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**SPECIFICATION FOR**  
**SPHEROIDAL GRAPHITE CAST IRON**  
**COMPONENTS OF 3-PHASE**  
**TRACTION MOTOR TYPE 6FRA-6068 & 6FXA-7059**  
**OF ELECTRIC LOCOMOTIVES**

Specification No. 4TMS.096.068, Rev-2, Alt-1

TRACTION MOTOR DEPARTMENT  
CHITTARANJAN LOCOMOTIVE WORKS  
CHITTARANJAN – 713365  
WEST BENGAL

Approved By
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AMENDMENT SHEET

ALT. No.	AUTHORITY	DESCRIPTION	SIGNATURE	DATE
1	Dy.CEE/TMD	Note added in Para 8.2	-Sd-	As Signed
2.	Dy.CEE/TMD	Para 4.8 modified.		Assigned

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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 6FRA-6068 & 6FXA-7059**

**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 DRAWING 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:

SN	Description	CLW Drg. No.	ABB Drg. No.
<b>COMPONENTS FOR 6FRA-6068</b>			
1	END FRAME/DE	1TWD.096.005	3EHM 112008
2	END FRAME/NDE	0TWD.096.003	3EHM 030965
3(i)	ROTOR END RING	2TWD.096.100	3EJD0000001057
3(ii)	END RING PLATE FOR SCHEME-I ROTOR	SKEL 4739	-
3(iii)	ROTOR END RING FOR SCHEME-II ROTOR	SKEL 4732	-
4	SPEED PROBE HOUSING	1TWD.096.077	3EHM 111880
5	OUTER BEARING CAP/DE	1TWD.096.006	3EHM 112045
6	CLAMP PLATE/NDE	2TWD.096.033	3EHM 211622
7	BEARING CAP/NDE	3TWD.096.032	3EHM 311758
8	INNER LABYRINTH/DE	4TWD.096.028	3EHM 413061
9	INNER LABYRINTH/NDE	4TWD.096.031	3EHM 412822
10	INNER LABYRINTH/NDE	4TWD.096.042	3EHM 412821
11	INNER LABYRINTH/DE	4TWD.096.043	3EHM 413072
12	OUTER LABYRINTH/DE	4TWD.096.029	3EHM 413071
<b>COMPONENTS FOR 6FXA-7059</b>			
13	END FRAME/DE	1TWD.097.011	3EHM 111956
14	END FRAME/NDE	0TWD.097.012	3EHM 030957
15	CLAMP PLATE/NDE	2TWD.097.040	HMMT 211395
16	BEARING CAP/NDE	3TWD.097.039	HMMT 311492
17	BEARING COVER/DE	3TWD.097.036	3EHM 413033
18	INNER LABYRINTH/NDE	4TWD.097.034	HMMT 412270
19	INNER LABYRINTH/NDE	4TWD.097.038	HMMT 412371
20	INNER LABYRINTH/DE	4TWD.097.037	3EHM 413036
21	INNER LABYRINTH/DE	4TWD.097.035	3EHM 413034
22	ROTOR END RING (MODIFIED)	2TWD.097.013	3EHM 211728

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**3.0. MANUFACTURING:**

- 3.1 The choice of manufacturing method are left to the manufacturer provided physical/chemical properties of specified grade nominated on the drawing are obtained. However, 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-1 or Latest.
- 3.2 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.
- 3.3 Machining variations in the linear and angular dimensions without tolerance indications shall be in accordance with IS: 2102 (part-I).
- 3.4 The surface of the castings shall be free of mould and core sand and any unevenness impairing the usability of the castings.
- 3.5 The castings shall not exhibit any defects which will impair their machinability or usefulness to more than insignificant extent.
- 3.6 Welding shall not be allowed for repair of castings.
- 3.7 In the event of castings proving defective from foundry in the course of preparation, machining or assembly, such castings may be rejected notwithstanding any previous certification or satisfactory testing and/or inspection.

**4.0. INSPECTION:**

- 4.1 Prototype inspection:- The successful tenderer shall offer a minimum of two m/sets of Components under procurement for Prototype Inspection/Testing to the Dy.CEE/TMD/CLW/CRJ before undertaking bulk production supply, for the first time.
- 4.2 The inspection shall be carried out as per Gr. 400/18 of IS: 1865.
- 4.3 The Inspection shall be carried out in two stages:
- Metallurgical Inspection of casting by CC&M/CLW/CRJ or as per stipulation in P.O.
  - Dimensional inspection of finish machined components as per P.O. stipulation.
- 4.4 Any shortcoming/defects in the design and workmanship of the castings shall be pointed out to the supplier after Prototype Inspection tests to enable him to incorporate necessary improvement before bulk supply is commenced.
- 4.5 Routine inspection of the items shall be carried out as per Para 4.2 and 4.3 above only after the approval of prototype sample by the authorised representative.
- 4.6 The manufacturer shall provide all the necessary facilities at their Works/Premises for Prototype as well as Routine inspection.
- 4.7 The inspection authority of purchaser shall have free access to the Works of the manufacturer at all times during manufacture. He shall be free to inspect the manufacture at any stage, to reject any material which do not confirm the terms of specification.
- 4.8 To ensure the accuracy and precision in the supplies of machined items procured in kit form, measurement of dimensions of 100% material per lot with proper traceability during firm's internal inspection (records to be shown to CLW's inspection wing) & ~~20%~~ <sup>100%</sup> material per lot during routine inspection in presence of CLW's inspector against P.O. quantity must be done by three dimensional Co-Ordinate Measuring Machine.

Alt-2

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**5.0. NON-DESTRUCTIVE TEST:**

5.1 Castings shall be subjected to radiographic or other method of Non-destructive inspection (5% offered qty. selected at random).

**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.

TABLE-1	
Shrinkage	3
Inclusion	3
Gas Porosity	3
Crack	Not Allowed
Hot Tears	Not Allowed
Chaplets	Not Allowed

The casting having defects exceeding the above radiographic quality limits shall not be accepted.

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  $20 \pm 5$  gram (max).

**7.0. DOCUMENTS TO BE SUPPLIED:**

7.1 The tenderer shall furnish following information along with their offer:

a) Facilities available for casting and machining as per RDSO's STR No. RDSO/2007/EL/STR/0021, Rev-1 or Latest and testing of castings including Non-destructive testing etc.

7.2 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.

7.3 Certificate of physical property test of individual components shall be supplied by the manufacturer along with each supply.

**8.0. MARKING:**

8.1 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 for the foundry).

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8.2 Each finish/machined component shall be legibly and indelibly marked/etched/punched properly mentioning the following, not necessarily in same order:

- a) Manufacturer's initial or trademark.
- \* b) Manufacturer's Unique Serial Number in format 'XX/MMYY/ZZZZZ' (where, 'XX' is code unique to a vendor to be obtained from Dy.CEE/TMD's Office, 'MMYY' is month & year of manufacture of subject item and 'ZZZZZ' is unique & incremental five digit serial number from 00001 to 99999 specific to a vendor irrespective of P.O. No. or P.O. placing authority).
- c) Batch/Heat Number.
- d) 'SGCI' marking.
- e) Drawing number (preferably last 03 digits).

Alt-1

\* **NOTE:** Applicable for PL No. 29941003, UVAM item ID-2100501 & PL No. 29945422, UVAM item ID-2100502.

#### 9.0. **PACKING:**

- i) The components shall be suitably packed to prevent transit/long storing damage.
- ii) The components shall be coated with antirust varnish/compound after inspection.
- iii) Varnished components shall be wrapped in polythene paper followed by corrugated paper.
- iv) The wrapped components shall finally be sealed in thick polythene bag.
- v) 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/thermocool sheets to prevent transit damage to machined surfaces.
- vi) Packing list shall be provided on the boxes.

#### 10.0. **DEVIATION:**

- 10.1 While submitting the offer, the tenderer shall furnish a list of deviation, if any, from this, specification and relevant drawings, and the manufacturing facility as per RDSO's STR No. RDSO/2007/EL/STR/0021, Rev-1 or Latest. Even if the tenderer has no particular deviation in their offer, a NIL statement shall be submitted.

- 11.0. Clause wise comments have to be furnished by the tenderer. Vague comments like noted and understood are not acceptable. Compliance have to be clearly stated, otherwise, CLW reserves the right to reject the offer.

- 12.0. Metallurgical testing for prototype supplies shall be carried out by Dy.CC&M/CLW/CRJ or NABL approved laboratory for which sample to be drawn, stamped & sealed by authorised representative of Dy.CEE/TMD/CLW/CRJ and for bulk supplies metallurgical test shall be done by Dy.CC&M/CLW/CRJ or NABL approved laboratory, to be witnessed by authorised representative of CLW Zonal Inspection Cell.

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- 13.0. Firms shall make bulk procurement of individual items required for subassemblies or complete equipments from Part-I source of CLW/RDSO only. Procurement from Part-II sources can be made up to 15% of total procurable qty. or the highest qty. of a past order successfully executed in Rlys. Units/PUs in the preceding three years. Upper limit of qty. to be procured from such Part-II source will not exceed 25% of the net procurable qty. in a given procurement case. In case where Part-I source is not available, material may be procured from Part-II sources of respective items as indicated in ASL of CLW/RDSO. Firm shall keep all such procurement records and will submit the same to inspecting agency at the time of inspection to ensure that above procurement procedure is strictly adhered to.

THE DETAILS OF ITEMS COVERED IN THIS SPECIFICATION FOR  
“ASSOCIATED COMPONENTS OF MACHINED STATOR ASSLY.”  
FOR TM TYPE 6FRA-6068 ARE GIVEN BELOW:-

Sl. No.	DESCRIPTION	CLW DRG. No.	QTY./TM	REMARKS
ASSOCIATED COMPONENTS OF MACHINED STATOR ASSLY.				
1	END FRAME/DE	1TWD.096.005	1 No.	
2	END FRAME/NDE	0TWD.096.003	1 No.	
3	SPEED PROBE HOUSING	1TWD.096.077	1 No.	
4	OUTER BEARING CAP/DE	1TWD.096.006	1 No.	
5	CLAMP PLATE/NDE	2TWD.096.033	1 No.	
6	BEARING CAP/NDE	3TWD.096.032	1 No.	
7	INNER LABYRINTH/DE	4TWD.096.028	1 No.	
8	INNER LABYRINTH/NDE	4TWD.096.031	1 No.	
9	INNER LABYRINTH/NDE	4TWD.096.042	1 No.	
10	INNER LABYRINTH/DE	4TWD.096.043	1 No.	
11	OUTER LABYRINTH/DE	4TWD.096.029	1 No.	

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