भारत सरकार – रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन

सत्यमेव जयते

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SCHEDULE OF TECHNICAL REQUIREMENTS FOR SPHERI BLOCKS AND MEMBRANES OF HURTH COUPLING OF THREE PHASE ELECTRIC LOCOMOTIVES

Approved by	Signature
PEDSE	ओमप्रकाश 22.3.18

ISSUED BY:-

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SSE/C&S	ADE/C&S	JDSE/C&S

Status of Revision

S. N.	Date of Revision	Page No.	Revision	Reason for Revision
1			1	To make it more suitable for industries to follow

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Schedule of Technical Requirements for Spheri Blocks and Membranes of Hurth Coupling of 3-phase Electric Locomotives

1. Scope :

Indian Railways is procuring spheriblocs for dampers(primary vertical damper(axle),secondary vertical damper, lateral damper, yaw damper) Wheel set guide for WAG9/WAP7 & WAP5 locos. Torque arm spheribloc for WAG9/WAP7 locos and Traction motor , gear case spheribloc for WAP5 locos.

The metallic part is of Ni-Cr forged steel and rubber of elastomeric material which may be blending of natural rubber, chloroprene or nitrile butadiene synthetic rubbers. The chosen material should preferably have been used in a similar rolling stock application. Use of regenerated/re-constituted material is not permitted.

The membranes of Hurth coupling will be of polyester or nitrile rubber or blending of these.

The environmental condition under which these are supposed to work are as follows:

Maximum temperature under sun- 70 Deg.C

Maximum temperature under shade- 50 Deg.C

Minimum temperature- 0 Deg.C

Average Temperature- 47 deg.C

Humidity- 100% saturation during rainy season

Very heavy rainfall in certain areas

Atmosphere during hot weather –extremely dusty & desert terrain in certain areas.

Coastal areas- The equipment shall be designed to work in coastal area in humidity and salt laden and corrosive atmosphere. The maximum values of the condition will be as follows:

a) Maximum pH value – 8.5
b) Sulphate- 7 mg/litre
c) Max. concentration of chlorine- 6mg/liter
d) Maximum conductivity- 1130 micro Siemens/CM

The firms should satisfy themselves about having complied the requirements of the specifications and the technical requirements.

2. SCOPE OF SUPPLY:

The drawings, specifications and the requirement of spheriblocs are as follows:

2.1 For WAG9 / WAP7 Locos:

SN	Application	ABB's Drawing No.	Quantity per loco
2.1	Axle Guide Rod / Traction Motor Support arm	IA016-00005,(Rev 3)	36

2.2 For WAP5 Locos:

SN	Application	ABB's Drawing No.	Quantity per loco
2.2.1	Gear Case	IA016-00005,(Rev.3)	08
2.2.2	Axle Guide Rod	IA016-00003,(Rev.1)	16
2.2.3	Traction Motor / Traction Motor support arm	IA016-00269,(Rev.3)	12

3. GENERAL REQUIREMENTS :

3.1 The firm should have currently valid ISO-9000 certification issued by an accredited agency i.e. NABCB with the activity desired clearly mentioned in the scope of certification. The firm shall have a Quality Manual indicating the extent of control over production. The QAP should cover the Quality control setup with name of person & designation, Process flow chart of manufacture, internal testing, stage inspection & final inspection before dispatch. The record/documentation of dimensional check and internal tests as specified in specification should be readily available for scrutiny by the inspecting official.

3.2 The firm shall have a system of documentation in respect of rejection at customer end, warranty replacement and failure of item supplied by them during service.

3.3 The testing and measuring equipment shall be duly calibrated and the validity of calibration should be current and verified by physically checking the calibration certificate issued by the Calibration Agency from whom it was calibrated.

3.4 The firm shall have a system of easy traceability of the product from manufacturing stage to finished product stage. Stamped identification marking with serial number of raw material should be used for this purpose.

4. INCOMING MATERIAL

4.1 A complete Bill of Material indicating all input material items required for manufacturing of the product, governing specification and their sources of supplies as approved by the firm in accordance with Clause 7.4.1 of ISO-9001 (2000) should be furnished.

4.2 Test results of incoming raw material with reference to Test Certificate issued by the supplier and the results of internal tests carried out by the firm for verification may be submitted as part of QAP. Record of tests conducted on Heat number of forging blanks etc. for a lot should be available for scrutiny.

4.3 The type of rubber used shall be natural suitably blended with synthetic rubber. No reclaimed rubber is allowed.

5. MANUFACTURING REQUIREMENTS

5.1 List of typical M & P required for manufacture is furnished in **Annexure- I.** The list is for general guidance only and actual manufacturing operations shall be submitted and got approved by the firm as a part of QAP.

5.2 The following details of machines used for all the steps of machining operations should be included :

- Make and model of the machine
- Accuracy
- Details of machining operations

5.3 Machining process should be such that all critical dimensions are final machined on CNC machining centers, preferably in a single setting.

5.4 Details of Jigs and fixtures used during manufacture should be furnished along with the manufacturing process wherever used.

6. INSPECTION AND TESTING PLAN

6.1 The list of Testing and Measuring instruments are furnished in **Annexure-II & III** respectively, for general guidance only. However the specific Testing & measuring instruments, gauges used by the firm will also form part of QAP which shall be submitted and got approved by RDSO.

6.2 The following details of measuring instruments/equipments/jigs/fixtures used for all the steps of measurement operations should be included.

- Make and model of the measuring equipment
- Accuracy
- Quantity to be measured and acceptable value range.

6.3 Stage inspection detailing inspection procedure, inspection parameters, and method of testing/test procedure including sample sizes for destructive and non-destructive testing. Record of test results of stage inspection should be available and furnished.

Enclosures: Annexure I to III

ANNEXURE-I

List of Machinery and Plants

List of Machinery for processing

S.No.	Equipment/Machinery	Capacity	Quantity
1	Injection moulding press alternatively.T.M(Resin Transfer moulding) facility	2000cc,250T or more	1
2	Air compressor	12 Cu.ft.	1
3	Extruder	50 mm	1
4	Auto Bonding agent application spray unit	--	1
5	Painting booths for spray paint	--	1
6	Shot/Grit blasting machine Or 1. RO water treatment plant for phospating process 2. Automatic nine tank PLC controlled phospating plant 3. Centrifuge- drier for phospating	-- --	1 1 Each

List of Machinery for Mixing

S.No.	Equipment/Machinery	Capacity	Quantity
1	Carousal-chemical storage	25 kg bin	1 set
2	Silos-carbon weighing		1
3	Scada(PLC system)-Chemical and carbon weight control		1
4	Intensive mixer	25 litre	1
5	Baby Mixing mill chilling plant	8"x8"	
6	Mixing mill 16"x42"- with chilling plant	16"x42"	1
7	Batch of unit-1-Cooling the MB compound	-	1
8	Kneader-Final batch	25 litre	1

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ANNEXURE-II

LIST OF TESTING FACILITIES:

1.0 Calibration of the Testing / Measuring Equipments should be done at least once in a year unless stated otherwise.

2.0 Inspection Staff conducting non-destructive testing shall be adequately trained and qualified by recognized agency and shall have adequate experience.

3.0 Staff conducting tests like Chemical Analysis and Mechanical Properties shall have adequate skill & competence and shall have under gone sufficient training. Skill of such staff shall periodically be qualified by making them carry out tests on blind samples.

Following testing facilities should be available with the firm:

METALLURGICAL AND CHEMICAL LABORATORY:

1. Rheometer-Rheological compound behavior
2. Mooney viscometer(1 No.)-Viscosity of polymer & rubber compound
3. Moisture Analyser-Heat loss of raw material/rubbers
4. Portable hardness testers/JIS
5. IRHD table type dead load hardness tester
6. Densimeter- Specific gravity of rubber components
7. Polymer identification test arrangement for all polymers
8. Chemical balance – 5 kgs
9. Oven with temperature recorder- 10"x10", 300/350 Deg.C
10. Muffle furnace for checking ash contents- 8"x10" 1000 Deg.C
11. Microscope 100 magnification – 100 MAG
12. Viscosity measuring cups(Ford cup B-4)
13. PH meter
14. Titration equipment
15. Salt spray test equipment
16. Profile projector 50 magnification
17. Granite surface plate grade-1 1000mmx630mm
18. Cold chamber - Minus 40 Deg.C
19. Ozone test chamber

PHYSICAL LABORATORY:

1. Electronic tensile testing machine with computer- 1000kg
2. Hydraulic load vs. deflection testing machine digital indicator with load cell- 8 tonnes
3. Load cell – 2000kg
4. Torque wrench-50-450 kgfm

FACILITIES FOR SPECIAL TESTS

1. Endurance testing machine (Torsional, radial & axial and conicaltest)- 2500 kg
2. Environmental test at 70Deg.C, 35 Deg.C and 100% humidity, salt spray test,dust
3. Resistance to ageing of rubber - 7 days at 70+1/70-0 Deg.C
4. Bond strength of rubber
5. Compression set

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