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**Government of India
Ministry of Railways**

QMS-42:2009

(Revision 0)

Infrastructural, manufacturing, testing & Quality control requirements
For

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|-------|---------------------------------|--------------------------------|
| (i) | Side Bearer Pad. | Spec. No. VL-02(Rev.-1), VL-03 |
| (ii) | Anti-vibration Rubber Pad | Spec. No. IRS-R-59/76 |
| (iii) | Centre Pivot Rubber Bush | Spec. No. VL-03 |
| (iv) | Conical Thrust Pad | Spec. No. IRS:R63/76 |
| (v) | Bonded Rubber Sandwich Mounting | Specn. No. IRS:R-49-75 |
| (vi) | Axle Box Guide Link | |

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(Price Rs 900 /-)

1.0 Scope:

1.1 The Schedule of Technical Requirements covers the norms for manufacture of following rubber and metal bonded rubber components for Diesel Locomotive:

- (i) Side Bearer Pad.
- (ii) Anti-vibration Rubber Pad
- (vii) Centre Pivot Rubber Bush
- (viii) Conical Thrust Pad
- (ix) Bonded Rubber Sandwich Mounting
- (x) Axle Box Guide Link

2.0 Requirements:

The vendors seeking approval shall comply with all the under mentioned requirements, from para 2.1 to para 4.11.

General & Manufacturing Facilities:

- 2.1 Covered area with adequate space for storage of raw rubber, carbon and chemicals should be available, which should be free from dampness and humidity.
- 2.2 The following weighing facilities for measuring various raw material constituents and the product at intermediate stages are required:
 - (i) Electronic weighing balance of 2 to 5 kg. capacity.
 - (ii) Mechanical spring balance or platform weighing machine of the capacity of minimum 50 kg of reputed make.
- 2.3 It shall be ensured that the weighing machines are calibrated regularly as per manufacturers' / IS specifications.
- 2.4 One press of min. 250 T capacity for shearing, cutting, bending & punching steel plates in one stroke of thickness up-to 16 mm should be available. Alternately, a press of Min. 250T capacity for shearing, cutting, bending & punching steel plates in various strokes i.e. one operation in one stroke should be available.

- 2.5 At least one medium duty drilling machine should be available.
- 2.6 At least two sets of closed dies, fixtures and templates for cutting, blanking, punching, bending of steel plates as per the drawing requirements should be available.
- 2.7 At least one bench grinding machine, to remove sharp edges from the sheared/blanked or bent steel plates should be available.
- 2.8 At least three sets of Go & No-Go gauges should be available to check the dimensional accuracy of the steel plates and also the product at intermediate stage & final stage.
- 2.9 Ensure that the Go & No-Go gauges are calibrated on due dates and records of calibration are maintained. The Go & No-Go gauges should have a mention of the due date of calibration.
- 2.10 At least one shot blasting machine with table dia of at least 1 meter should be available. The shot blasting machine shall have in-built sieving facility to screen under-sized shots.
- 2.11 Adequate capacity for degreasing should be available. The process of cleaning should be a proven one and capable of removing accumulated dirt/dust, black spots etc.
- 2.12 Suitable spraying facility is required for application of adhesive. The spraying machine shall have an in-built provision of stirring the adhesive.
- 2.13 The adhesive application shall be done in a separate room which should be free from dirt/dust and having proper exhaust facility.
- 2.14 Elcometer or any other scientific & accurate measuring equipment should be available to measure the thickness of adhesive coats at primer application & final application stage. The instrument shall be capable of measuring the thickness of coating in microns.
- 2.15 Ensure that a system exists to measure the adhesive film

thickness at the specified frequency and the same is recorded.

- 2.16 A suitable capacity close mixing mill (Banburry) for mixing purpose (minimum one number) is preferable. However, availability of at least one kneader or internal mixer is essential.

The mixer/ kneader should be fitted with a device having automatic control for opening and closing to avoid manual control.

- 2.17 Ensure that minimum one number open mixing mill for sizing of rubber sheets is available. The open mixing mill should be equipped with suitable cooling arrangement and digital temperature indicator.

- 2.18 Ensure that at least one extruder to ensure uniform mixing is available.

- 2.19 Minimum two numbers suitable size presses for cutting rubber blanks should be available. Ensure that a suitable size die and punch facility to cut the blanks to the size is available.

- 2.20 An automatic thermic heating moulding press having provision of heating the platium hydraulically or by steam is available.

The press should be fully equipped with temperature controllers, digital temperature indicators and timers.

There should be a provision to set the press in such a way that the required pressure, time period and the temperature can be synchronized for subsequent series manufacture of a particular product without disturbing the setting on the machine. Minimum two number presses should be available.

- 2.21 Minimum two number of suitable designed dies & injection /transfer/compression moulds should be available for the product as per relevant specification and drawing.

- 2.22 It shall be ensured that the moulds are measured for their accuracy for various dimensions and profile at least on

weekly basis or after a production of 500 pieces, whichever is earlier and the observations of the mould are recorded.

2.23 Ensure that the system exists to check the dimensional accuracy of the mould before its use, if it is being used after a gap of considerable time period.

2.24 In-house availability of minimum infrastructure for maintenance and polishing of dies and moulds should be available.

3.0 Testing Facilities: The following testing facilities are required:

3.1 A controlled atmosphere laboratory to maintain standard temperature and humidity for rubber testing as per IS 13867 should be available.

3.2 A separate laboratory mixing mill & laboratory testing hydraulic press with temperature control, digital indicator, timer & pressure gauge should be available.

3.3 Tensile testing machine capable to read the load and elongation as per the requirement of the product should be available. The tensile testing machine should have all the provisions in accordance with para 4.2 of IS 3400 Part I.

3.4 A) Ensure that one universal testing machine with load indicator having a least-count of minimum 20 kg is available. The capacity of the machine should be adequate to work at specified speeds and it should be capable of checking of load deflection characteristics of the product, as stipulated in relevant specification/drawing of the product.

B) The universal testing machine should also have the facility to draw a graph for load deflection characteristics.

3.5 Ensure that a rheometer is available and it is being used regularly.

Ensure that a record is maintained of the batches, which are checked on rheometer.

3.6 Minimum two air ovens should be available to facilitate

the testing in accordance with para 4.2 & 6.2 of IS 3400 Part X.

- 3.7 Minimum one muffle furnace should be available.
- 3.8 Ensure that minimum two Shore 'A' hardness tester with standard test pieces are available.
- 3.9 At least one specific gravity testing apparatus should be available.
- 3.10 Ensure that the facility exists to check the viscosity of the adhesive.
- 3.11 Ensure that the facility for preparing test specimen as per IS 3400 Part I is existing.
- 3.12 Under mentioned measuring instruments in adequate number should be available –
 - (a) Micrometers
 - (b) Dial gauges
 - (c) Vernier calipers
 - (d) Go – No-Go gauges for all the important dimensions for a specific product
- 3.13 One number chemical balance and a crucible for measuring ash content should be available.
- 3.14 Suitable facilities for cutting the test specimen from the product should be available.

- 3.15 Following are the specific requirement for testing of Side Bearer Pads, only: -
- a) At least one suitable fixture for checking of load deflection characteristics of the product as specified in relevant specification, drawing (s) of the product should be available.
 - b) Ensure that suitable fixture for fatigue testing in vertical and shear mode is available.
 - c) One hydraulic/mechanical fatigue-testing machine should be available. The shear and vertical fatigue testing machine should satisfy the following requirements:
 - Provision for sealing of test sample should be available, so that the sample can not be changed during testing.
 - It should be able to apply the fatigue load/deflection as per the stipulated specification.
 - It should be possible to read the load deflection applied, as well as the no. of cycles directly on the machine.
 - Facility for recording the load versus deflection should be available.
 - The fixture for fatigue testing will be as per schematic, shown in drg. No. SKVL-135 (Annexure-I).
- 3.16 At least one suitable fixture for checking of shear bond strength of the metal to rubber bonded components should be available.

4.0 Quality control requirements:

- 4.1 There should be a system to ensure the traceability of the product from raw material stage to finished product stage. This system should also facilitate to identify the raw material composition from the finish product stage.
- 4.2 Ensure that the system of 'First in –First out' is followed for raw material and the intermediate stage product.
- 4.3 Ensure that there is a Quality Assurance Plan for the product detailing various aspects –
- Organisational chart
 - Process Flow chart
 - Stage inspection details
 - Various parameters and to ensure control

over them

The QAP shall be available as per the requirements detailed in “Vendor approval guidelines & application form”

- 4.4 There should be at least one full time rubber technologist having a minimum Bachelor’s degree in relevant field with 5 years’ experience or a person with Diploma in relevant field with 12 years’ experience. He should be free from day-to-day production, testing & quality control responsibility. He should be mainly responsible for development of a product, analysis of products, control over raw material, and corrective action in case of difficulties in achieving the required parameters.
- 4.5 Ensure that the in-charge of the Quality Control Section is having a qualification of minimum Bachelor’s degree in the relevant field & have min 5 years’ experience or a Diploma holder with min 12 years’ experience. He should be actively involved in day-to-day activities of quality control / stage inspection / compliance of QAP etc.
- 4.6 The firm should have acquired ISO: 9000 series certification and the product for which an approval is sought should be broadly covered in the scope of the certification for manufacture & supply. ISO 9000:1994 version is acceptable upto 14.12.2003 & only ISO 9001:2000 acceptable thereafter.
- 4.7 The Quality manual of the firm for ISO:9000/9001 should clearly indicate at all stages the control over manufacturing and testing of the said railway product.
- 4.8 Ensure that proper analysis is being done on monthly basis to study the rejections at various internal stages of manufacturing and it is documented.
- 4.9 Ensure that all the latest relevant specifications, drawing and IS standards are available with the firm.
- 4.10 Ensure that the adequate covered area for storage of final product, awaiting inspection is available.

- 4.11 Ensure that proper record of complaints received from users (Railways) is being maintained and corrective action is taken.
