



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 0042 REV. '0'

ITEM SPECIFIC GUIDELINES & SCHEDULE OF TECHNICAL REQUIREMENTS

FOR

MANUFACTURE & SUPPLY

OF

RUBBER PADS FOR PLACING BENEATH RAILS

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

**TRACK DESIGN DIRECTORATE
RESEARCH DESIGNS AND STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW - 226011**

1.0 Purpose:

The purpose is to specifically define the guidelines for vendor approval of 'Rubber Pads' which include Grooved Rubber Sole plates (GRSP), Composite Grooved Rubber Sole plates (CGRSP) and Nylon Cord Reinforced GRSP and to specify technical and other Requirements in context with adequate space needed for storage of raw/finished material, manpower and plant/ machinery & equipment required for manufacture and supply of Rubber Pads.

The existing item specific guidelines & schedule for technical requirements for GRSP (6mm & 10mm), CGRSP (6.2mm & 10mm) and Nylon Cord Reinforced GRSP (6mm thick) have been merged together in the present document no. TDG 0042 Rev. '0' and is being issued in 2022.

2.0 Scope of Application

This shall be applicable for initial capability assessment, periodic quality audit for extension of approval, up-gradation of vendors and maintaining their approved list. In case of any variation between the procedure/provision given in work instruction and that in the 'Item- specific guidelines', the later shall prevail. The competent authority wherever referred to in this document shall mean Executive Director/ Principal Executive Director/INFRA-I.

3.0 Procedure / Details

Procedure/details are annexed.

4.0 Referenced Documents:

ISO apex documents of RDSO

5.0 Referenced Documents of External Origin

None.

6.0 Associated Records

None.

7.0 Responsibility and Authority

Activity	Responsible	Approver	Supporting	Consulted	Informed
Creation, maintenance of this document	ED/Track Design-II/ Director/ Track Design-IV	PED/INFRA-I	ADE S&F	Track design	All approved vendors through website
Compliance of directives contained in this document	DD/XEN/AIE/ARO	ED/Track Design-III/ Director/ Track Design-IV	-	-	-
Requirement of deviation from this directive	ED/Track Design-II/ Director/ Track Design-IV	PED/INFRA-I	ADE S&F	Track Design	-

8.0 Abbreviations

PED	Principal Executive Director
RDSO	Research Designs & Standards Organisation
DD	Dy. Director
ADE	Assistant Design Engineer.

A. ITEM SPECIFIC GUIDELINES

1.0 The process of approval will involve following steps / activities.

- i) Vendor seeking fresh registration shall register online on RDSO website www.ireps.gov.in
- ii) Submit duly filled-in online fresh application form along with vendor registration charges as applicable at the time of submission.
- iii) Upload the documents as mentioned at online vendor registration portal along with Quality Assurance Programme (QAP) and legal documents. Submit a key plan & layout plan, on Auto CAD (A-1/A-2 Size), for technical approval of RDSO. The layout plan should indicate the adjacent plot productions unit thereof, roads, boundaries etc.
- iv) The specification & relevant drawings are available on RDSO website and same can be downloaded from RDSO website www.rdso.indianrailways.gov.in. The charges of these documents are included in fresh registration charges and no need to deposit separate charges for these documents at the first time.
- v) Application/proforma along with documents & charges will be scrutinized by RDSO and if details are found satisfactory, the works unit of the firm will be visited for Technical Capability Assessment.
- vi) If any shortcomings are observed during the visit, the same will be conveyed to the firm for their compliance.
- vii) After satisfactory compliance by the firm, the firm is advised to submit gauge checking charges and inspection gauges of the drawings of Rubber pads applied for will be checked and approved during STR verification visit.
- viii) After satisfactory verification of document and CCA (Capacity cum Capability Assessment), the name of the firm shall be considered to be placed in the “List of RDSO vendors for Developmental order” with Initial Conditional approval for 24 months period subject to technical clearance of Prototype/ Test samples and its approval by the RDSO (to be mentioned in check note in Vendor directory).
- ix) After clearance / approval of two sets of inspection gauges as mentioned in para (vii) above, the firm would be advised to start trial production and to submit internal test results in formats as per Quality Assurance Programme (QAP) for manufacture and testing. If the internal test results are found satisfactory, the firm would be advised for drawl of samples manufactured in presence of RDSO official from their works premises.
- x) The testing of the samples drawn will be carried out as per clause laid down in the relevant IRS specification. If test report is found satisfactory and other conditions are fulfilled, the conditional check note in Vendor directory as mentioned in para viii above shall be removed. The firm will be advised to start production of the product. During the inspection the QAP adopted and records maintained by the firm will be verified.

- 2.0 In the case of new Vendor/firms the process of approval will be initiated only if the firm has applied on-line or has been placed with developmental order from Zonal Railways/ Railway Board or given go ahead from RDSO as per instructions /guidelines of Railway Board from time to time. Rest of the procedure for approval will be the same as detailed in para1.0 above.
- 3.0 In case, firms approved for manufacturing of Rubber Pad to one drawing, desires to develop the product to other drawings, the requisite inspection gauges will have to be approved by RDSO. After getting satisfactory internal test reports, the samples will be drawn and tested at RDSO. If test results on samples found satisfactory, the firm would be considered for inclusion in the “List of RDSO Vendors for Developmental Orders” as per the provisions of latest ISO apex documents”.
- 4.0 Up-gradation from “List of RDSO Vendors for Developmental Orders” to “List of Approved Vendors” shall be as per procedure mentioned in RDSO’s latest ISO apex documents.

FINAL DRAFT CHANGES

B. SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURING AND SUPPLY OF RUBBER PADS

1.0 SCOPE: The Schedule of technical requirements covers the norms for manufacture of Rubber pads.

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

2.1 GENERAL AND MANUFACTURING FACILITIES

2.1.1 Sufficient covered area free from dampness and humidity with adequate space for manufacturing, testing/inspection and storage facilities. Storage of raw rubber, carbon and chemicals with suitable dust collector to be provided around Kneader area.

2.1.2 Duly calibrated automatic weighing/batching of sufficient capacity with digital display, and with bin system facilities for measuring chemical and other raw material constituents (except rubber and wax) accurately.

2.1.3 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 be below 30°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

2.1.4 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.

2.1.4.1 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).

2.1.4.2 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 the sheets batch wise (duly marked 'A' layer & 'B' layer separately for Composite GRSP).

2.1.4.3 Facilities for mechanized building of preform of Composite GRSP 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).

- 2.1.5 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 the Co-extrusion facility is available, rubber compound (two different rubber compound 'A' & 'B' for Composite GRSP) 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.

Minimum two numbers presses of suitable size should be available for cutting of rubber blanks. Ensure the availability of a die of suitable size and punch facility to cut the blanks to the appropriate size.

- 2.1.6 Facilities for curing and molding i.e. curing hydraulic press.

2.1.6.1 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.

2.1.6.2

(a) 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.

(b) Molds must be periodically cleaned.

(c) Single or multi cavity mold for producing a rubber product shall comprise a precipitation hardening stainless steel without any surface treatment such as plating and/or fluorine resin coating applied to a finished surface of the mold. (For Nylon Cord Reinforced GRSP)

2.1.6.3 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.

2.1.7 In house availability of minimum infrastructure for maintenance.

2.1.8 Facilities for measuring temperature of surface.

2.1.9 Facilities for maintenance and repairs of equipment.

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

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

2.1.12 Provision of adequate sized room or steel Almirahs for inspecting official, with facility for safe storage of test samples / documents etc.

3.0 TESTING FACILITIES:

A fully air-conditioned separate laboratory with following testing facilities and measuring instruments should be available with the firm.

The air conditioned laboratory should maintain lab test conditions at $27\pm 2^{\circ}\text{C}$ and $65\pm 5\%$ relative humidity (RH), for which suitable indicating/ measuring instruments should be available with the firm with valid calibration certificate.

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.

Note: In case of CGRSP, records to be maintained 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 four number of ovens with proper arrangement of lock & key for inspection and testing
- 3.5 Muffle furnace (up to minimum 1000°C temperature for Nylon Cord Reinforced GRSP).
- 3.6 Shore 'A' hardness testing machine with standard test pieces.
- 3.7 Specific gravity and Ash content testing apparatus.
- 3.8 Digital balance with least count 0.001gm 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

Two Dial gauges with least count 0.01 mm for measurement of load deflection in compression testing

- ii) Vernier Calipers with digital display
- 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
- viii) Thickness gauge with least count 0.01mm
- ix) Twist Counter (For Nylon Cord Reinforced GRSP only)
- x) Ends per inch counter (For Nylon Cord Reinforced GRSP only)

3.17 Suitable testing equipment for Impact Attenuation Test.

3.18 Suitable testing equipment for Secant Stiffness Test.

3.19 Suitable testing equipment for Adhesion Strength Test for Composite GRSP.

3.20 Yorzely Oscillograph machine to test the properties of Compound B of Composite GRSP as per ASTM-D 945-06.

4.0 QUALITY CONTROL REQUIREMENTS:

4.1 There should be a well designed system, (preferably a computerized process control system) to ensure the traceability of the product and identification of the product composition at any stage from raw material to finished product stage. This system should be clearly stated in the quality manual of the firm. The firm should ensure that proper analysis is being done on monthly basis to study the rejection at various stages and keep a record of the same.

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 IS, ISO, IRS, ASTM standards should be available with the firm

4.4 The technical supervisors / managers responsible for production, quality control and testing activities related to manufacturing of Rubber Pad, should have minimum educational qualification of Diploma in Rubber / Polymer / Plastic Engineering / Technology with atleast 2 years experience in the relevant field.

C. PROFORMA FOR TECHNICAL CAPABILITY ASSESSMENT / QUALITY AUDIT FOR MANUFACTURING AND SUPPLY OF RUBBER PADS (GRSP / Composite GRSP/ Nylon Cord Reinforced GRSP as applicable)

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

1.0	SECTION – I : GENERAL INFORMATION (For record purpose only)	
1.1	Name of the Firm	
1.2	Address	
(a)	Head Office	
(b)	Works	
(c)	Location of Workskm fromRly. Stn.	
1.3	Factory Area (Attach layout plan for factory premises).	
(a)	Covered	
(b)	Uncovered	
(c)	Is the factory site in your name or on rental basis? (Support with documents)	
(d)	Telephone No. (i) Head Office (ii) Works	
(e)	Telegraphic address/Telex Address/Fax address/Email ID (i) Head Office (ii) Works	
1.4	SSIC / NSIC / MSME Registration No. (Enclose copy)	
1.5	Power Availability	
(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 relevant 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 numbers with their qualifications and service experience)	
(c)	Lab Incharge whether full time or part time. (Indicate their names, qualification and service experience)	
(d)	Inspection & Quality Control Staff. (Their nos., name, qualification 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 assessment official) Indicate the availability of following against each item	
2.1	Infrastructure for production and production capability of Rubber pads	
2.1.1	Facility for storage of raw material	
2.1.2	Facility for weighing of raw material and storage of weighed raw material batch wise.	
2.1.3	Facility for office of Inspecting official with standard furniture and attached toilet.	
2.1.4	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.)	
2.1.5	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)	
2.1.6	Facility for Calendaring Machine-Three roll calendar / spreader (if Co-extruder is used, then calendaring machine is not required).	
(i)	Nos.	
(ii)	Size	
(iii)	Type	
(iv)	Capacity	
(v)	Make	
(vi)	Mode of heating of press (Steam / Electrical)	
2.1.7	Facilities for curing and moulding -Curing Hydraulic press:	
(i)	Nos.	
(ii)	Size	
(iii)	Type	
(iv)	Capacity	
(v)	Make	
(vi)	Mode of heating of press (Steam / Electrical)	
(vii)	Day light	
(viii)	Clamping pressure	
(ix)	Temperature control system	
2.1.8	Provision of Flash Cutting Machine	
2.1.9	Provision of automatic weighing/batching plant having digital display duly calibrated and with bin system facilities.	
2.1.10	Provision of mechanized preform building machine. (If Co-extruder is used, then mechanized preform building machine is not required).	
2.1.11	Provision of Rheometer	
(i)	Make	
(ii)	Type	
2.1.12	Facilities for measuring and recording temperature of:	
(i)	Rubber Compound	
(ii)	Surface	
2.1.13	Facilities for maintenance and repairs of equipment and moulds (optional)	
(i)	Tool room M&P	
(ii)	Moulds and dies.	

2.1.14	Rated production capacity planned for rubber pads.		
2.1.15	Arrangement for storing finished Rubber pads, batch-wise to avoid mix up (Bond room)		
2.2	Test facilities cum quality control measures		
2.2.1	Laboratory room		
	(i)	Size of Mechanical lab and Chemical lab.	
	(ii)	Provision of Air conditioning arrangement for controlling temperature and humidity in the room.	
2.2.2	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 tonne with adjustable lower scale and capable of adjusting operating speed 450-600 mm/min & having facility to generate graph from the testing machine used to get tensile strength. 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, having facility to generate graph from the testing machine used to get Elongation at break.	
		(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, having facility to generate graph from the testing machine used to get Modulus relaxed at 100% elongation	
		(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 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 of 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. The compression testing equipment should be fully automatic and connected with computer to give compressive loads at required intervals and having facility to generate report/graph. (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 Composite GRSP as per ASTM-D 945-06.	
(x)	Dimensional Check	Two sets of inspection gauges.	
2.2.3	Facility for accelerating ageing of the rubber pad: Electrical oven with provision of Air circulation and continuous temperature / time recorder.		
2.2.4	Facilities for checking Calibration of Computerized Tensile Testing machine and the periodicity of calibration.		
2.2.5	Facilities for checking the calibration of the Motorized Load Compression testing equipment for the load compression characteristic test and the periodicity of checking calibration.		
2.2.6	Facilities for Adhesion Strength Test.(Only for CGRSP)		
2.2.7	Facilities for Impact Attenuation Test.		
2.2.8	Facilities for Secant Stiffness Test		

2.3	STAFF STRENGTH:																						
(i)	Production staff																						
(ii)	Quality assurance staff																						
(iii)	Staff for quality monitoring at production stage																						
(iv)	Staff for laboratory testing																						
2.4	Availability of relevant IS IRS and ASTM codes/specifications etc. for Rubber pads. Details to be given																						
2.5	Submission of Quality Assurance Programme (QAP) 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 should also be submitted.																						
3.0	SECTION - III : EXPERIENCE (For record purpose only)																						
3.1	Experience in manufacture of heat treated products																						
3.2	Indicate various types of items being manufactured in your works and the name of the agency / client for whom it is being manufactured.																						
3.3	Give details of important orders completed in the past 3 years																						
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		year	year	year																			
3.4	Please specify current orders in hand																						
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3.5	Whether the firm is already registered with RDSO for other P. way items. If so, name the item(s) supported by documents.																						
3.6	Annual turnover of the firm:																						

4.0 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 concern has not been black listed by Railway/Railway Board/ RDSO for business with the Railways.
- 4.4 We hereby undertake that all our machinery and equipments etc. for manufacture and testing as listed above shall be maintained in good working order at all time.
- 4.5 We hereby declare that the contents and the instructions of "**ISO Apex Documents of RDSO**" have been read and understood by us and our firm shall agree abide by all the stipulations laid therein.

Place:

Signature of Firm's Rep.

Date:

Name in full of signing authority

Status in the firm

Stamp of the firm

FINAL DRAFT CHANGES