सत्यमेव जयते

भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन

Govt. of India - Ministry of Railways
Research Designs and Standards Organisation

Document No. TDG 0034 Rev. '1'

ITEM SPECIFIC GUIDELINES FOR MANUFACTURE & SUPPLY OF COMPOSITE GROOVED RUBBER SOLE PLATE

रेलपथ अभिकल्प निदेशालय
अनुसंधान अभिकल्प और मानक संगठन
मानक नगर, लखनऊ - २२६०११

Track Design Directorate
Research Designs and Standards Organisation
Manak Nagar, Lucknow - 226011

A. GUIDELINES FOR REGISRATION OF COMPOSITE GROOVED RUBBER SOLE PLATES

This Schedule of Technical Requirements (STR) is for 6.2mm thick Composite Grooved Rubber Sole Plate and 10mm thick Composite Grooved Rubber Sole Plate. Vendors seeking registration for any of the items shall register online on the RDSO website and shall submit the initial vendor registration fee. All relevant documents like Vendor approval guidelines, latest version of all the relevant specifications, STRs and drawings are available on the website of RDSO. The vendor development shall be done as per the provision of latest ISO documents of RDSO in vogue and Railway Board instructions. ISO documents in regard with vendor approval process are available on RDSO website in public domain.

B. SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF COMPOSITE GROOVED RUBBER SOLE PLATE

1.0 SCOPE

1.1 This Schedule of Technical Requirements covers the norms for manufacture and supply of Composite Grooved Rubber Sole Plate.

REQUIREMENTS

The vendors seeking approval shall comply all the below mentioned requirements.

2.0 GENERAL AND MANUFACTURING FACILITIES

2.1 Covered area free from dampness and humidity with adequate space for storage of raw rubber, carbon and chemicals with suitable dust collector to be provided around Kneader area.

2.2 The automatic weighing/batching shall have digital display duly calibrated and with bin system facilities for measuring chemical and other raw material constituents (except rubber and wax) accurately.

2.3 Facilities for storage of mixed rubber compound batch-wise shall have:

(i) The storage room for mixed rubber compounds must be cool, dry and dust free.

(ii) Storage temperature should range between + 15 to +25°C.

(iii) The air humidity in storage room should be below 65%.

(iv) Rubber compound should be protected in particular against direct sun light and strong artificial light with a high ultra violet content.

(v) Thermometer and hygrometer for measurement of ambient temperature and humidity shall be provided at suitable location in storage area

2.4 Facilities for mixing of rubber compound in internal mixer (kneader) at a temperature below the oxidation temperature.

(i) There shall be appropriate arrangement of cooling tower/Chilling plant to control mixing process temperature of the compounding machinery to avoid scorching.

(ii) The optimum temperature to be maintained during mixing should not exceed 120°C.

(iii) Rubber compounds shall be used as First in First out methods (FIFO) for further processing.

2.4.1 Mixing Mill:

Mixing of various other ingredients/ chemicals and refining of rubber compounds for better dispersion can be achieved in open mixing mill. The temperature at this stage is to be within specified range to avoid oxidation of rubber compound. Therefore, in the mixing mill –

(i) There shall be arrangement of cooling tower/Chilling plant to control mixing process temperature of the compounding machinery to avoid scorching.

(ii) The optimum temperature to be maintained during mixing should not exceed 120°C.

(iii) Each batch should be marked with batch number & date.

(iv) Rubber compounds kept batch wise shall be used as First in First out methods (FIFO).

2.4.2 Facilities for calendaring:

(i) A minimum 3 roll calendar is to be provided where sheet taken out from open mixing mill shall be fed to this calendaring machine to take smooth sheet of desired thickness and width.

(ii) Pass this sheet in desired width through cooling drums running with chilled flow of water to control process temperature.

(iii) Roll in PP liner or HDPE polyethylene film to avoid sticking of layers.

(iv) Maintain the weight as per mould feed weight.

(v) Sheets must be cooled up to ambient temp while stacking (Maturation 06 hour's minimum).

(vi) Stack batch wise duly marked 'A' layer & 'B' layer separately.

2.4.3 Facilities for mechanized building of preform of CGRSP before moulding:

Load 'A' layer & 'B' layer separately on automatic building machine. Unroll sheet and apply 'A' layer on 'B' layer with proper tension and pass both the sheet jointly under pressure roll with help of pneumatic pressure roller to bond it properly and then pass through pricker roll to avoid air entrapment. Stamp or mark 'A' on A side properly to avoid wrong feeding in press and then cut in to desired size by auto cutter (Preform maker).

2.5 Facilities for Co-extrusion with roller head (in case, facility for Co-extrusion is available, then calendaring machine and mechanized building of preform is not required).

In case of Co-extrusion facility available, two different rubber compound 'A' & 'B' from mixing mill should be feed to Co-extruder. The co-extruded preform in strip shape is received by a post extrusion line where the strip is continuously cooled and automatically cut to the size to achieve performs of precise size, weight.

2.6 Facilities for curing and molding the Composite Grooved Rubber Sole Plate (curing hydraulic press):

2.6.1 The molding presses shall be hydraulically operated with timer and digital display of controlled temperature without pressure drop even in multiple daylight presses. There

should be a provision to set the press in such a way that the required pressure, the time period and the temperature can be synchronized for subsequent series in manufacture of a particular product without disturbing the setting on the machine. All molding press shall be facilitated with auto close/auto open system along with auto bumping facilities.

2.6.2 It is to be ensured that the moulds are measured for their accuracy for various dimensions and profile at least on monthly basis or after a production of 50,000 pads whichever is later and the observations of the mould are recorded.

2.6.3 It is to be ensured that the system for checking the dimensional accuracy of the mould exists in case it is being used after a gap of considerable time period.

2.6.4 In house availability of minimum infrastructure for maintenance.

2.6.5 Facilities for measuring temperature of surface.

2.6.6 Facilities for maintenance and repairs of equipment.

2.6.7 Facility for adequate storage of finished product, batch-wise to avoid mix up (Bond room).

2.7 Finishing of final product: Finishing of final product should be done with Mechanized flash cutting machine.

3.0 TESTING FACILITIES:

Following testing facilities and measuring instruments should be available with the firm.

3.1 A separate laboratory, mixing mill and testing hydraulic press equipped with temperature control, digital indicator, timer and pressure gauge.

3.2 Rheometer shall be used to regulate process control parameters. Record of Rheometer is to be maintained batch wise separately for compound A & B. The maximum difference in curing time of compound A and compound B shall be defined in firms QAP along with the time to be taken for curing of Composite GRSP (average, higher /lower of the two).

3.3 Computerized Tensile testing machines capable to read the load and elongation as per the requirement of the product.

3.4 Minimum two numbers of ovens.

3.5 Muffle furnace.

3.6 Shore 'A' hardness testing machine with standard test pieces.

3.7 Specific gravity and Ash content testing apparatus.

3.8 Digital balance and crucibles for measuring Ash Content.

3.9 Sufficient number of compression set equipment with suitable steel separators.

3.10 Sufficient number of tensioning device with suitable self-tightening grip.

3.11 A suitable air oven and other facilities as per requirement of test method given in the specification with automatic continuous recorder including stamping/printing on rolls/charts.

3.12 Motorized Load compression testing equipment, capacity 50 T with two dial gauges capable of reading 1/100mm to be mounted on the opposite sides of the equipment so as to measure the compression.

Alternatively, computer controlled Universal Testing Machine (UTM) of capacity 50t having different load cells of capacity 500 kg, 1t, 20t & 50t.

3.13 Million Mega ohm meter or any other suitable equipment, capable of measuring electrical resistance more than 500 Mega Ohm along with facilities for calibration of standard box of electrical resistance.

3.14 Go and No Go gauges are calibrated on due date and the record there of.

3.15 Any other facility acquired for testing methods given in the specification.

3.16 The following measuring instruments in adequate number:

i) Dial gauges

ii) Vernier Calipers

iii) Dumbbell and test specimen cutter

iv) Two sets of Go, No-Go, gauge for all the important dimensions marked with firm's initial, set no. of gauge and drg. no. of the product

v) Steel Scale (Linear)

vi) Hygrometer (Humidity Recorder) of suitable range

vii) Dry & Wet Thermometer of suitable range

3.17 Suitable testing equipment for Adhesion Strength Test.

3.18 Suitable testing equipment for Impact Attenuation Test.

3.19 Suitable testing equipment for Secant Stiffness Test.

3.20 Yerzely Oscillograph machine to test the properties of Compound B of the item as per ASTM-D 945-06.

4.0 QUALITY CONTROL REQUIREMENTS:

4.1 There should be a system to ensure the traceability of the product from raw material sample to finished product stage. This system should also facilitate to identify the raw material composition from the finished product stage.

4.2 There should be QAP for the product, detailing following aspects.

i) Organizational Chart

ii) Flow Process Chart

iii) Stage inspection details

iv) Each mix/batch testing as per specification.

v) Plants and machinery as per STR

4.3 All the relevant specifications and IS Standards should be available with the firm.

C. PROFORMA FOR TECHNICAL CAPABILITY ASSESSMENT FOR MANUFACTURE AND SUPPLY OF COMPOSITE GROOVED RUBBER SOLE PLATES

(To be filled in by the firm in triplicate. Attach extra sheets wherever necessary)

1.0 SECTION-I : GENERAL INFORMATION

1.1 Name of the firm

1.2 Address:

(a) Head Office

(b) Works

(c) Location of works …….Km, From ……Railway Station.

1.3 Factory Area (Sq.m):

(a) Covered

(b) Uncovered

(c) Is the factory site in your name or on rental basis? (Support with documents)

(d) Telephone No./Mobile No.

(i) Head Office
(ii) Works

(e) Telegraphic /Fax Address/E-mail ID

(i) Head Office
(ii) Works

(f) E-mail Address

(i) Head Office
(ii) Works

1.4 SSI/NSIC Registration No. (Enclose Copy):

1.5 Power availability (KVA)

(a) General allotted capacity

(b) Standby generator and its capacity, if available.

(c) Name the party/person in whose name the power is sanctioned and your agreement with the party/person (Support with documents)

1.6 Name of any other units located in the above premises.

1.7 Man Power Management

(a) Managerial staff
(b) Shop floor Engineers/Supervisors (Their Nos. with their qualifications and service experience)
(c) Laboratory In charge whether full time or part time. (Indicate their names, qualifications and service experience)

(d) Inspection & quality control staff,
(Give their name, qualifications and service experience)

(e) Workmen

(i) Highly skilled

(ii) Semi-skilled

(iii) Un-skilled.

2.0 SECTION-II: TECHNICAL INFORMATION (Availability of plant & machinery as indicated by manufacturer should be verified by assessing official)

2.1 Infrastructure for production of Composite Grooved rubber sole plates.

2.2 (a) Facility for storage of raw material

(b) Facility for weighing of raw material and storage of weighed raw material batch wise.

2.2.1 Facility for mixing rubber compound.

(a)	**Mixing mills**
(i)	Nos.
(ii)	Type
(iii)	Size
(iv)	Capacity
(v)	Make
(vi)	Temperature control system
(vii)	Each mix/batch size (in Kg.)

(b)	**Internal mixer (Kneader)**
(i)	Nos.
(ii)	Type
(iii)	Size
(iv)	Capacity of motor in H.P.
(v)	Make
(vi)	Temperature control system
(vii)	Each mix/batch size (in Kg.)

2.2.2 Facilities for extrusion (optional)

(a) Extruder
(i) Nos.
(ii) Size
(iii) Type
(iv) Capacity
(v) Make
(vi) Temperature Control system
(vii) Each mix/batch size (in Kg)

2.2.3 Facility for Calendaring Machine-Three roll calendar / spreader (if Co-extruder is used, then calendaring machine is not required).

(i) Nos.

(ii) Type

(iii) Make

(iv) Size

(v) Capacity

(vi) Mode of heating of press (Steam / Electrical)

2.2.4 Facilities for curing and moulding the Composite Grooved rubber sole plate, Curing Hydraulic press:

(i) Nos.

(ii) Type

(iii) Make

(iv) Day light

(v) Size

(vi) Capacity

(vii) Clamping pressure

(viii) Mode of heating for press (Steam/ electrical)

(ix) Temperature Control system

2.2.5 Provision of Flash Cutting Machine

2.2.6 Provision of automatic weighing/batching plant having digital display duly calibrated and with bin system facilities.

2.2.7 Provision of mechanized preform building machine. (If Co-extruder is used, then mechanized preform building machine is not required).

2.2.8 Rheometer

(i) Make
(ii) Type
(iii) Sample size

2.2.9 Facilities for measuring and recording temperature of:

(i) Rubber Compound
(ii) Surface

2.2.10 Facilities for maintenance and repairs of equipment and moulds (optional)

(i) Tool room M&P
(ii) Mould and dies.

2.2.11 Rated production capacity planned for sole plates.

2.2.12 Arrangement for storing finished sole plates, batch-wise to avoid mix up (Bond room)

2.3 Test facilities cum quality control measures.

2.3.1 Laboratory room

(i) Size Mechanical lab and chemical lab.
(ii) Air conditioning arrangement for controlling temperature and humidity in the room.

2.3.2 Test Facilities

SN	Test	Requirement	Indicate availability in detail
(i)	Hardness (Shore A)	(a) Hardness tester Shore 'A' Durometer. (b) Other test facilities as per the requirement of test method given in the specification.	
(ii)	Tensile strength	(a) Computerized tensile testing machine with suitable grips, capacity up to one tone with adjustable lower scale and capable of adjusting operating speed 450-600 mm/min. The testing machine should be suitable for relaxed modulus testing. (b) Other test facilities such as preparation of test specimens and facilities as per the requirement of test method given in the specification.	
(iii)	Elongation at break	(a) Computerized tensile testing machine. (b) Other test facilities as per the requirement of test method given in the specification.	
(iv)	Modulus relaxed at 100% elongation	(a) Computerized tensile testing machine with power actuated grips & operating speed of 450-600 mm/min. (b) Other test facilities as per the requirement of test method given in the specification.	
(v)	Compression set at 50% compression	(a) Compression set equipment with suitable steel spacers. (b) Air oven and other facilities as per	

SN	Test	Requirement	Indicate availability in detail
		requirement of test method given in the specification.	
(vi)	Tension set at 50% stretch	(a) Tensioning device with suitable self-tightening grips. (b) Air oven and other facilities as per requirement of test method given in the specification.	
vii)	Load compression characteristic	(a) Motorized load compression testing equipment 50t capacity mounted with two dial gauges capable of reading 1/100 mm. Or computer controlled UTM of capacity 50T having different load cells of capacity 500 kg, 1T, 20T & 50T. (b) Other facilities as per requirement of test method given in the specification.	
(viii)	Electrical resistance	a) Million mega ohm meter or any other suitable equipment, capable of measuring electrical resistance more than 500 mega ohms. b) Test facilities and arrangements as per the specification. c) Standard resistant box of 100 to 500 mega ohms.	
(ix)	Dynamic property	Yerzely Oscillograph machine to test the properties of Compound B of the item as per ASTM-D 945-06.	
(x)	Dimensional Check	Two sets of inspection gauges.	

2.3.3 Facility for accelerating ageing of the rubber pad: Electrical oven with provision of Air circulation and continuous temperature / time recorder.

2.3.4 Facilities for checking Calibration of Computerized Tensile Testing machine and the periodicity of calibration.

2.3.5 Facilities for checking the calibration of the Motorized Load Compression testing equipment for the load compression characteristic test and the periodicity of checking calibration.

2.3.6 Facilities for Adhesion Strength Test.

2.3.7 Facilities for Impact Attenuation Test.

2.3.8 Facilities for Secant Stiffness Test

2.4 Staff strength:

a. Production staff

b. Quality assurance staff

c. Staff for quality monitoring at production stage

d. Staff for laboratory testing

2.5 Give a list of the relevant IRS, I.S. and ASTM specification as available with you relevant for grooved rubber sole plates.

2.6 Submit quality assurance Programme, if any being followed or proposed to be introduced covering information, audit check, points pertaining to various stages, such as raw material control, chemical weighing room mixing, performing, curing, finishing, Inspection and packing stages. Formats being used / proposed to be used for the documentation of quality control system also be submitted.

3.0 SECTION-III: EXPERIENCE

3.1 Indicate various types of items being manufactured in your works and the name of the agency / client for whom it is being manufactured.

3.2 Indicate important customers for the last three years (both Govt. and non Govt.) if any, for information furnished in your reply to 3.1.

3.3 Indicate details (contract reference, item and quantity manufactured and supplies of important orders executed in the past three years for the following. Indicate the inspecting agency for each:

(i) Govt. Department, Central, State and Govt. undertaking other than Railway

(ii) Directly to the Railways.

(iii) Outside important firms.

3.4 Please specify current orders in hand on your firm (Contract reference, client, item, quantity under manufacture and supply)

3.5 Whether you are already registered with RDSO for other P.Way items. If so, name the item supported by documents.

3.6 Whether you are already registered with RDSO for other than P.way items. If so, name the item & department with which you are registered, supported by documents.

3.7 Indicate annual turnover of your company.

4 DECLARATION:

4.1 We do hereby declare that the above particulars are correct and no discrepancy shall be found during actual investigation before and during execution of order on our firm.

4.2 Any change in the plant and machinery and change of place of office and of works site shall be brought to the notice of RDSO for clearance and approval.

4.3 We also declare that our firm has not been black-listed by Railways, Railway Board/RDSO for business with the Railways.

4.4 We hereby undertake that all our equipments for manufacturing and testing as listed above shall be maintained in good working order at all times.

4.5 We hereby declare that the contents and the instructions of "latest ISO document for Vendor Approval" have been read and understood by us and our firm shall agree to abide by all the stipulations laid therein.

Signature
Name in full of Signing Authority
Place : Status in the Firm
Date : Stamp of the firm