Name	Designation	Signature	Date	Level
Sh. Harikesh Kumar	SSE / Design			Prepared
Sh. Ashok kumar Agnihotri	SME /Fur/Design			Agreed
Sh. Shobhit Pratap Singh	Dy. CME / Design-II			Reviewed
Sh. D.K. Singh	CDE			Approved

Issue/Rev.	Details of changes	Date
01	a) Eligibility criteria added for the tenderer in clause 2. b) Type tests and acceptance tests defined in clause 12. c) Values for Moisture contents, shot content, sulphur content, Recovery after compression, Resistance to Jolting and Alkalinity added.	08.08.2018
02	a) Fixing of insulation with adhesive "CPRX compound" added specified in para VII of clause no. 2. b) Construction image deleted from clause no. 2. c) Gas analysis in smoke chamber using FTIR technique CITg (4) max. added in clause no.8. d) Reinforcing deleted from composition (clause no. 9). e) Minimum warranty of the insulating material changed from 15 years to 20 years (clause no. 12). f) All properties of FRP tissue and temperature resistance added (clause no 13). g) Clause no. 13 added, to specify submission of sample for three tests (clause no. 13)	08.04.2019
03	Eligibility criteria (clause 3.0) deleted.	06.08.2022
Rev.04	1. **Clause no.2: Construction modified as "Open cell"** foam added in Construction. 2. **Clause no.5: Acoustic property "ACOUSTIC PROPERTIES for 50mm & 25mm " added in clause 6.** **1. Clause no.7:** Test requirements/properties for Insulation board/foam(for 25mm & 50mm) : modified as Density is 40+/-15% Kg/m^3 ***or lighter*** 3. **Clause 11**: Modified as: i. "Supplier/OEM as per Rev.04 or latest of this specification shall submit clause wise comments on the specification for compliance and deviation (if any)". (Sr. no. i)	

	ii. Any **Government recognized lab** in India added in sr. no. ii (b) iii. "**In rare case, when test facilities are not available as per (a) & (b) of this Para above, test certificate from NABL accredited lab not having tests & test method mentioned in clause 4 to 10 in its scope of accreditation from NABL shall be acceptable, subject to prior approval of the purchaser for such specific test**" added in clause no. 12, sr. no. ii(c). iii. The submitted test reports along with offer shall not be more than three (03) years old from the date of tender opening ~~except for type test (Fires and smoke test) (item no. 22 of table 1 of Para 4). Test report for Fire and smoke characteristics as per EN 45545/2 R1/HL3 Shall not be more than three (03) years older from date of tender opening~~.(Sr. No. iii) iv. Clause 11, Sr. no. (iv) deleted. 4. **Clause 12**: PROTOTYPE APPROVAL: **"In rare case, when test facilities are not available as per (a) & (b) of this Para above, test certificate from NABL accredited lab not having tests & test method mentioned in clause 4 to 10 in its scope of accreditation from NABL shall be acceptable, subject to prior approval of the purchaser for such specific tests"** added in clause no. 12, sr. no.i(c). 5. **Clause 13**: Quality Assurance plan **"In rare case, when test facilities are not available as per (a) & (b) of this Para above, test certificate from NABL accredited lab not having tests & test method mentioned in clause 4 to 10 in its scope of accreditation from NABL shall be acceptable, subject to prior approval of the purchaser for such specific tests"** added in clause no. 13, note(c). 6. **Clause 14**: Quality Assurance plan **"If purchaser requirement is only 25 or 50mm, then these test shall carried out on only 25mm or 50mm applicable. if purchase requirement is both(25mm & 50mm), then these test shall be carried out on 25 mm as well as 50mm"** added in clause no. 13, note(3). 7. **Clause 16**: In Process audit requirement (in every 3 years) modified as : Audit of OEMs for manufacturing & testing activities of	

	material will be done by M/s RITES or any agency authorized by concerned PU in every 3 years. It shall be responsibility of OEM to get audit done by M/s RITES or any agency authorized by concerned PU at its own cost. **Auditor will audit manufacturing & testing process at premises of the supplier.** During audit, all tests **(facilities which are available in premises of supplier)** ~~**except type test (Fire and smoke characteristics as per EN 45545-2, R1, HL 3)**~~ shall be conducted as per specification & shall be made part of the report. **However, auditor shall pick & send sealed sample to labs as detailed in of this specification for testing of all parameters in clause 4 to 10.** **Reports of tests from labs shall also be made part of audit report. However, provisional audit report may be issued meanwhile, till receiving reports from labs.** OEMs shall keep valid audit report & submit the valid audit report on demand. For type test, report not older than three (03) shall be submitted during audit. At any stage of procurement i.e. tender opening date, Purchase order placement date & during supplies, valid process audit report shall be available with supplier/tenderer. However, in case, audit report validity of three (03) years has expired but the supplier/tenderer has applied for audit/re-audit to RITES/or agency authorized by concern PUs well in advance i.e. at least three (03) months before expiry date of last audit report, case of such supplier/tenderer shall be proceeded & shall not be rejected on this account. However, for such cases, it shall be responsibility of supplier/tenderer to submit valid audit report within three (03) months after expiry at validity of last audit report. In case of new suppliers, CCA report shall be considered first audit report.	

Schedule of Technical Requirements

1. SCOPE:

This specification covers the general, technical and test requirements of Thermal cum acoustic Insulation material for Roof, Sidewall, End wall and Under-frame of LHB Coaches.

2. Construction:

The construction of Thermal Cum Acoustic insulation material will be sandwich of Densified resin Bonded insulation Board (factory laminated) or closed cell/ **open cell** foam made of polyolefin or hydrophobic melamine (factory laminated) with following layers:

I. First, topmost layer of perforated aluminium foil (outer layer)
II. Second layer of fiberglass tissue
III. Third layer of fiberglass board/foam
IV. Fourth layer of fiberglass tissue
V. Fifth layer of Black woven glass-fibre (outer layer).
VI. Each individual insulation slab shall be sealed from all four sides by using Aluminium tape before insulation.
VII. Each insulation slab shall be glued to the coach surface using CPRX compound (MDTS 153 Rev-nil), quantity per coach as 60 ltrs approx. The material has to conform all the properties mentioned in this specification. If any other material is offered, it shall require prior approval from MCF Design. Raw material for the insulation as per this standard should be indigenously available.

3. Salient features of the material:

i. The Insulation material to be supplied as per this standard shall meet the thermal, acoustic and fire properties as mentioned in para-4, 5 and 6 respectively.
ii. The Insulation material when subjected to vibration and Jolting tests ~~as per IS: 3144/BS 2972, shall not settle down at all and~~ shall conform to test specified in clause no.7 (sr. no. 13 & 14).
iii. Raw material for the insulation as per this standard shall be light weight, cost effective & indigenously available.

4. THERMAL PROPERTIES (for 25mm & 50mm):

Thermal conductivity (K-Value)	W/m.K @ 25 deg C mean temp	0.034 (Max.)	IS: 8183

5. ACOUSTIC PROPERTIES:

Noise Reduction coefficient (NRC) for 60 mm thickness	No unit	0.80 (min)	ISO 354 / ASTM 423
Sound Transmission Class (STC) for 60 mm thickness	db	41 min.	ISO:10140-2/ ASTM E 90/ ISO 15186-1
Construction of Panel for STC test: Stainless steel sheet 3mm+Thermal cum Acoustic Board+3mm LP panel			

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ACOUSTIC PROPERTIES for 50mm & 25mm			
Noise Reduction coefficient (NRC) for 50 mm thickness	No unit	0.85 to 0.95	ISO 354 / ASTM 423
Noise Reduction coefficient (NRC) for 25 mm thickness		0.5 to 0.6	
Sound Transmission Class (STC) for 50 mm thickness	db	35 to 45	ISO:10140-2/ ASTM E 90/ ISO 15186-1
Sound Transmission Class (STC) for 25 mm thickness		30 to 35	
Construction of Panel for STC test: Stainless steel sheet 3mm+Thermal cum Acoustic Board+3mm LP panel			

6. Fire Safety:

Fire safety property of thermal cum sound insulation material complete {Perforated aluminium foil (Top most layer)+Fibre glass tissue(second layer)+ Insulation board/foam(third layer)+ Fibre glass tissue(fourth layer)+ Black woven glass fibre(outer layer)}for thickness 25mm & 50mm as per standards shall be R1, HL3 as per EN 45545-2 as under:

Description	Units	Value	Test standard
Fire and Smoke Characteristics as per EN 45545-2(Table-5) R1,HL3	-------	----------	EN 45545 (2): 2013
• Lateral spread flame CFE (Minimum)	Kw/m^2	20 (Min.)	ISO-5658-2
• Heat release rate (Cone Calorimeter method)MARHE (Max)	Kw/m^2	60 (Max.)	ISO:5660-1:50Kw/m2
• Smoke generation Ds(4) (Max.)	No unit	150 (Max.)	EN ISO:5659, 2: 50 Kw/m2
• Smoke generation VOF4 (Max.)	Min	300 (Max.)	EN ISO:5659, 2:50 Kw/m2
• Gas analysis in smoke chamber using FTIR technique CITg(4) (Max.)	No unit	0.75 (Max.)	EN ISO:5659, 2: 50 Kw/m2

7. Test requirements/properties for Insulation board/foam(for 25mm & 50mm):

Table-1

S.No.	Description	Units	Value	Test standard
1.	Density	(Kg/m3)	40+/- 15% ***or lighter***	IS 8183
2.	Thickness	As per requirement		IS 8183
3.	Temperature resistance	°C	-50 to +230 °C	IS 8183

	(Insulation Board/foam)			
4.	Resistance to Micro Organism	------	No growth	As per IS 8183
5.	Limiting Oxygen Index (insulation Board/foam)	Percent	50 (Min.)	NES 714/ NCD 1410
6.	Horizontal Burning Rate	mm/min	0	IS:15061-2002, CLAUSE 3.2 and Annex A
7.	Melting Behaviour Test	No drop which ignites the cotton wool	No drop	IS:15061-2002, CLAUSE 3.4 and Annex C
8.	Moisture absorption	Percent	2 (Max.)	IS 8183
9.	Recovery after compression	Percent	90 (Min.)	IS 8183
10.	Shot content	Percent	15 (Max.)	IS 8183
11.	Incombustibility	------	Incombustible	IS 8183 BS:476-Pt.4
12.	Sulphur content	Percent	0.6 (max)	IS 8183
13.	Resistance to Vibrations		1 % Max of height settlement	IS 8183
14.	Resistance to Jolting test		3 % Max of height settlement	IS 8183
15.	Alkalinity	pH	7-10	IS 8183

Note: Above properties (Table-1) is for Densified resin bonded insulation Board. However, If Insulation board/foam material is made of *Polyolefin or Hydrophobic melamine (factory laminated)*, properties shall be superior than above properties mentioned in Table-1.

8. Composition and test/properties of Aluminium Foil:

- **Composition:**

S.No	Facing Composition	Description	Specified Value
1.	Foil	Aluminium	6.0-8.0 Microns
2.	Adhesive	Water based	4.0-6.0 g/m2
3.	Kraft	Natural	Density 45-55 g/ m²

- **Test requirements/Properties:**

S.No	Physical Properties	Specified Value	Test Method
1.	Basic weight	95-120 g/ m2	Scale
2.	Water Vapour Transmission rate	1.1-1.2 ng/N.s	ASTM E 96 Procedure-A
3.	Bursting Strength	2.0-3.5 Kg/ cm²	ASTM D 774
4.	Tensile Strength	4.5(min)KN/m(MD) 2.5 (min)KN/m(XD)	ASTM C 1136
5.	Calliper Thickness	140-180 microns	Micrometer
6.	Water immersion	No de-lamination	24 hrs at 20-25°C

9. Requirement of Black Woven Glass Cloth:

Description	Data
Weight	140-160 gm/m2
Width	0.935m
Thickness	0.14mm± 15%
Colour	Dark Black

10. Requirement of FRP Tissue:

Description	Data
Weight	35 gm/m2 + 4 gm

11. Documents to be submitted along with offer:

i. ~~**First time**~~ supplier/OEM as per Rev.04 of this specification shall submit clause wise comments on the specification for compliance and deviation (if any).

ii. Supplier/OEM shall submit test certificate of parameters(clause 4 to 10) of specification from:

(a) Any NABL accredited lab (in-house or outside) having tests & test method mentioned in clause 4 to 10 in its scope of accreditation from NABL or report from NTH/NPL. Test report must contain NABL logo/seal, in case reports are submitted from NABL accredited lab.

(b) In case, there is no NABL accredited lab is available in India for some tests (with test method mentioned in the specification) and the test facility for same tests (with test method mentioned in the specification) are also not available with NTH/NPL, then for those tests, **report from** any Government's lab/any **Government recognized lab for such test** in India will be acceptable.

(c) **In rare case, when test facilities are not available as per (a) & (b) of this Para above, test certificate from NABL accredited lab not having tests & test method mentioned in clause 4 to 10 in its scope of accreditation from NABL shall be acceptable, subject to prior approval of the purchaser for such specific tests.**

In absence of any of above details for offered product, the offer would not be considered.

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iii. The submitted test reports along with offer shall not be more than one **(03)** years old from the date of tender opening ~~**except for type test (Fires and smoke test) (clause no. 6). Test report for Fire and smoke characteristics as per EN 45545/2 R1/HL3 Shall not be more than three (03) years older from date of tender opening.**~~

~~**iv. Valid audit report/CCA report except by bidder seeking developmental order based on availability of M&P & shall be subjected to CCA before placement of purchase order if its bid is acceptable.**~~

12. PROTOTYPE APPROVAL:

The Firm shall supply a sample along with the following details at the time of prototype testing as per PO or as per applicable guideline:

i. Supplier shall submit test certificate for parameters(clause 4 to 10) of specification from:

(a) Any NABL accredited lab (in-house or outside) having tests & test method mentioned in clause 4 to 10 of specification in its scope of accreditation from NABL or report from NTH/NPL. Test report must contain NABL logo/seal, in case reports are submitted from NABL accredited lab.

(b) In case, there is no NABL accredited lab is available in India for some tests (with test method mentioned in the specification) and the test facility for same tests (with test method mentioned in the specification) are also not available with NTH/NPL, then for those tests, **report from** any Government's lab/any **Government recognized lab for such test** in India will be acceptable.

(c) **In rare case, when test facilities are not available as per (a) & (b) of this Para above, test certificate from NABL accredited lab not having tests & test method mentioned in clause 4 to 10 in its scope of accreditation from NABL shall be acceptable, subject to prior approval of the purchaser for such specific tests.**

These tests shall be done during initial approval, change of design and change of manufacturing process or raw material.

ii. Material and Safety date sheets.

iii. For thermal conductivity test, noise reduction coefficient and sound transmission class, firm has to submit the sample to MCF for test. The cost of these three tests shall be borne by the firm.

iv. The bulk manufacturing shall be undertaken only after approval of Prototype. This clause of Prototype approval is applicable for the first supply by new firm as well as in case of change of design and change of manufacturing process or raw material.

13. <u>Quality Assurance, test & documents:</u>

Requirement description	Requirement detail	<u>Remarks</u>
Quality Assurance plan	The manufacturer shall have the detailed quality Assurance plan. The Plan shall be submitted for the approval by respective PU. The QAP document shall clearly document the following	The QAP shall be submitted in PDF as per MCF format (Annexure-A)

	and control the test record formats. **1.** Control over outsourced products and processes **2.** Testing of raw material and establishing its traceability **3.** Sampling Plan **4.** Type Tests **5.** Routine Tests **6.** Acceptance tests **7.** Raw Materials	
Type Tests	These tests shall be done on a sampled lot of prototype. Such Tests are required only on initial approval, change of design and chance of manufacturing process or raw material. These tests are to be repeated after every 36 months or as specified. • Fire and smoke characteristics as per EN 45545-2, R1, HL3 (clause no. 6). However, if the consignee or inspecting agency desires to do the type tests, before 36 months, the supplier should not deny the same. There are various circumstances when type tests may be needed on next supply before 1 year of last supply /last type tests. eg: • In case of doubt in type test certificate. (Previous) • Complaint regarding type test certificates. • Failure of material attributable to any of the parameters covered in type tests, etc. *Moreover, during type test, all tests, listed in routine tests & acceptance tests shall also be conducted.*	The records of the type tests shall be maintained by the manufacturer and shall be made available upon demand. These records shall be traceable and verifiable.
Routine Tests	These tests are required to verify the functional working of the system. These may require simulated in-puts for testing the operation under full range of inputs. These tests shall be done by the manufacturer during manufacturing and record maintained for inspection. These tests are to be repeated after every 12 months or as specified. • Thermal Conductivity • Noise Reduction coefficient (NRC)@ 60 mm thickness • Sound transmission Class (STC)@ 60 mm thickness • Temperature resistance • Resistance to Micro organism.	The records of the Routine tests shall be maintained by the manufacturer shall be made available upon demand. These records shall be traceable and verifiable. •

	• Limiting Oxygen Index • Horizontal Burning Rate • Melting behaviour test • Moisture absorption • Recovery after Compression • Shot Content • Incombustibility, • Sulphur Content • Resistance to Vibration, • Resistance to Jolting • Alkalinity • Al Properties of Al. Perforated Foil • All properties of Black glass cloth • All properties of FRP tissue *Moreover, during routine tests, all tests, listed in acceptance tests shall also be conducted.*	
Acceptance tests	These tests shall be done on all or samples of lot for bulk supply. Sampling shall be done as per IS:2500 These tests shall normally consist of routine tests and additionally specified in the contract. Following tests shall be considered as acceptance tests: • Bulk Density • Thickness & dimensional Check • Density of base material wool) • Construction, basic wt. and caliper thickness of aluminium foil as clause no. 8. ~~• All other parameters apart from Type test & routine test shall be checked as per Acceptance test.~~ • Documents for routine test & type test with above detailed periodicity & validity shall also be checked during acceptance test & enclosed with acceptance test documents.	These shall be conducted by the consignee or their authorized agency prior to dispatch. All infrastructures required to enable acceptance tests shall be provided by the bidder / OEM. The records of the acceptance tests shall be enclosed along with the supply consignment. These records shall be traceable and verifiable.

Note:

1. For thermal conductivity, noise reduction coefficient and sound transmission class, firm has to submit the sample to MCF for test. The cost of these three tests shall be borne by the firm.
2. Supplier shall submit test certificate of parameters (clause no. 4 to 10) of specification for Type Tests, Routine Tests & Acceptance tests from :
   (a) Any NABL accredited lab (in-house or outside) having tests & test method mentioned in clause no. 4 to 10 of specification in its scope of accreditation from NABL or report from NTH/NPL. Test report must contain NABL logo/seal, in case reports are submitted from NABL accredited lab.

   (b) In case, there is no NABL accredited lab is available in India for some tests (with test method mentioned in the specification) and the test facility for same tests (with test method mentioned in the specification) are also not available with NTH/NPL, then for those tests, **report from** any Government's lab/any **Government recognized lab for such test** in India will be acceptable.

   (c) **In rare case, when test facilities are not available as per (a) & (b) of this Para above, test certificate from NABL accredited lab not having tests & test method mentioned in clause 4 to 10 in its scope of accreditation from NABL shall be acceptable, subject to prior approval of the purchaser for such specific tests.**

3. **If purchaser requirement is only 25 or 50mm, then these test shall carried out on only 25mm or 50mm as applicable. If purchase requirement is both (25mm & 50mm), then these test shall be carried out on 25 mm as well as 50mm.**

14. Warranty:

Minimum warranty of the insulating material shall be 20 years from the date of application of the material in the coach.

15. List of Machineries & plant and testing facilities :

A. Machinery and Equipments :

1. Slitting machine
2. Compressors- 6 bar - 2 nos, 3 bar -3 nos. (472 LPS)
3. Compression packing m/c.
4. Batch House-30 MT/D
5. Melter-30 MT/D
6. Forming machine
7. Vacuum pump 2 nos. (760 mm of Hg)
8. Process water filtration and recirculation system
9. Resin & binder preparation equipment
10. Effluent treatment Plant (30 MT/D**) if process of manufacturing & testing in coaches discharge(in case of complete recycling resulting in discharge may be exempted)**
11. Facing Lamination machine
12. Fork lift - 3 ton - 2 nos. (3 Ton)
13. Diesel Generator-1010 KVA -01 No. (1010 KVA)
14. Electric substation (22 KV)
15. Fire hydrent system (297 m3/hr)

16. Cooling tower (200 M3)
17. Rolling up/stacking machine

B. Essential Testing facilities

1. Measuring scale
2. Measuring tape (3m & 5m)
3. Sound level meter
4. Varnier calliper
5. pH meter (pH 0 to 14)
6. Moister analyser
7. Laboratory Oven (0 to 999, Min. 0 to 400 o C)
8. Humidity Chamber, (0 to 99% RH, 0 to 99 o C)
9. Hot Plate (0 to 250 o C)
10. Projection Microscope (0 to 1 mm)
11. Sieve mesh-class A(BSS NO:- 30, BSS NO:- 60 BSS NO:- 100)
12. Ignition Test Apparatus (0 to 99.99 Min., 0 to 800 o C)
13. Compression Testing machine (0 to 10000 N)
14. Vibration Tester & Jolting Machine (0 to 6000 Min.)
15. Water bath Thermostatic (0 to 100 oC)
16. Weighing balance (0 to 100 Kg, 0 to 3 Kg & 0 to 220 gms)
17. Muffle Furnace (0 to 1200 °C)

16. Process audit requirement(in every 3 years):

Audit of OEMs for manufacturing & testing activities of material will be done by M/s RITES or any agency authorized by concerned PU in every 3 years.

It shall be responsibility of OEM to get audit done by M/s RITES or any agency authorized by concerned PU at its own cost.

Auditor will audit manufacturing & testing process at premises of the supplier. During audit, all tests **(facilities which are available in premises of supplier)** ~~**except type test (Fire and smoke characteristics as per EN 45545-2, R1, HL 3)**~~ shall be conducted as per specification & shall be made part of the report.**However, auditor shall pick & send sealed sample to labs as detailed in of this specification for testing of all parameters in clause 4 to 10.**

Reports of tests from labs shall also be made part of audit report. However, provisional audit report may be issued meanwhile, till receiving reports from labs.

OEMs shall keep valid audit report & submit the valid audit report on demand. For type test, report not older than three (03) shall be submitted during audit.

At any stage of procurement i.e. tender opening date, Purchase order placement date & during supplies, valid process audit report shall be available with supplier/tenderer. However, in case, audit report validity of three (03) years has expired but the supplier/tenderer has applied for audit/re-audit to RITES/or agency authorized by concerned PUs well in advance i.e. at least three (03) months before expiry date of last audit report, i**n case of re-audit.** case of such supplier/tenderer shall be proceeded & shall not be rejected on this account. However, for such cases, it shall be responsibility of supplier/tenderer to submit valid audit report

within three (03) months after expiry at validity of last audit report. In case of new suppliers, CCA report shall be considered first audit report.

MCF QAP format (Annexure-A)

Name of the firm

Head Office Address	Manufacturing Unit Addresses	
ABC XYZ STATE with PIN Telephone: Mobile: Email:	ABC XYZ STATE with PIN Telephone: Mobile: Email:	Add more columns if more required

PL Number of the item	
Description of the item	
Specification/Drawing number of the item	
Purchase order number with date	

Date of submission of QAP: DD.MM.YYYY

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ANNEXURE-I

QAP	PL Number & Item Description	Internal Doc. No.	Revision
Name of the firm		ABCD-1234	XX

Index of QAP

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ANNEXURE-I

QAP	PL Number & Item Description	Internal Doc. No.	Revision
Name of the firm		ABCD-1234	XX

1. **Company Profile** (*Maximum 250 words*)

May include brief history, date of setup, founders, products/services, organization chart, article of association of the company as per companies act,1956.

2. **Certificates and Essential Documents**

Clear images/scans of factory license and ISO certifications (9001, 14001, others). Please ensure that the text is legible.

3. **Process Flow chart/Installation Flow Chart**

Description of manufacturing process

A. Process flow chart indicating various stages/activities of manufacturing process for an individual product, with quality control points
B. Details of manufacturing & testing processes to comply specification(s)

Sl. No.	Clause	Requirement of manufacturing process as per specification	Process details to comply the specification requirements

Note

(i) Process flow chart shall indicate all the operations involving procurement, handling, manufacturing, & testing of the product from raw material to finished product, including RDSO/RITES/Consignee inspection/dispatch.
(ii) There should be a separate flow chart for each item.

4. **Details of Procurement - Raw material/Components/Sub-assemblies**

A. Details of components/sub-assemblies manufactured in-house

Sl. No.	Item Name	Drawing No	Material Grade	Source of Raw Material

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ANNEXURE-I

QAP	PL Number & Item Description	Internal Doc. No.	Revision
Name of the firm		ABCD-1234	XX

B. Details of components/sub-assemblies purchased from approved sources of ICF/MCF/RCF/RDSO

Sl. No.	Item Name	Drawing No	Material Grade	Source (Firm name & Address)

C. Details of outsourced/imported items

Sl. No.	Item Name	Drawing No	Material Grade	Source (Firm name & Address)

5. **Inspection Procedure**

Provide the inspection process followed at the firm for subject item(s). It may include stage inspections where critical parameters are inspected before sending to the next stage, material composition test when the material is received from an outside agency, inspection of material properties and critical dimensions at the time of final dispatch to Indian Railways units. Kindly provide details in the following format.

Sl. No.	Type of inspection Raw material or Incoming product/ Assembly or Stage/Final dispatch of the item to consignee	Sample Size & its Frequency of inspection	Inspection parameter	Mode of inspection/ Test equipment used	Criteria or limits of acceptance	Record of inspection maintained at Register No./Compute r file name & address

Note: Provide internal inspection dimensional/material checklists for raw material, stage assembly, final assembly, as annexure.

6. **Rejection Handling Plan**

Rejections are part and parcel of any manufacturing process and can occur at any stage. It is essential to have a clear plan to handle the rejections due to various reasons. In a few situations, rework may be done to correct the workpieces. In others it might not be feasible and/or recommendable. A rejection handling plan clarifies the rejection criteria and further required processing for rework or scrapping. Analyzing rejects is a key component to improve the efficiency and quality of the output.

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ANNEXURE-I

QAP	PL Number & Item Description	Internal Doc. No.	Revision
Name of the firm		ABCD-1234	XX

Kindly provide the details of handling rejection of work-in-process (WIP) and recording such incidents.

7. **Tool and machine calibration plan**

The machines, tools, fixtures, jigs, gauges, and instruments used for manufacturing, testing, and inspection should be regularly calibrated to ensure that they are accurate for their intended use. A schedule of calibration for all the essential machines, tools, gauges, and instruments may be planned by taking into account both usage rate and that machine's particular maintenance needs. Kindly provide details in the following format.

Sl. No.	Name and ID of Tool/Machine/Gauge/ Instrument	Make and Model Number	Range/Capacity	Frequency of calibration	Due date of calibration	Record of calibration maintained at Register No./Computer file name & address

8. **Requirement of Qualified/Experienced Personnel as per Specification(s)**

Details of qualification/experience of the quality control personnel specified in the relevant STR/MDTS/ Specification for the items to be manufactured may be provided in the following format.

Sl. No.	**Specified Requirements**		**Details of Personnel Employed**			
	Clause number with specification details	Qualification/ Experience	Name	Designation	Technical Qualification	Experience

Note: Welding procedure specification **(WPS)**, Welding Procedure Qualification Record **(WPQR)** and Welder Qualification Test Certificate **(WTC)** to be submitted wherever applicable.

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Approved by	Issued by	Page Number
Signature with date and stamp	Signature with date and stamp	5 of X

Note: "This QAP does not have any deviation from Purchase order" will be written on front page of QAP.

PREPARED BY **AGREED BY**

Reasoned Document for draft of specification no. MMDTS 18009, Rev-4

Comments/suggestions received from firms and MCF's decisions on them are given below.

1. **Clause no.2(Construction):**

The construction of Thermal Cum Acoustic insulation material will be sandwich of Densified resin Bonded insulation Board (factory laminated) or closed cell foam made of polyolefin or hydrophobic melamine (factory laminated) with following layers:

I. First, topmost layer of perforated aluminium foil (outer layer)
II. Second layer of fiberglass tissue
III. Third layer of fiberglass board/foam
IV. Fourth layer of fiberglass tissue
V. Fifth layer of Black woven glass-fibre (outer layer).
VI. Each individual insulation slab shall be sealed from all four sides by using Aluminium tape before insulation.
VII. Each insulation slab shall be glued to the coach surface using CPRX compound (MDTS 153 Rev-nil), quantity per coach as 60 ltrs approx. The material has to conform all the properties mentioned in this specification. If any other material is offered, it shall require prior approval from MCF Design. Raw material for the insulation as per this standard should be indigenously available.

Firm's comments:

(i) M/s Paracoat Products Limited, (Hosour) Tamilnadu(CP-49):

We suggest including open-cell polyurethane foam as an additional material option.

MCF decision: acceptable and clause modified as

The construction of Thermal Cum Acoustic insulation material will be sandwich of Densified resin Bonded insulation Board (factory laminated) or closed cell/open cell foam made of polyolefin or hydrophobic melamine (factory laminated) may be consider

2. **M/s Rail Coach engineers, Kapurthala (CP-45):**

Clause no. 4 to 10: Please clarify whether these tests are to be conducted for both thickness (25mm & 50mm).

MCF decision:

Thermal properties (clause no. 4) test, Fire safety test (clause no. 6) and Test requirement /properties for insulation board shall be conducted on 25 mm and 50mm thickness which is already clarified in draft specification. Following note added:

Moreover, if purchaser requirement is only 25mm or 50mm, then these test shall carried out on only 25mm or 50mmas applicable. If purchaser requirement is both (25mm & 50mm), then these test shall carried out on 25mm as well 50mm.

3. **Acoustic property** (Clause no. 5):

Noise Reduction coefficient (NRC) for 60 mm thickness	No unit	0.80(Min.)	ISO 354/ASTM 423
Sound Transmission Class (STC) for 60 mm thickness	dB	41 (Min.)	ISO:10140-2/ASTM E90/ISO 15186-1
Construction of Panel for STC test: Stainless steel sheet 3mm+Thermal cum Acoustic Board+3mm			

LP panel

Firm's comments:

(i) M/s Paracoat Products Limited, (Hosour),Tamilnadu (CP-47):

Noise reduction coefficient (NRC) and sound transmission class (STC) for 60 mm thickness are defined. What are the values of NRC for 25 mm thickness and 50 mm thickness, and how are these properties of NRC and STC going to be checked? :

PARACOAT comments: Even if the 60 mm data is available, direct extrapolation to thinner materials may not be accurate. As per our understanding, the specification has been defined for 60 mm thickness to assess the material's properties and performance at this standard thickness. If the 60 mm material meets the target, the 25 mm and 50 mm thickness materials are expected to perform as per the coach-level Acoustic targets.

MCF decision: clause modified as

Noise Reduction coefficient (NRC) for 60 mm thickness	No unit	0.80(Min.)	ISO 354/ASTM 423
Sound Transmission Class (STC) for 60 mm thickness	dB	41 (Min.)	ISO:10140-2/ASTM E90/ISO 15186-1
Construction of Panel for STC test: Stainless steel sheet 3mm+Thermal cum Acoustic Board+3mm LP panel			

ACOUSTIC PROPERTIES for 50mm & 25mm			
Noise Reduction coefficient (NRC) for 50 mm thickness	No unit	0.85 to 0.95	ISO 354 / ASTM 423
Noise Reduction coefficient (NRC) for 25 mm thickness		0.5 to 0.6	
Sound Transmission Class (STC) for 50 mm thickness	db	35 to 45	ISO:10140-2/ ASTM E 90/ ISO 15186-1
Sound Transmission Class (STC) for 25 mm thickness		30 to 35	
Construction of Panel for STC test: Stainless steel sheet 3mm+Thermal cum Acoustic Board+3mm LP panel			

4. **Clause no. 6 (Fire safety property):**

Fire safety property of thermal cum sound insulation material complete {Perforated aluminium foil (Top most layer)+Fibre glass tissue(second layer)+ Insulation board/foam(third layer)+ Fibre glass tissue(fourth layer)+ Black woven glass fibre(outer layer)}for thickness 25mm & 50mm as per standards shall be R1, HL3 as per EN 45545-2

Firm's comments:

(i) M/s Paracoat Products Limited, (Hosour),Tamilnadu (CP-47):

Fire Safety: These parameters are mentioned in two places. Please mention it only in 1 place. :: PARACOAT Comments: Agree, should be for final Composite.

MCF decision:
In draft specification no. MMDTS18009 Rev.04, Fire Safety property is only mentioned in one place only (i.e. clause no. 6).
Firm is also agree with Fire Safety property test should be for final composite [i.e.Fire safety property of thermal cum sound insulation material complete {Perforated aluminium foil (Top most layer)+Fibre glass tissue(second layer)+ Insulation board/foam(third layer)+ Fibre glass tissue(fourth layer)+ Black woven glass fibre(outer layer)}for thickness 25mm & 50mm as per standards shall be R1, HL3 as per EN 45545-2].

5. **Clause no. 7 (test requirement):**
Density = 40+/-15% as per IS 8183

Firm's comments:
(ii) M/s Paracoat Products Limited, (Hosour),Tamilnadu (CP-49):

- We propose modifying the density *requirement to "40 ± 15% Kg/m³ or lighter materials may be* considered."
- Alternatively, the density requirement could specify:
  - Fiber glass board: 40 ± 15% Kg/m³
  - Polyurethane foam: 25 ± 15% Kg/m³. etc
- This will provide flexibility to optimize the insulation's weight while maintaining performance, as the current specification fixes both density and thickness without an option for lightweight alternatives.

MCF decision: Accepted, clause modify as under:
Density is 40+/-15% or lighter may be offered as per IS 8183.

(iii) M/s Emprise Marketing, Lucknow (CP-51):
Hira Technologies Closed cell XLPE Thermal Insulation density =35+/-3kg/m^3 (core foam) as per IS 78880.
MCF decision: Accepted, clause modify as under:
Density is 40+/-15% or lighter may be offered as per IS 8183.

6. **Clause no. 7 (test requirement)(CP-51):**
Thickness =as per requirement as per as per IS 8183

Firm's comments:
(i) M/s Emprise marketing, Lucknow (CP-51):

Thickness as per requirement as per ASTM D 3575 (in-house)
MCF decision: Thickness as per requirement as per ASTM D 3575 (in-house) may be considered.

7. **Clause no. 7 (test requirement):**
Incombustibility = Incombustible as per IS 8183, BS:476-Pt.4

Firm's comments:
(i) M/s Paracoat Products Limited, (Hosour),Tamilnadu (CP-49):

i. **The incombustibility** test (IS 8183:1993) is specifically applicable to fiber glass board and refers to bonded mineral/rock wool insulation.

ii. **PARACOAT Feedback**: Since this specification also applies to polyolefin, melamine, and polyurethane foam materials—***which are polymeric in nature and cannot remain stable at 750°C—we recommend removing this test for these materials.***
Fire safety-related tests are already included, such as Fire and Smoke Characteristics as per EN 45545-2 (Table-5) R1, HL3; Limiting Oxygen Index as per NES 714/NCD 1410; and Horizontal Burning Rate & Melting Behaviour tests as per IS 15061:2002 (Annex A & C).

iii. Additionally, we request the removal of Shot Content, Alkalinity, and Sulphur Content tests, ***as these are applicable only to fiber-glass boards and not relevant for other foam-based materials***.

MCF decision: As this properties is better, hence being retained.

8. Clause no. 8 (Composition and test/properties of Aluminium Foil)(CP-36/5):

- **Composition:**

S.No	Facing Composition	Description	Specified Value
1.	Foil	Aluminium	6.0-8.0 Microns
2.	Adhesive	Water based	4.0-6.0 g/m2
3.	Kraft	Natural	Density 45-55 g/ m²

- **Test requirements/Properties:**

S.No	Physical Properties	Specified Value	Test Method
1.	Basic weight	95-120 g/ m2	Scale
2.	Water Vapour Transmission rate	1.1-1.2 ng/N.s	ASTM E 96 Procedure-A
3.	Bursting Strength	2.0-3.5 Kg/ m²	ASTM D 774
4.	Tensile Strength	4.5(min)KN/m(MD) 2.5 (min)KN/m(XD)	ASTM C 1136
5.	Calliper Thickness	140-180 microns	Micrometer
6.	Water immersion	No de-lamination	24 hrs at 20-25°C

Firm's comments:

(i) M/s Rail Coach engineers, Kapurthala(CP-45):

(a)Comments on tests requirement/properties (Sr. no. 3) Bursting Strength:
The unit is kg/cm^2 due to some typographical error, it was mentioned as kg/m^2 Rev.03. However, the unit was kg/cm^2 in Rev.01 & 02. We would further request you to modify value of bursting strength as 1.5 to 3.5 kg/cm^2

MCF decision: The unit is kg/cm^2 due to some typographical error. It may be consider as 2.0 to 3.5 kg/cm^2 in place of 2.0-3.5 Kg/ m².

(b)Comments on tests requirement/properties (Sr. no. 5) Caliper thickness:
We would request you to modify value of caliper thickness as 120-180 Microns.

MCF decision: Value of calliper thickness should be as per specification (i.e. 120-180 Microns).

(ii) M/s Paracoat Products Limited, (Hosour),Tamilnadu (CP-49):

a) The specification requires a ***composition test for aluminium foil including Aluminium foil thickness***, adhesive GSM & kraft GSM, *as this is a factory laminated composite material & not be possible to separate the layers to check individual layers .Hence recommendation is to composite GSM instead of individual layers.*

b) **Suggestion**: Since composition testing is complex, we recommend *accepting test reports from the raw material manufacturer-OEM or the user instead of requiring NABL or external lab testing.*

MCF decision:

Testing of ***composition test for aluminium foil including Aluminium foil thickness***, adhesive GSM & kraft GSM should be done as per specification clause no. 8.
Testing should be carried out as per clause no. 12(i) a, b &c

(iii) M/s Emprise marketing, Lucknow (CP-51):
Aluminium foil Thickness=9 microns.

MCF decision: Aluminium foil Thickness should be as per specification.

9. Clause no. 9 (Requirement of Black Woven Glass Cloth)(CP-36/5):

Description	Data
Weight	140-160 gm/m2
Width	0.935m
Thickness	0.14mm± 15%
Colour	Dark Black

Firm's comments:
(i) M/s Paracoat Products Limited, (Hosour),Tamilnadu (CP-49):

a) We **recommend** accepting test reports from the raw material manufacturer-OEM or the user instead of requiring NABL or external lab testing.
b) **Additionally**, *the specified width is 1.20m, whereas the material description requires 935mm /1000mm width.*
c) **Suggestion**: *Instead of making cloth width as test parameter, it should be left to the supplier to meet the size requirements.*

MCF decision:

a) Testing should be carried out as per clause no. 12(i)a , b & c
b) Since width size of material is 935mm and thickness 25mm/50mm, so *width of material may be consider as is 935mm in place of 1.20m.*

(ii) M/s Emprise marketing, Lucknow (CP-51):
Black Woven Glass Cloth Thickness=0.140mm and weight=150-160 GSM
MCF decision: Black Woven Glass Cloth Thickness should be as per specification clause no. 9.

10. Clause no. 10 (Requirement of FRP Tissue)(36/5):

Description	Data
Weight	35 gm/m2 + 4 gm

Firm's comments:

(i) M/s Paracoat Products Limited, (Hosour), Tamilnadu (CP-49):

We recommend accepting test reports from the raw material manufacturer-OEM or the user instead of requiring NABL or external lab testing

MCF decision: Already clarified in draft specification clause no. 12, i(a) ,(b), (c)

11. Clause no. 13 (Quality Assurance, test & documents)(CP-36/7):

Requirement description	Requirement detail	Remarks
Quality Assurance plan	The manufacturer shall have the detailed quality Assurance plan. The Plan shall be submitted for the approval by respective PU. The QAP document shall clearly document the following and control the test record formats. **1.** Control over outsourced products and processes **2.** Testing of raw material and establishing its traceability **3.** Sampling Plan **4.** Type Tests **5.** Routine Tests **6.** Acceptance tests **7.** Raw Materials	The QAP shall be submitted in PDF as per MCF format (Annexure-A)
Type Tests	These tests shall be done on a sampled lot of prototype. Such Tests are required only on initial approval, change of design and chance of manufacturing process or raw material. These tests are to be repeated after every 36 months or as specified. • Fire and smoke characteristics as per EN 45545-2, R1, HL3 (clause no. 6). However, if the consignee or inspecting agency desires to do the type tests, before 36 months, the supplier should not deny the same. There are various circumstances when type tests may be needed on next supply before 1 year of last supply /last type tests. eg: • In case of doubt in type test certificate. (Previous) • Complaint regarding type test certificates. • Failure of material attributable to any of the parameters covered in type tests, etc. *Moreover, during type test, all tests, listed in routine tests & acceptance tests shall also be conducted.*	The records of the type tests shall be maintained by the manufacturer and shall be made available upon demand. These records shall be traceable and verifiable.
Routine Tests	These tests are required to verify the functional	The records of the

	working of the system. These may require simulated in-puts for testing the operation under full range of inputs. These tests shall be done by the manufacturer during manufacturing and record maintained for inspection. These tests are to be repeated after every 12 months or as specified. • Thermal Conductivity • Noise Reduction coefficient (NRC)@ 60 mm thickness • Sound transmission Class (STC)@ 60 mm thickness • Temperature resistance • Resistance to Micro organism. • Limiting Oxygen Index • Horizontal Burning Rate • Melting behaviour test • Moisture absorption • Recovery after Compression • Shot Content • Incombustibility, • Sulphur Content • Resistance to Vibration, • Resistance to Jolting • Alkalinity • Al Properties of Al. Perforated Foil • All properties of Black glass cloth • All properties of FRP tissue *Moreover, during routine tests, all tests, listed in acceptance tests shall also be conducted.*	Routine tests shall be maintained by the manufacturer shall be made available upon demand. These records shall be traceable and verifiable. •
Acceptance tests	These tests shall be done on all or samples of lot for bulk supply. Sampling shall be done as per IS:2500 These tests shall normally consist of routine tests and additionally specified in the contract. Following tests shall be considered as acceptance tests: • Bulk Density • Thickness & dimensional Check • Density of base material wool) • Construction, basic wt. and calliper thickness of aluminium foil as clause no. 8. • All other parameters apart from Type test & routine test shall be checked as per Acceptance test. • Documents for routine test & type test with above detailed	These shall be conducted by the consignee or their authorized agency prior to dispatch. All infrastructures required to enable acceptance tests shall be provided by the bidder / OEM. The records of the acceptance tests shall be enclosed along with the supply consignment. These records shall be traceable and verifiable.

		periodicity & validity shall also be checked during acceptance test & enclosed with acceptance test documents.	

Note:

1. For thermal conductivity, noise reduction coefficient and sound transmission class, firm has to submit the sample to MCF for test. The cost of these three tests shall be borne by the firm.
2. Supplier shall submit test certificate of parameters (clause no. 4 to 10) of specification for Type Tests, Routine Tests & Acceptance tests from :
   (a) Any NABL accredited lab (in-house or outside) having tests & test method mentioned in clause no. 4 to 10 of specification in its scope of accreditation from NABL or report from NTH/NPL. Test report must contain NABL logo/seal, in case reports are submitted from NABL accredited lab.
   (b) In case, there is no NABL accredited lab is available in India for some tests (with test method mentioned in the specification) and the test facility for same tests (with test method mentioned in the specification) are also not available with NTH/NPL, then for those tests, any government's lab in India report will be acceptable.

Firm's comments:

(i) **M/s Rail Coach engineers, Kapurthala(CP-44 to 45):**

Comments on routine test:

a. Thermal Conductivity
b. Noise reduction Coefficient
c. Sound Transmission Class
d. Temperature Resistance
e. Resistance to Micro Organism
f. Limiting Oxygen Index
g. Horizontal Burning Rate
h. Melting Behavior Test
i. Moisture Absorption
j. All Properties of Al. Perforated Foil
k. All Properties of Black Glass Cloth
l. All Properties of FRP Tissue

A. Above test are classified under routine test in draft specification. These tests are generic test and will not very from lot to lot. Hence these tests should be listed in type test and should be repeated after every 12 months or as required. Even in MMDTS 18009 Rev-03 these tests are classified under Type test.

MCF decision: these test are mentioned in Routine test and repeated after every 12 months

B. Following remaining test will be conducted on every batch and the result will be submitted to TPI for verification:

i. Recovery after compression
ii. Shot Content
iii. Incombustibility
iv. Sulphur Content
v. Resistance to Vibration
vi. Resistance to Jolting
vii. Alkalinity

MCF Decision: not accepted

Comments on note no. 1 of clause no. 13:

As per draft specification firm has to submit the sample to MCF for conducting thermal conductivity, NRC and STC tests. This should be applicable only during prototype approval. We will conduct these tests annually from NABL accredited labs.

MCF Decision: Only during prototype approval, firm has to submit the sample to MCF for test of thermal conductivity, noise reduction coefficient and sound transmission class. The cost of these three tests shall be borne by the firm as per specification.

Comments on note no. 2 (b) of clause no. 13:

In case, there is no NABL accredited lab available in India for some tests than ISO/IEC-17025 accredited lab should also be allowed.

MCF Decision: Acceptable clause 3, note no.2(c) added as follows:

(c) In rare case, when test facilities are not available as per (a) & (b) of this Para above, test certificate from NABL accredited lab not having tests & test method mentioned in clause 4 to 10 in its scope of accreditation from NABL shall be acceptable, subject to prior approval of the purchaser for the SUCH specific test.

(ii) M/s Paracoat Products Limited, (Hosour), Tamilnadu (CP-48):

(i)Comments on acceptance test:

- The current list of acceptance tests is extensive.
- **Suggestion**: We recommend revising the acceptance test list to include only key short-duration tests that can be witnessed by TPI/RITES inspectors, such as:
  - Thickness and dimensional check
  - Density verification of base material (fiber glass board/foam)
  - Review of test reports for all parameters.
- Please clarify when these test reports are required to be submitted, at the time of inspection or at the time of bidding.
  PARACOAT comments: **at the time of Inspection**

MCF Decision: Para is clear. No clarification required. However, for clarification clause updated.

(ii)Comments on type test:

- Type tests: Please clarify when these test reports are required to be submitted, at the time of inspection or at the time of bidding.
  PARACOAT comments: **1st time of during bidding & once in 5 years.**

MCF Decision: For bidding, clause 12 may be referred. For periodicity of type testing, clause 14 may be referred.

12. clause no. 15 (List of Machineries & plant and testing facilities) :

A. Machinery and Equipments :

1. Slitting machine
2. Compressors- 6 bar - 2 nos, 3 bar -3 nos. (472 LPS)
3. Compression packing m/c.
4. Batch House-30 MT/D
5. Melter-30 MT/D

6. Forming machine
7. Vacuum pump 2 nos. (760 mm of Hg)
8. Process water filtration and recirculation system
9. Resin & binder preparation equipment
10. Effluent treatment Plant (30 MT/D)
11. Facing Lamination machine
12. Fork lift - 3 ton - 2 nos. (3 Ton)
13. Diesel Generator-1010 KVA -01 No. (1010 KVA)
14. Electric substation (22 KV)
15. Fire hydrent system (297 m3/hr)
16. Cooling tower (200 M3)
17. Rolling up/stacking machine

Firm's comments:

(i) **M/s Rail Coach engineers, Kapurthala(CP-44 to 45):**

Effluent treatment Plant (30 MT/D): Since we recycle all of the process water because we have a filtering and re-circulating system in place and have zero discharge, the ETP facility is available but not in use.

MCF decision: acceptable. Clause modified as

"Effluent treatment Plant (30 MT/D**) if process of manufacturing & testing in coaches discharge (in case of complete recycling resulting in discharge may be exempted)".**

13. Clause no. 15 (List of Machineries & plant and testing facilities) :

B. Essential Testing facilities

1. Measuring scale
2. Measuring tape (3m & 5m)
3. Sound level meter
4. Varnier calliper
5. pH meter (pH 0 to 14)
6. Moister analyser
7. Laboratory Oven (0 to 999, Min. 0 to 400 o C)
8. Humidity Chamber, (0 to 99% RH, 0 to 99 o C)
9. Hot Plate (0 to 250 o C)
10. Projection Microscope (0 to 1 mm)
11. Sieve mesh-class A(BSS NO:- 30, BSS NO:- 60 BSS NO:- 100)
12. Ignition Test Apparatus (0 to 99.99 Min., 0 to 800 o C)
13. Compression Testing machine (0 to 10000 N)
14. Vibration Tester & Jolting Machine (0 to 6000 Min.)
15. Water bath Thermostatic (0 to 100 oC)
16. Weighing balance (0 to 100 Kg, 0 to 3 Kg & 0 to 220 gms)
17. Muffle Furnace (0 to 1200 ^{o}C)

Firm's comments:

(i) **M/s Rail Coach engineers, Kapurthala(CP-44 to 45):**

Sound Level Meter: As NRC and STC test to be conducted from NABL lab, sound level meter is not required.

MCF decision: A sound level meter is an instrument used to measure the intensity of sound in the environment/ inside of the coach. It quantifies sound levels in decibels (dB), which are a unit of sound intensity. So sound level meter is required.

14. Clause no. 16[Process audit requirement(in every 3 years)]:

Audit of OEMs for manufacturing & testing activities of material will be done by M/s RITES or any agency authorized by concerned PU in every 3 years.

It shall be responsibility of OEM to get audit done by M/s RITES or any agency authorized by concerned PU at its own cost. During audit, all tests except type test (Fire and smoke characteristics as per EN 45545-2, R1, HL 3) shall be conducted as per specification & shall be made part of the report. OEMs shall keep valid audit report & submit the valid audit report on demand. For type test, report not older than three (03) shall be submitted during audit.

At any stage of procurement i.e. tender opening date, Purchase order placement date & during supplies, valid process audit report shall be available with supplier/tenderer. However, in case, audit report validity of three (03) years has expired but the supplier/tenderer has applied for audit/re-audit to RITES/or agency authorized by concern PUs well in advance i.e. at least three (03) months before expiry date of last audit report, case of such supplier/tenderer shall be proceeded & shall not be rejected on this account. However, for such cases, it shall be responsibility of supplier/tenderer to submit valid audit report within three (03) months after expiry at validity of last audit report. In case of new suppliers, CCA report shall be considered first audit report.

Firm's comments:

(i) **M/s Rail Coach engineers, Kapurthala(CP-44 to 45):**

We humbly request that there is no requirement of process audit as routine test and acceptance test will be conducting on every lot and will be witnessed by TPI during inspection.TPI will also verify the type test reports during inspection. Supplier/OEM will submit test certificate of all parameters (clause 4 to 10) along with the bid while participating in tender. As all these tests will also be verified during technical scrutiny of tender so there is no requirement of process audit to conducted in every 3 years. we would request you to please waive off this clause.

MCF decision: clause modified under:

Audit of OEMs for manufacturing & testing activities of material will be done by M/s RITES or any agency authorized by concerned PU in every 3 years.

It shall be responsibility of OEM to get audit done by M/s RITES or any agency authorized by concerned PU at its own cost.

Auditor will audit manufacturing & testing process at premises of the supplier. During audit, all tests **(facilities which are available in premises of supplier)** ~~**except type test (Fire and smoke characteristics as per EN 45545-2, R1, HL 3)**~~ shall be conducted as per specification & shall be made part of the report.**However, auditor shall pick & send sealed sample to labs as detailed in Note of Para 13 of this specification for testing of all parameters as per clause 4 to 10.**

Reports of tests from labs shall also be made part of audit report. However, provisional audit report may be issued meanwhile, till receiving reports from labs.

OEMs shall keep valid audit report & submit the valid audit report on demand. For type test, report not older than three (03) shall be submitted during audit.

At any stage of procurement i.e. tender opening date, Purchase order placement date & during supplies, valid process audit report shall be available with supplier/tenderer. However, in case, audit report validity of three (03) years has expired but the supplier/tenderer has applied for audit/re-audit to RITES/or agency authorized by concern PUs well in advance i.e. at least three (03) months before expiry date of last audit report, case of such supplier/tenderer shall be proceeded & shall not be rejected on this account. However, for such cases, it shall be responsibility of supplier/tenderer to submit valid audit report within three (03) months after expiry at validity of last audit report. In case of new suppliers, CCA report shall be considered first audit report.

15.M/s Emprise Marketing, Lucknow (CP-51):

M/s Emprise Marketing, Lucknow offered brand/material "***Closed cell XLPE Thermal Insulation***" having following property as under:

MCF XLPE Thermal Cum Sound Insulation						
Sr. No	Properties	Value	Railway require Test method	Hira Technologies Closed cell XLPE Thermal Insulation Value	Hira Technologies Test Method &comply	Reference Certificate no.
1	Density	40 ± 15% kg/m^3	IS 8183	35 ± 3 kg/m^3 (core foam)	IS7888	……
2	Thickness	As per requirement	IS 8183	As per requirement	ASTM D 3575	INHOUSE
2	Thermal Conductivity	Max. 0.034 W/m^0K at 25^{0}C	IS :8183	Max. 0.036 W/m^0K at 23^{0}C	ASTM C 518	A1M240514002/ Dt.25.05.2024
3	Sound absorption/Noise reduction Coefficient	>0.80 (for 60 mm)	ISO 354/ASTM 423	>0.70 (for 60 mm)	ISO 354/ASTM 423	NVH/3100015151/2022-23/0002. 02.01.2023
	Sound transmission Class (STC)	>41 db (for 60mm)	ISO:10140-2/ASTM E90/ISO 15186-1	>41 db (for 60mm)	ISO:10140-2/ASTM E90/ISO 15186-1	NVH/3100013051/2022-23/0124. 16.05.2022
4	Fire & Smoke characteristics	R1, HL3	EN 45545-2 (Table 5)	R1, HL3	EN 45545 -2	AJFS2405005957FF-01 Dt.11.06.2024
A	Lateral spread flame CFE (Minimum)	20 kW/m^2	ISO-5658-2	23.91 kW/m²		
B	Heat release rate (Cone calorimeter method) *MARHE* (Max.)	60 kW/m^2	ISO:5660-1 : 50 kW/m^2	0.31 kW/m^2		
C	Smoke generation D_s(4) (Max)	150 (Max)	EN ISO:5659-2 : 50 kW/m^2	0.09		
D	Smoke generation VOF_4(Max)	300 (Max)	EN ISO:5659-2 : 50 kW/m^2	0.28		
E	Gas analysis in smoke chamber using FTIR technique CIT_G(4) (Max)	0.75 (Max)	EN ISO:5659-2 : 50 kW/m^2	0.0062		
	Temperature Resistance (Insulation Board/Foam)	-50 to + 230°C	IS8183	-80 to +105	ASTM C411	RD18481-R1. 13.07.2018
	Resistance to micro organism	no growth	IS 8183	Excellent	ASTM G21	IND/BLR/CH/2021/1012R. 11.03.2021 &

5	**Limiting oxygen Index (Insulation Board/Foam)**	**50% (min)**	**NES 714/NCD1410**	**25%**	**ASTM D2863**	**53564C. 09.06.2017**
6	**Horizontal burning rate**	**0 mm/min.**	**IS 15061-2002Clause 3.2& Annex A**	**Comply**	**IS 15061-2002**	**IND/BLR/CH/2021/3014R. 21.04.2021**
7	**Melting Behaviour test**	**no Drop**	**IS 15061-2002Clause 3.4& Annex C**	**Comply**	**IS 15061-2002**	**IND/BLR/CH/2018/2507. 22.05.2018**
8	**Moisture absorption**	**2% (max)**	**IS 8183**	**Water absorption 1mg/cm2 (for 10mm thickness)**	**JIS K 6767**	**IND/BLR/CH/2021/1308R. 16.02.2021**
9	**Recovery after compression**	**90% (min)**	**IS 8183**	**Compression set 20% (50% Deflection)**	**ASTM D 3575**	**IND/BLR/CH/2019/3376R. 20.05.2019**
10	**shot content**	**15% (max)**	**IS 8183**	**Water vapor transmission rate (Max)0.042g/m2/hrs (25mm thickness)**	**ASTM E96(foil face towards desicant)**	**C10000227517 .09.09.2020**
11	**Incombustibility**	**Incombustible**	**IS 8183, BS 476 Part- 4**	**Not Applicable**		
12	**Sulphur content**	**0.6%(Max)**	**IS 8183**	**Not Applicable**		
13	**Resistance to vibrations**	**1% Maxof height settlement**	**IS 8183**	**Not Applicable**		
14	**Resistance to Jolting test**	**3% Max. of height settlement**	**IS 8183**	**Not Applicable**		
15	**Alkalinity**	**7-10 pH**	**IS 8183**	**7-10 pH**	**IS 8183**	**We will conduct the test**

Foil Details

SN	Properties	Value	Railway require Test method		Hira Technologies Test Method &comply	Reference Certificate no.
1	**Aluminum foil Thickness**	**6-8 micron**	**…**		**9 micron**	
2	**Black woven Glass cloth**	**0.14mm + 15%**	**…**		**0.140 mm**	
3	**Black woven Glass cloth weight**	**140-160gr/m2**	**..**		**150-160 GSM**	

MCF decision: Offered material does not comply the specification, hence not acceptable.