



सत्यमेव जयते

भारत सरकार
रेल मंत्रालयGovernment of India
Ministry of Railwaysविद्युत लोकोमोटिव्स और इ एम् यू / मेमु की ऑक्सिलरी मशीन बियरिंग्स के निर्माण हेतु
तकनीकी आवश्यकताओं की अनुसूचीSchedule of Technical Requirement for Manufacturing of
Auxiliary Machine Bearings for
Electric Locomotives & EMUs/MEMUs

एस टी आर संख्या: आरडीएसओ /2017/ ईएल/एस टी आर/0090 (संशोधन '0' '1')

दिसंबर -2022

STR no: RDSO/2017/EL/STR/0090 (Rev-'0' '1')

~~August-2017~~ December-2022

Approved by	Signature
EDSE(CO-ORD) PED/Traction	

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Status of Revision

S. N.	Date of Revision	Page No.	Revision	Reasons for Revision
1.	-	All	0	First Issue.
2.	XX-12-2022	All	1	In line with latest ISO guidelines, Spl DG(VD) note no. SplDG(VD)/Vendor Policy dated 20.10.2020 & CVO/RDSO note no. CVO/RDSO/Confdl/2020 dated 23.06.2020.

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Schedule of Technical Requirement for Manufacturing of Auxiliary Machine Bearings for Electric Locomotives & EMUs/MEMUs

1.0 SCOPE

1.1 Schedule of Technical Requirement (STR) is a stipulated document which describes the requirements to be met by the vendors who are interested in manufacturing, testing and supplying of Auxiliary Machine Bearings for Electric Locomotives & EMUs/MEMUs. The prospective vendors have to comply all the points mentioned in this STR to develop Auxiliary Machine Bearings for Electric Locomotives & EMUs/MEMUs for Indian Railways.

~~This Schedule of Technical Requirement (STR) is issued for the guidance of prospective manufacturers as well as existing Auxiliary Machine Bearing manufacturers (henceforth called "firm"). The technical requirements mentioned hereunder are meant to serve as a guideline only & are not exhaustive and should be read in conjunction with the relevant specifications, RDSO's extant guidelines for firms/manufacturers seeking fresh registration/renewal/up gradation. Bearings (for which this STR is issued) are used various types of auxiliary machines for electric locomotives e.g. bearings for compressor motors, blower motors, oil pump motors etc. which are subjected to a difficult loading cycles during operation. List of bearings being covered by this STR is enclosed as **Annexure-I**.~~

1.2 The firm should satisfy themselves having complied with the requirement of the specification/standards and STR. The technical requirements are meant to serve as guidelines only and are not exhaustive.

1.3 The Schedule of technical Requirement (STR) mentioned hereunder is issued to serve as a guide to manufacturers (called the "firm" hereafter) and should be read in conjunction with the requirement of the specification/standards with amendments or latest.

1.4 ~~Wherever lacking,~~ The existing RDSO approved sources must also upgrade their facility to fulfill the requirements of this STR within a period of one year from date of issue of this STR for continuing their registration with RDSO.

2.0 GENERAL REQUIREMENTS

2.1 ~~The firm should have complete control over the design, modification/alteration of basic designs of Auxiliary Machine Bearings as per governing specifications/standards etc.~~

The main vendor/manufacture should have currently valid ISO: 9001:2015 (Latest) certifications for his works address, covering the items for which firm seeks registration with IR. It shall be ensured that the certifying body which issues the ISO: 9001 certificate is accredited by an accreditation body that is a part of the International Accreditation Forum (IAF) under the Multi lateral Recognition Arrangement (MLA).

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- 2.2 ~~The firm should have adequate covered space available for storage of incoming material /raw material and finished product awaiting dispatch and prototype / routine inspection. The storage for raw material and finished product should be separate. The storage facility should be free from dust, clean and non humid and shall include lifting and handling machinery/plants for finished and unfinished product.~~
All the machines and measuring instruments/gauges should be properly calibrated. The latest calibration certificate shall be required to be shown during validation of the firm.
- 2.3 ~~The firm should have a clean and pollution free environment, and should be taking adequate safety precautions during the manufacture/testing/storage & dispatch.~~
The firm should have its own testing laboratory; otherwise services of a Government approved Test Laboratory or NABL accredited laboratory for concerning testing can be availed. The firm shall take prior approval from RDSO for outsourced testing by submitting details of the Government approved/NABL Approved Test Laboratory is mandatory.
- 2.4 The firm must have procedures and compliances to hazardous substances, waste disposal and environmental policies.
- 2.5 The firm shall have a system of easy traceability of the product from manufacturing stage to finished product stage.
- 2.6 The firm shall maintain list of brought out items along with
- (i) Basis of procurement i.e. specification etc. and assurance that the material is of standard quality.
 - (ii) Sources of procurement with the details of Quality Assurance Plan of such sources.
 - (iii) Tests carried out by sub - vendors on brought out items and test certificate for each lot of supply.
 - (iv) Test carried out by the firm on the brought out items before usage.
- 2.7 The firm shall maintain:-
- (v) List of in – house manufactured items.
 - (vi) Detailed drawings, jigs & fixtures required and process adopted for these items.
 - (vii) Details of the process followed and routine checks observed for assembly of the items.
 - (viii) Record of shelf life of items/components/materials used as applicable.

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3.0 STORAGE FACILITY:

The firm should have sufficient covered space available for storage of incoming material /raw material and finished product. The storage for raw material and finished product should be separate. The storage facility should be clean, non-humid and free from dust. The equipment handling machinery/plants should be included in list of M&P and should be a part of QAP.

~~3.0 MINIMUM REQUIREMENTS OF MANUFACTURING AND QUALITY CONTROL FACILITIES FOR MANUFACTURING & SUPPLY OF AUXILIARY MACHINE BEARINGS~~

4.0 MINIMUM FACILITIES/ REQUIREMENTS OF MACHINERY & PLANT (M & P) AND TESTING FACILITIES

~~3.1 The firm should have latest ISO: 9000 series certification and the product for which the approval is sought should be broadly covered in the scope of the certification for manufacture & supply.~~

~~The firm should possess a clearly laid down Quality Assurance Plan (QAP) approved by RDSO for the product covering the following aspects (refer ISO document no. EL-WI 7.1-1 titled as 'QM-RF 8.1-3 Guidelines for preparing QAP(Quality Assurance Plan) during registration' which is available on RDSO website under 'Vendor Interface' → Directorate's Documents ISO/Other → Rolling Stock → QM-RF 8.1-3 Guidelines for preparing QAP(Quality Assurance Plan) during registration.~~

- ~~(a) Organisation Chart, clearly indicating the quality control set-up.~~
- ~~(b) Qualification of key personnel and the officials deployed in quality control cell.~~
- ~~(c) Process Flow Chart indicating process of manufacture for an individual product or for a family of products, if the process is same.~~
- ~~(e) **Quality Assurance System** — Inspection and Testing Plan to cover:

 - ~~• Incoming material~~
 - ~~• Process control~~
 - ~~• Product control~~
 - ~~• System control~~
 - ~~• Testing facility~~~~
- ~~(f) Stage inspection detailing inspection procedure, inspection parameters, method of testing / test procedure including sample sizes for destructive and non-destructive testing etc.~~
- ~~(g) Calibration scheme and status of calibration of test equipment.~~
- ~~(h) The firm shall submit the QAP in triplicate alongwith the application.~~

~~3.3 Firm shall have to declare details of the manufacturing operations to be conducted in house or by outside agencies. Details of the outside agencies shall be indicated. RDSO reserves the right to inspect these firms also.~~

~~3.4 The firm shall maintain list of brought out items along with~~

- ~~• Basis of procurement i.e. specification etc. and assurance that the material is of standard quality.~~

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- ~~Tests carried out by sub firms on brought out items and test certificate for each lot of supply.~~
 - ~~Test carried out by the firm on the brought out items before usage.~~
 - ~~Sources of procurement with the details of Quality Assurance Plan of these sources.~~
- 3.5 ~~Raw Material shall be purchased from reputed suppliers. Documentary proof of purchase and test certificate of each component shall be maintained and produced.~~
- 3.6 ~~A record of each sub supplier clearly showing the quantity purchased and rejected as well as cases of late delivery, if any shall be kept.~~
- 3.7 ~~The firm shall maintain~~
- ~~List of in house manufactured items.~~
 - ~~Detailed drawings, jigs & fixtures required and process adopted for these items.~~
 - ~~Details of the process followed and routine checks observed for assembly of the items.~~
- 3.8 ~~Firm shall have approved layout plan for works & shall be submitted while making application for registration. The layout plan shall clearly indicate the various areas of storages/manufacturing/testing.~~
- 3.9 ~~The firm should maintain the proper record of complaints received from users (Railways) is being maintained & corrective action is taken.~~
- 3.10 ~~The firm should be in possession of Digital Signature Certificate from valid licensing authority & shall be registered with IREPS (Indian Railway Electronic Procurement System) in order to be able to interact with the E-procurement website and submit tenders electronically.~~
- 3.11 ~~The manufacturing & general assembly of equipment shall be according to relevant standards & Quality Assurance Plan and the various parts shall be as per the standard drawings of particular bearing. The firm should possess in house plant & machinery used for manufacturing and testing equipments as per clause 3.14. The machines and equipments should preferably be computer controlled to ensure high accuracy. The firm should have stage wise manufacturing & testing records and complete traceability of the product from manufacturing stage to finished product stage.~~
- 3.12 ~~The firm should be established bearing manufacturer with capability to produce quality bearings under mass production.~~
- 3.13 ~~The firm must have indigenous manufacturing facility for the bearing proposed to be designed and supplied to Indian Railways.~~

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4.1 The following basic machinery & plant and testing equipment for manufacturing of Auxiliary Machine Bearings for Electric Locomotives & EMUs/MEMUs shall be available with the firm indigenous:

4.1.1	<p>Name of equipment/machinery</p> <p>Full facilities for heat treatment of bearing component i.e. inner races, outer races and Balls/Rollers, which should have the following equipments.</p> <p>(i) Heating and tempering furnaces (gas/oil fired or electric) of adequate capacity with automatic temperature control.</p> <p>(ii) Quenching bath (oil bath/salt bath).</p>
4.1.2	<p>Machine tools / equipments</p> <p>(i) Single/double disc grinders for face grinding of inner and outer races / similar components.</p> <p>(ii) Centerless grinders for outer diameter grinding of outer race/ similar components.</p> <p>(iii) Internal grinders for bore grinding of inner race / similar components.</p> <p>(iv) Internal / external grinders for track / raceways grinding.</p> <p>(v) Honing machine for tracks /raceways super finishing.</p> <p>(vi) Centreless grinder for rollers outer diameter grinding.</p> <p>(vii) Assembling machine of adequate capacity.</p> <p>(viii) Washing facilities of assembled bearing and components.</p> <p>(ix) Riveting machine</p> <p>(x) Automatic greasing machine.</p> <p>(xi) Ball Flashing machine, Ball grinding machine & Lapping machine for super finishing of balls if balls are being manufactured in-house.</p>
4.1.3	<p>The firm must have laboratory / testing facilities which will include generally the following :</p> <p>(i) A metrology lab with controlled atmosphere in it.</p> <p>(ii) Adequate no. of various gauges (at least three sets) for checking various parameters as per drawing of bearing.</p> <p>(iii) All precision measuring equipments required for inspection:</p> <ul style="list-style-type: none"> • Vernier caliper. • Height gauge. • Inside and outside micrometers • Dial gauges and comparators. • Feeler gauges • Gauge block set for calibration purpose etc. • Roundness checking machine. • Surface roughness measuring instrument. • Standard blocks for calibrating surface roughness measuring instrument. <p>Following testing facilities shall be available with the firm; alternately the tests can also be conducted through NABL approved lab & same shall be indicated in QAP.</p> <p>(iv) Facility to carry out chemical analysis of raw material.</p> <p>(v) Facility for preparation of metallographic specimen.</p> <p>(vi) Metallographic Microscope and photographic attachment.</p> <p>(vii) Mechanical and non-destructive testing facility:</p> <ul style="list-style-type: none"> • Rockwell hardness tester. • Universal testing machine with extensometer. • Brinell hardness testing machines.

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	<ul style="list-style-type: none"> Facilities for crack detection of bearing component (Magnetic particle testing, Red dye penetrant etc.).
	<p>Following testing & measuring facilities shall be available with firm:</p> <ul style="list-style-type: none"> (viii) Noise & vibration testing. (ix) Dynamic Capacity test rig. (x) Static Capacity test rig. (xi) Radial Clearance checking machine. (xii) Sealing ability test rig. (xiii) Automatic dimensional checking machine. (xiv) Facility for roundness measurement (xv) Profile & contour measuring facility (xvi) Balls deformation measuring machine.

Note: Vendor approving agency may assess the facilities of outsourced firm.

In this case following are to be ensured by the firm:

- The credentials of the outsourced firms for the activity being outsourced.
- Quality Standard compliance, etc.
- Firm shall maintain updated QAP or relevant documents like TC/Inspection reports, Production part approval process etc. of the outsourced firm for the outsourced product.
- MoU or any other documentary proof of long term supply commitment with the outsourced firm is to be submitted.
- Outsourced firm should also be indicated in QAP.
- Approved detailed process (with process flow chart), which are to be outsourced.
- The justification why it cannot be done in-house.
- Prior intimation is to be given to Vendor approving agency for any addition/deletion of the outsourcing sources mentioned in QAP.

~~All the gauges and precision instruments must be regularly calibrated for which the firm must have documented calibration procedure. The firm may have in house calibration capability or services of renowned external Government approved agency may be taken. If calibration is being done by outside Government approved agency, valid calibration certificates from same shall be available.~~

- The capacity & accuracy of the testing and measuring instruments shall be adequate to meet the requirements of the relevant specification.
- ~~3.17 Ensure that proper analysis is being done on monthly basis to study the rejection at various internal stages and it is documented.~~
- Ensure that all the relevant specifications, IS etc. are available with the firm.
- In case raw material forging/rolling and turning facilities are not available with the firm, **firm can outsource these activities from outside firm(s).** The following information shall be furnished by firm.
 - Name of firm by which forging/rolling is to be done.
 - Name of firm by which turning is to be done.
 - Method of forging / rolling.

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5.0 PACKING

Firm must have packing facilities through which proper packing of product can be done. The bearings shall be packed individually in suitable card board carton and several pieces may be packed together in suitable wooden containers depending upon size. The packing shall carry company's trade mark, bearing number and packaging date and shall conform to international norms so as to protect the product during transit, handling and storage. In the event of supply to various sheds, the bulk packing shall not be opened and bearings in multiple of bulk packing shall only be supplied.

6.0 MARKING

Firm shall have in-house etching/laser marking facilities and clearly defined internal standards for marking of each product.

6.1 Packed containers shall be marked with the following.

- Manufacturer's name or trade mark
- Code or direct indication of month and year of manufacture.
- Designation of the bearing defining the type and dimensions, radial internal clearance etc.
- Quantity.

6.2 Each bearing shall carry on the side face of its inner **and/or** outer rings visibly and indelibly the following markings-

- Manufacturer's name/code/trade mark
- Complete designation of the bearing.
- Date code of manufacturing of the production lot.

7.0 The firm shall submit the Parawise compliance of STR while making application for fresh registration along with deviation statement if any.

8.0 BILL OF MATERIAL

A complete Bill of Material (BOM) indicating all input material required for manufacturing of product, governing specification and their sources of supplies as approved by firm shall be furnished by the firm. Test results of incoming raw material with reference to test certificate issued by supplier and the results of internal tests carried out by the firm for verification shall be submitted by the firm as a part of QAP.

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Annexure-I

~~Type of Bearings being generally used in Various Auxiliary Machines of electric locomotives.~~

SN	Name of Auxiliary Motor	Type of Bearings	
		Non Driving End	Driving End
A.	Three Phase Electric Locomotives		
1.	Oil pump for SR	6306	3306A
2.	Oil Pump for transformer	6306	4306A
3.	TM blower motor	6312	6312
4.	Oil cooler blower motor	6312	6312
5.	Scavenge blower motor (TM+ Oil Cooler blower)	6206	6206
6.	Machine room blower motor	6208	6208
7.	Scavenge blower motor for machine room	6205	6205
8.	Main Compressor Motor 200L	6312	6312
	160L	6209	6209
B.	Tap-changer Electric locomotives		
1.	MVRH	6313	6313
2.	MVMT	6313	6313
3.	MVSL	6306	6306
4.	MVSI	6306	6306
5.	MCP	6310	6310
6.	MVRF(DC)	7310	6312
7.	MVRF(AC)	6313	6313
7.	MPH	6305	6305
8.	ARNO (120kVA)	6316	6316
9.	ARNO(150/180kVA)	6320	6320

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