Machined forgings/ fabrications on labour basis |
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| | <p>ii) When punched marking is removed: In case the component is machined all over & the punched marking is removed, the same shall be re-punched on fully finished component. Date of finish machining in MM-YY format & manufacturer's details shall be punched below the above punched marking as per details given below:-</p> <p>Supplier's name initial , xxxxx , MM-YY</p> <div style="margin-left: 400px;"> <p>4 digits of date of manufacturing in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/00345/0319/341) ← To be punched.</p> <p>ABCD/00345/0319 ← To be punched.</p> <p>b) Size & location: For size and location of identification marks, supplier to take prior approval from BHEL unless otherwise specified in the drawing.</p> | | |
| | <p>3. Fully finished forged/fabricated components</p> | <p>a) Method of marking in finished components: Each component shall be punched on un-machined surface/ etched on machined surface legibly and indelibly with following details:-</p> <p>Supplier's name initial / xxxxx / MM-YY / xxx</p> <div style="margin-left: 400px;"> <p>Heat no.</p> <p>4 digits of date of manufacturing in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/00345/0319/341)</p> <p>b) Size & location: For size and location of identification marks, supplier to take prior approval from BHEL unless otherwise specified in the drawing.</p> | |
| <p>C) SHEET METAL COMPONENTS:</p> | | | |
| <p>1. Sheet metal components</p> | <p>a) Method of marking: Each component shall be etched or punched as the case may be legibly with following details:-</p> <p>Supplier's name initial , xxxxx , MM-YY</p> <div style="margin-left: 400px;"> <p>4 digits of date of manufacturing in MM-YY format</p> <p>Manufacturer's unique job serial no.</p> </div> <p>(Example: SAIL/00345/0319)</p> <p>b) Size & location: For etching/painting and size & location of identification marks, supplier to take prior approval from BHEL unless otherwise specified in the drawing.</p> | | |

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|  | CORPORATE PURCHASING SPECIFICATION | | | AA56113 | | | | | | | | | |
| | | | | Rev No.02 | | | | | | | | | |
| | | | | PREFACE SHEET | | | | | | | | | |
| <h2 style="margin: 0;">INORGANIC ETHYL ZINC SILICATE PRIMER</h2> <div style="text-align: center; margin: 20px 0;"> <p>FOR INTERNAL USE ONLY</p> <p>REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS</p> </div> <div style="text-align: center; margin: 20px 0;"> <p>Equivalent/Comparable Standards</p> <p>INDIAN : IS: 14946-2001, Main coat</p> </div> <div style="text-align: center; margin: 20px 0;"> <p>User Plants and Replaced Plant Specifications/References</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">1) HEP, BHOPAL</td> <td style="width: 30%;">: ---</td> </tr> <tr> <td>2) HEEP, HARIDWAR</td> <td>: HW56175</td> </tr> <tr> <td>3) HPEP, HYDERABAD</td> <td>: ---</td> </tr> <tr> <td>4) HPBP, Trichy</td> <td>: ---</td> </tr> </table> </div> | | | | | | 1) HEP, BHOPAL | : --- | 2) HEEP, HARIDWAR | : HW56175 | 3) HPEP, HYDERABAD | : --- | 4) HPBP, Trichy | : --- |
| 1) HEP, BHOPAL | : --- | | | | | | | | | | | | |
| 2) HEEP, HARIDWAR | : HW56175 | | | | | | | | | | | | |
| 3) HPEP, HYDERABAD | : --- | | | | | | | | | | | | |
| 4) HPBP, Trichy | : --- | | | | | | | | | | | | |
| Revisions: | | | APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC(CPO+NM) | | | | | | | | | | |
| Rev No.02 | Amd No. | Reaffirmed | Prepared | Issued | Dt. of 1 st Issue | | | | | | | | |
| Dt:26-05-2012 | Dt: | Year:2019 | 25 HPEP, Hyderabad | Corp.R&D | 01-06-2001 | | | | | | | | |

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INORGANIC ETHYL ZINC SILICATE PRIMER

1 GENERAL

This specification prescribes the quality requirements and application procedure for two components, air-drying, Inorganic Zinc Ethyl Silicate priming paint. This priming paint when applied on steel structures provides excellent resistance to temperature, soil chemicals, salts, water, and chemical resistance under marine conditions and outside weather ability.

2 APPLICATION

The material shall be intended for use as a primer coat in the painting system on new steel structures internally and externally. Normally, for best performance, the surface to be coated shall be ensured free from oil, loose rust/dust etc., followed by blast cleaning to Sa 2 ½ min. with a surface profile of 35 to 50 microns. This shall be followed by application of single coat of the priming paint by spray method so as to achieve dry film thickness t of 65-75 microns. The surface profile after blasting shall be 20-35 microns.

3 COMPLIANCE WITH NATIONAL STANDARDS

The material shall comply with the requirements of following Indian standard and also, meet other requirements of this specification:

IS: 14946-2001, Main coat: Zinc Ethyl Silicate Primer, Two Components

4 COLOUR

The colour of the material shall be Grey.

5 FINISH

Smooth and Matt.

6 COMPOSITION

The material shall be two components moisture and self-cured Inorganic Ethyl Silicate Binder pigmented with zinc metal powder conforming to IS: 14355 and having a purity of 99% and particle size of 4-5 microns, in the recommended proportion. The coating of this material attains water resistance within 30 minutes of application and remains unaffected by rains, condensation or dew etc. The manufacturer shall specify the principal type of binder used.

The supplier of the material shall declare that components of paint supplied shall meet the legislative requirements ISO 14001.


7 MIXING RATIO

The components of paints are to be mixed in the proportion as recommended by supplier of the material.

8 TEST METHODS

Unless specified otherwise, tests shall be conducted as prescribed in relevant parts and section of Indian standard IS: 101 and IS: 14946. The test panels shall preferably be prepared on blast cleaned surface.

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9 PROPERTIES

The material shall meet the following technical requirements:

9.1 DRYING TIME

- Surface dry : 15 minutes, max.
- Hard dry : 2 hrs. min.
- Time to topcoat : 24 hrs. min.

9.2 CONSISTENCY

The liquid component mixed with powder shall be suitable for application by spray as such or when thinned in the proportions at specified by the manufacturer.

9.3 FLASH POINT

Not below 15°C

9.4 MASS PER TEN LITRES

20 kgs., min.

9.5 VOLUME SOLIDS

60% , min.

9.6 POT LIFE OF MIX (ANNEXURE D OF IS: 14946)

4 hrs. min. at 30°C

9.7 DRY FILM THICKNESS

65-75 microns per coat when measured after 72 hrs. of curing.

9.8 RESISTANCE TO SALT SPRAY TEST (TYPE TEST)

The material shall pass resistance to salt spray test, when test panels cured for 72 hrs. are subjected to continuous exposure for 2000 hrs.

9.9 PROTECTION AGAINST CORROSION UNDER CONDITIONS OF CONDENSATION (TYPE TEST)

The material shall pass the test, when test panels cured for 72 hrs. are subjected to exposure at specified conditions for 2000 hrs.

9.10 HEAT RESISTANCE TEST

The film shall not show signs of cracking, blistering or flaking when coated test panels air-dried for 48 hrs., are kept at 400±10°C for 6 hrs followed by plunging in cold water-three cycles, min.

9.11 COMPOSITION

9.11.1 SOLID CONTENT

68%, min. by weight of mixed paint.

9.11.2 TOTAL METALLIC ZINC CONTENT (ANNEXURE B OF IS: 14946)


75%, min. by weight in non-volatile portion of the paint.

9.12 MUD-CRACKING TEST

The coating applied to dry film thickness of 120 microns minimum, shall not show any mud cracking when viewed under 10 X magnification.

9.13 SEDIMENTATION TEST

There shall not be any segregation of zinc powder from the base material within 2 hrs in the

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mixed paint.

9.14 CURE TEST

The coated test panels air dried for 48 hrs shall pass the cure test when tested according to test procedure given in ASTM D 4752.

10 KEEPING PROPERTY

When stored in covered dry place in the original sealed containers under normal ambient conditions, the liquid portion shall not show thickening, curdling, gelling or hard caking and also retain the properties of mixed paint prescribed in this specification for a period of six months from date of delivery.

11 TEST CERTIFICATES

Unless otherwise stated, three copies of test certificates and product data sheet shall be supplied along with each consignment giving following information:

In addition, the supplier shall ensure to send one copy of test certificate along with the dispatch documents to facilitate quick clearance of the materials.

- AA56113, Rev. 02: INORGANIC ETHYL ZINC SILICATE PRIMER
- BHEL Order No. & Date
- Batch / Lot No.
- Supplier's/ Manufacturer's Name and Trade mark, if any
- Quality supplied
- Date of manufacture and expiry
- Test values as per clause 9
- Mixing ratio
- Technical information, if any:

12 PACKING AND MARKING


Unless otherwise stated, the components of paint shall be supplied separately in moisture and leak proof containers in packing size as specified in the BHEL order.

Each container of the consignment shall bear the following information printed or pasted at suitable place so as to protect it from damage during transportation and handling:

- AA56113: INORGANIC ETHYL ZINC SILICATE PRIMER
- BHEL Order No. & Date
- Batch / Lot No.
- Supplier's/ Manufacturer's Name and Trade mark, if any
- Name of contents:
- Mixing ratio:
- Quantity in container
- Date of manufacture and expiry
- Technical information, If any:

13 ENVIRONMENTAL REQUIREMENTS

The supplier shall furnish Material Safety Data Sheet (MSDS) covering all information relating to human safety and environmental impacts of the hazardous materials particularly during their transportation, storage, handling and disposal along with each supply.

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Each container shall be marked with corresponding symbol and minimum worded cautionary notice for flammable / corrosive / toxic / harmful / irritant and oxidizing etc. as applicable.

14 PRECAUTIONS

- Use off the mixed paints within stipulated pot life i.e., 4 hrs after mixing and should be continuously agitated during application.
- Inorganic Zinc silicate primer should not be applied at relative humidity below 50% and the surface should remain free from condensation at the time of application.
- After completion of the work, the application equipment must be cleaned thoroughly immediately with thinner and kept safely for next use.
- The surface to be painted must be blast cleaned to Sa 2 ½, min. and the painting shall be done by spray method uniformly. However, brush may be used for touch up of local areas only.

15 REFERRED STANDARDS (Latest Publications Including Amendments)

- IS: 101
- IS: 14355
- AA0674101
- ASTM D4752