

	 <p><b>PRODUCT STANDARD</b> <b>TME DIVISION, BHOPAL</b></p>	<b>TM 11491 Rev.06</b>	
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**TECHNICAL SPECIFICATION OF END FRAME (DE), END FRAME (NDE), ROTOR END RING (MODIFIED) SET OF LABYRINTHS AND SPEED PROBE HOUSING MADE FROM SPHEROIDAL GRAPHITE CAST IRON (SGCI) FOR USE ON THREE PHASE TRACTION MOTORS TYPE 6FRA6068 & 6FXA7059.**

**1.0 Scope :**

1.1 This specification covers the technical requirements, manufacture, inspection and packing of End Frame (DE), End Frame (NDE) , Rotor End Ring (modified), Set of Labyrinths and Speed Probe housing made from Spheroidal Graphite Cast Iron (SGCI) for use on three phase traction motors type 6FRA-6068 & 6FXA-7059.

**2.0 Material specification and drawings of components :**


2.1 The castings shall conform to Gr.400/18 of IS:1865 (Latest version) in regards to Chemical composition, physical properties and other relevant aspects.


The details of castings / items covered in this specification are given below :


Sl. no.	Description	BHEL drawing number	CLW/ RDSO drawing number
<b>COMPONENTS FOR 6FRA - 6068</b>			
1	End Frame /DE	04454364051	1TWD.096.005
2	End Frame /NDE	04454464051	0TWD.096.003
3	Rotor End Ring	24454564053	SKEL 4732
4	Speed Probe Housing	14450164053	1TWD.096.077
5	Outer Bearing Cap /DE	14454364051	1TWD.096.006
6	Clamp Plate /NDE	24454464051	2TWD.096.033
7	Bearing Cap / NDE	34454464051	3TWD.096.032
8	Inner Labyrinth /DE	44454364052	4TWD.096.043
9	Inner Labyrinth /NDE	44454464052	4TWD.096.031
10	Inner Labyrinth /NDE	44454464051	4TWD.096.042
11	Inner Labyrinth /DE	44454364053	4TWD.096.028
12	Outer Labyrinth /DE	44454364051	4TWD.096.029

Revision : 06  Date: 18.07.2022	Distribution	Qty.	Approved :  Manish Verma Sr. DGM/ TME		
			Prepared  Abhishek Shukla Sr. Engr./ TME	Checked:  Abhijit Jain Dy. Mgr./ TME	Date:  04.05.2011

 <p>PRODUCT STANDARD TME DIVISION, BHOPAL</p> <p>TME/2012</p>	<p>TM 11491 Rev.06</p> <p>PAGE 02 OF 06</p>	<p><b>COPYRIGHT AND CONFIDENTIAL</b></p> <p>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>	<table border="1"> <thead> <tr> <th>Sl. no.</th> <th>Description</th> <th>BHEL drawing number</th> <th>CLW/ RDSO drawing number</th> </tr> </thead> <tbody> <tr> <td colspan="4"><b>COMPONENTS FOR 6FXA - 7059</b></td> </tr> <tr> <td>1</td> <td>End Frame / DE</td> <td>04454366051</td> <td>1TWD.097.011</td> </tr> <tr> <td>2</td> <td>End Frame /NDE</td> <td>04454466051</td> <td>0TWD.097.012</td> </tr> <tr> <td>3</td> <td>Clamp Plate /NDE</td> <td>24454466051</td> <td>2TWD.097.040</td> </tr> <tr> <td>4</td> <td>Bearing Cap / NDE</td> <td>34454466051</td> <td>3TWD.097.039</td> </tr> <tr> <td>5</td> <td>Bearing Cover / DE</td> <td>34454366051</td> <td>3TWD.097.036</td> </tr> <tr> <td>6</td> <td>Inner Labyrinth /NDE</td> <td>44454466052</td> <td>4TWD.097.034</td> </tr> <tr> <td>7</td> <td>Inner Labyrinth /NDE</td> <td>44454466051</td> <td>3TWD.097.038</td> </tr> <tr> <td>8</td> <td>Inner Labyrinth /DE</td> <td>44454366051</td> <td>4TWD.097.037</td> </tr> <tr> <td>9</td> <td>Inner Labyrinth /DE</td> <td>44454366052</td> <td>4TWD.097.035</td> </tr> <tr> <td>10</td> <td>Rotor end ring (Modified)</td> <td>14454566051</td> <td>2TWD.097.013</td> </tr> </tbody> </table> <p><b>3.0 Manufacturing :</b></p> <p>3.1 Firm should have their own foundry duly approved by RDSO as Class – A foundry for casting raw material or they have to submit adequate documentary evidence regarding sourcing of raw material (casting) from RDSO approved class – A foundry only.</p> <p>3.2 All the components should be machined on CNC machine and the manufacturer should fulfil schedule of Technical requirements as per RDSO's STR No. RDSO/2007/EL/STR/0021 Rev.01 or latest.</p> <p>3.3 The dimension indicated on the relevant drawing are for the finish-machined components. The working drawing of the pattern and the pattern shall be prepared by the manufacturer/ tenderer himself. Responsibilities for pattern design shall be with the manufacturer / supplier completely.</p> <p>3.4 Machining variations in the linear and angular dimensions without tolerance indications shall be in accordance with IS:2102 (Part-I)</p> <p>3.5 The surface of the castings shall be free of mould and core sand and any unevenness impairing the usability of the castings.</p> <p>3.6 The castings shall not exhibit any defects which will impair their machinability or usefulness to more than insignificant extent.</p> <p>3.7 Welding shall not be allowed for repair of castings.</p>	Sl. no.	Description	BHEL drawing number	CLW/ RDSO drawing number	<b>COMPONENTS FOR 6FXA - 7059</b>				1	End Frame / DE	04454366051	1TWD.097.011	2	End Frame /NDE	04454466051	0TWD.097.012	3	Clamp Plate /NDE	24454466051	2TWD.097.040	4	Bearing Cap / NDE	34454466051	3TWD.097.039	5	Bearing Cover / DE	34454366051	3TWD.097.036	6	Inner Labyrinth /NDE	44454466052	4TWD.097.034	7	Inner Labyrinth /NDE	44454466051	3TWD.097.038	8	Inner Labyrinth /DE	44454366051	4TWD.097.037	9	Inner Labyrinth /DE	44454366052	4TWD.097.035	10	Rotor end ring (Modified)	14454566051	2TWD.097.013
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>COPYRIGHT AND CONFIDENTIAL</b></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>3.8 In the event of castings proving defective from foundry in the course of preparation, machining or assembly, such castings may be rejected not withstanding any previous certification or satisfactory testing and / or inspection.</p> <p><b>4.0 Inspection :-</b></p> <p>4.1 For vendors supplying this item to BHEL Bhopal for the first time, first lot of item shall be supplied for quality inspection at BHEL Bhopal and bulk supply shall be undertaken only after clearance of first lot by BHEL Bhopal.</p> <p>4.2 Vendor has to initiate the supplies as per PO delivery only. Delay in supply of first lot of components or rejection of components due to any non-conformity/ quality deficiency shall not be considered as reason for delay in supply of components in subsequent deliveries as per PO delivery requirement.</p> <p>4.3 Initial clearance of 1st lot of items does not absolve the supplier from supply of items as per drawing and specification requirement during bulk supply.</p> <p>4.4 To ensure the accuracy and precision in the supplies of machined items checking of dimensions of each consignment must be done on 3-D Co-Ordinate Measuring Machine. Quantum of inspection shall be as per relevant QA plan.</p> <p><b>5.0 Non-Destructive Test</b></p> <p>5.1 Castings shall be subjected to radiographic inspection (5% offered qty. selected at random).</p> <p>5.2 Radiographic test shall be done as per ASTM E689-95 Radiograph shall be graded in accordance with ASTM E-446 and ASTM E-186 as per Table – 1.</p> <table border="1" data-bbox="408 1431 1110 1671"> <tr> <th colspan="2">TABLE -1</th></tr> <tr> <td>Shrinkage</td><td>3</td></tr> <tr> <td>Inclusion</td><td>3</td></tr> <tr> <td>Gas Porosity</td><td>3</td></tr> <tr> <td>Crack</td><td>Not Allowed</td></tr> <tr> <td>Hot Tears</td><td>Not Allowed</td></tr> <tr> <td>Chaplets</td><td>Not Allowed</td></tr> </table> <p>The casting having defects exceeding the above radiographic quality limits shall not be accepted.</p>	TABLE -1		Shrinkage	3	Inclusion	3	Gas Porosity	3	Crack	Not Allowed	Hot Tears	Not Allowed	Chaplets	Not Allowed
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5.3 The sampling of castings shall be in accordance with clause of relevant specification nominated on the relevant drawing.

5.4 Sample of the castings shall be inspected by the authorised representative of purchaser for its physical property test.

5.5 In case the radiographic test is not possible due to special shape or contour of the casting, it may be subjected to other non-destructive test.

**6.0 Static Balancing**

6.1 Only Rotor End Ring required to be checked for 100% static unbalance. The permissible unbalance in fully machined condition shall be limited to 20±5 gram (max).

**7.0 Documents to be supplied :**

7.1 The manufacturer shall produce the records of all tests carried out by them along with tested sample to the inspecting authority at the time of inspection.

7.2 Report of dimensional compliance of individual components shall be provided by the manufacturer along with each supply.

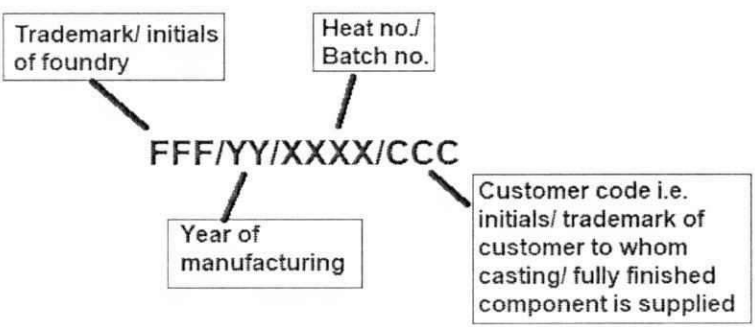
**8.0 Marking :**

**8.1 Embossing details (To be done by casting manufacturer):**

- Each cast component should have individual distinct number embossed by the foundry in format 'FFF/YY/XXXX/CCC' (where 'FFF' is trademark or initial of foundry, 'YY' is year of casting, 'XXXX' is unique four digit batch/ Heat no. & 'CCC' is customer code i.e. initials/ trademark of the customer to whom casting/ fully finished is supplied by the foundry.


e.g. for 'CCC':


Sl. no.	Order of components in form of:	Customer	'CCC' shall be:
1.	Casting/ rough machined	Machinist	Initials/ trade mark of machinist.
2.	Fully finished	Motor manufacturer	Initials/ trade mark of motor manufacturer i.e. 'BHEL'



**FFF/YY/XXXX/CCC**

EMBOSSING DETAILS

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<p><b>COPYRIGHT AND CONFIDENTIAL</b></p> <p>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>	<ul style="list-style-type: none"> <li>Embossing of batch no./ heat no. done on items having all round machining to be remarked (etched/ punched) properly on finished components at location shown in drawing (as per requirement of clause 8.2 (c)).</li> <li>Embossing to be done at location marked in individual component drawing.</li> </ul> <p><b>8.2 Etching/ punch marking details (To be done by machinist):</b></p> <ul style="list-style-type: none"> <li>Each finish machined component shall be legibly and indelibly marked (i.e. punched/ etched in End Frame DE, End Frame NDE &amp; Speed probe housing and etched on remaining components) properly mentioning the following, not necessarily in same order:           <ol style="list-style-type: none"> <li>Manufacturer's initial/ trademark.</li> <li>Manufacturer's unique serial number in format 'XX/MMYY/ZZZZZ' (where 'XX' is code unique to the vendor, vendor wise code attached at annexure A, 'MMYY' is month &amp; year of manufacture of subject item and 'ZZZZZ' is unique &amp; incremental five digit serial number from 00001 to 99999 specific to a vendor irrespective of P.O. no. or P.O. placing authority).</li> <li>Batch/ Heat number.</li> <li>'SGCI' marking.</li> <li>CLW Drawing no. (preferable last 03 digits).</li> </ol> </li> </ul> <div data-bbox="438 936 1380 1265" data-label="Diagram"> <p style="text-align: center;"><b>AA/XX/MMYY/ZZZZZ/BBBB/SGCI/DDD</b></p> <div style="display: flex; justify-content: space-around; font-size: small;"> <div>AA Manufacturer's initial/ trademark</div> <div>XX Code unique to a vendor, ref. annexure A</div> <div>MMYY Month and Year of manufacturing</div> <div>ZZZZZ unique &amp; incremental five digit serial number from 00001 to 99999 specific to a vendor irrespective of P.O. no. or P.O. placing authority</div> <div>BBBB Heat no./ Batch no.</div> <div>SGCI SGCI marking</div> <div>DDD Last 03 digits of drawing no. of component</div> </div> </div> <p style="text-align: center;"><b>ETCHING/ PUNCHING DETAILS</b></p> <ul style="list-style-type: none"> <li>Etching/ punch marking to be done at location marked in individual component drawing.</li> </ul>	
	<p><b>9.0 Packing :</b></p> <ol style="list-style-type: none"> <li>The components shall be suitably packed to prevent transit / long storing damage.</li> <li>The components shall be coated with antirust varnish/compound after inspection.</li> <li>Varnished components shall be wrapped in polythene paper followed by corrugated paper.</li> <li>The wrapped components shall finally be sealed in thick polythene bag.</li> <li>All sealed components in a kit bearing same serial number shall be finally packed in single wooden crate separated by different wooden compartments for each item, properly lined/ padded by big bubble wrapper/ thick foam/ thermocol sheets to prevent transit damage to machined surfaces.</li> <li>Packing list shall be provided on the boxes.</li> </ol> <p><b>10.0</b> This specification is equivalent to CLW's specification no. 4TMS.096.068 Rev.01 Alt.08.</p>	

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