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SECTION-A

Schedule of Technical Requirements

I: General

1. Foreword & Scope:

This specification provides the technical requirements for the interior Paneling for Side wall, Ceiling & lavatory module of passenger Coaches of Indian Railways.

This specification is divided into two sections i.e. A & B.

Section-A: Intends to cover the technical requirements/provisions relating to materials construction, parameters and testing requirements and does not include all the necessary provisions of the contracts.

Section–B covers the infrastructural, testing and quality control facilities required to manufacture TDPCP Panel. The supplier shall provide necessary supervision to Railway employees in fitment of TDPCP interior Panel & Modular Toilets of IR passenger coaches.

2. Documents to be submitted along with offer:

i. First time supplier/OEM as per 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 as per Table-I,II,III,IV,V,VI & VII of this specification from:

(a) Any NABL accredited lab (in-house or outside) having tests & test method mentioned in Table-I, III, IV & VI of this 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.

(c) Fire property test (Table-II, V & VII of this specification) shall be conducted at any 'CERTIFER' lab or lab empanelled by RDSO, to perform test as per EN-45545-2, R1 & HL3.

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

(d) The submitted test reports along with offer shall not be more than one (01) years old from the date of tender opening except for Fire property (Table-II, V& VII of this specification). Test report for Fire property (Table- II, V & VII of this specification)as per EN 45545-2, R1 & HL3 shall not be more than three (03) years older from date of tender opening.

3. Method of Manufacture:

The TDPCP panels shall be manufactured by Extrusion Process.

4. Requirements

4.1 General

4.1.1 These composite panels shall be made from thermoplastic along with Bio base husk with mineral fillers. The panels will also contain additives like rheology modifiers, UV stabilizers, Lubricants, printed/plain/decorative layer and coloring agents.

Raw Material to be used:

A) **Thermoplastic:** This shall be Virgin Plastic Polymer to be reinforced with suitable reinforcements.

B) **Mineral Filler:** The Filler material shall be added to TDPCP formulation as per the final material physical requirements. This has a very high significance and choice of filler like Bio husk and others to ensure that the required mechanical and fire properties are achieved.

C) **Rheology Modifier:** The Toughness of TDPCP is added through Rheology modifier, this has a very high significance as it improves stability and sag resistance.

D) **UV Stabilizer:** The major role of UV regulators/stabilizers is to control the amount of radiation that reaches the final product TDPCP. It helps the product not to degrade over a longer duration of time and helps color stability.

E) **Bio husk:** Bio base (plant) husk is the main ingredient. Husk processed with polymers to create durable finished goods (TDPCP).

F) **Filler & Fibers:** Wood used as filler is usually a by-product of industrial wood processing in the form of wood shavings, sawdust or wood flour.

G) **Polymers and Resin:** Polyethylene's (PE), Polypropylene (PP) are the active ingredient to be used in manufacturing.

H) **Pigment/Coloring agents:** This shall be UV resistant and consist of inorganic or non-fading organic dyes. The maximum permissible proportion shall not exceed 5% of the total weight of the TDPCP panel.

I) **Decorative layer:** The decorative layer, if required by colour scheme by purchaser to be laminated to the TDPCP panel, shall be made up of Thermoplastic having high scratch resistance. The color/print/finish shall be as per relevant drawings/PO. The supplier shall ensure that offered material of decorative layer is regularly used in railway application for laminating interior panels & in able to retain its properties & gloss over life of panel against scratches, UV exposure, chemical & cleaning agent exposure etc. Material of decorative layer shall also comply to EN45545-2, R1 & HL3. As decorative layer shall be made part of TDPCP sheet, testing of complete panel shall be done as per requirements in Table I to V in this specification. Moreover, decorative layer shall comply requirements in table VI & VII separately as well.

All raw materials are churned into a mixture and then extruded into a sheet.

4.1.2 The surface of the panels shall not show blisters, porosity or cracks. The surface shall be reasonably smooth and even.

4.1.3 The panels shall be sufficiently robust to withstand the normal handling during assembly on coaches. The panels shall not crack or fracture when worked on by ordinary woodworking tools or machinery.

4.1.4 The panels shall be weather resistant and shall not loose shape or rot in service. They shall also withstand attacks by termite. The panels shall not warp, split, delaminate, or blister. Expansion or shrinkage due to thermal changes shall be negligible.

4.1.5 The panels shall be made available in different colors, design, and pattern as per the requirement of Railway. The color & pattern of the panel shall be got approved from purchaser before bulk supply for first time supply only.

All raw material used for the fittings shall be traceable to their original sources. The chain of documents establishing the traceability shall be verifiable.

II: Specification & Requirements

5.0 Specification & Requirements for Side Wall & Ceiling Panels:

5.1 Unless otherwise specified in drawing or Purchase Order the thickness of panel shall be 3mm ± 0.2 mm including decorative layer. The length, width and thickness of the panels shall be as per relevant drawings/PO.

5.2 Properties

The properties of sheets shall conform to the requirements indicated in Table-I & II.

TABLE-I (For Side Wall & Ceiling Panels)

SN	Property	Required Value	Method of Test
1.	Specific Gravity	1.5-1.8	ASTM D-792
2.	Tensile Strength (MPa) Min. both along length and width	25	IS: 2380
3.	Impact Strength – (J/m) min	195	ASTM D 256
4.	Water absorption (%) Max.	0.05%	ASTM D 570
5.	Resistance to staining for a) acetone, b) Black tea	Should not show any visible changes on the surface	IS: 2046
6.	Resistance to color change in xenon arc light	Not worse than 5	IS: 2046
7.	Resistance to solvent (Toluene)	No change	ASTM D 543
8.	Hardness Shore D	70-90	ASTM D2583
9.	Elongation at break (%)	65-75	IS: 1998
10.	Thermal conductivity (W/m*K)	(0.16 – 0.20)	DIN52616
11.	Flexural Rigidity min	1172	IS: 4020
12.	Thermal Expansion	3.6 x 10-5 /°C ± 10%	ASTM D696
13.	Wear and cleanability	Pass	ISO 19712-2
14.	Screw Withdrawal Strength force (N) min	1200	IS: 2380
15.	E-Modulus: Long grain (Mpa) min	3400	ASTM E-143
16.	Resistance to Crack	No crack was observed	ASTM D 903

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TABLE-II (For Side Wall & Ceiling Panels)

(FIRE PROPERTIES)

SN	Property	Required Value	Method of Test
1.	Spread of Flame	R1 (HL3)	ISO 5658-2
2.	MARHE (Maximum Average Rate of Heat Emission)	R1 (HL3)	ISO 5660-1
3.	Ds(4) Optical density at 4th minute	R1 (HL3)	ISO 5659-2
4.	CITG (conventional Index of Toxicity)	R1 (HL3)	ISO 5659-2
5.	VOF (4) cumulative Optical density at 4th minute	R1 (HL3)	ISO 5659-2

6. Specification & Requirements for Toilet Module

6.1 Unless otherwise specified in drawing the thickness of wall panel shall be 12mm ± 0.25 mm including decorative layer and that of Toilet floor will be 16mm ± 0.25 mm including decorative layer. The length, width and thickness of the panels shall be as per relevant drawings and specification.

6.1.1 Properties

The properties of sheets shall conform to the requirements indicated in Table III, IV &V.

TABLE-III (For Toilet Walls)

SN	Property	Required Value	Method of Test
1.	Specific Gravity	0.7-0.8	ASTM D-792
2.	Tensile Strength (MPa)Min. both along length and width	25	IS: 2380
3.	Impact Strength – (J/m) min	195	ASTM D 256
4.	Water absorption (%) Max.	0.05%	ASTM D 570
5.	Resistance to staining for a) acetone, b) Black tea	Should not show any visible changes on the surface	IS: 2046
6.	Resistance to color change in xenon arc light	Not worse than 5	IS: 2046
7.	Resistance to solvent (Toluene)	No change	ASTM D 543
8.	Hardness Shore D	70-90	ASTM D 2583
9.	Elongation at break (%)	65-75	IS: 1998
10.	Thermal conductivity (W/m*K)	0.82 ± 10%	DIN 52616
11.	Flexural Rigidity min	855	IS: 4020
12.	Thermal Expansion	3.6 x 10-5 /°C ± 10%	ASTM D 696
13.	Wear and cleanability	Pass	ISO 19712-2
14.	Screw Withdrawal Strength force (N) min.	1200	IS: 2380
15.	E-Modulus: Long grain (Mpa)	3400-3600	ASTM E-143

16.	Resistance to Crack	No crack was observed	ASTM D 903
17.	Boiling water test	No visual change	ASTM D 570

TABLE-IV (For Toilet Floor)

SN	Property	Required Value	Method of Test
1.	Specific Gravity	1.0-1.1	ASTM D-792
2.	Tensile Strength (MPa) Min. both along length and width	25	IS: 2380
3.	Impact Strength – (J/m) min	195	ASTM D 256
4.	Water absorption (%) Max.	0.05%	ASTM D 570
5.	Resistance to staining for a) acetone, b) Black tea	Should not show any visible changes on the surface	IS: 2046
6.	Resistance to color change in xenon arc light	Not worse than 5	IS: 2046
7.	Resistance to solvent (Toluene)	No change	ASTM D 543
8.	Hardness Shore D	70-90	ASTM D 2583
9.	Elongation at break (%)	65-75	IS: 1998
10.	Thermal conductivity (W/m*K)	0.82 ± 10%	DIN52616
11.	Flexural Rigidity min	1200	IS: 4020
12.	Thermal Expansion	3.6 x 10-5 /°C ± 10%	ASTM D696
13.	Wear and cleanability	Pass	ISO 19712-2
14.	Screw Withdrawal Strength force (N) min.	1200	IS: 2380
15.	E-Modulus: Long grain (Mpa) min	3400	ASTM E-143
16.	Resistance to Crack	No crack was observed	ASTM D 903
17.	Boiling water test	No visual change	ASTM D 570

TABLE-V (For Toilet Walls/ Floor)

(FIRE PROPERTIES)

SN	Property	Required Value	Method of Test
1.	Spread of Flame	R1 (HL3)	ISO 5658-2
2.	MARHE (Maximum Average Rate of Heat Emission)	R1 (HL3)	ISO 5660-1
3.	Ds (4) Optical density at 4th minute	R1 (HL3)	ISO 5659-2
4.	CITG (conventional Index of Toxicity)	R1 (HL3)	ISO 5659-2
5.	VOF (4) cumulative Optical density at 4th minute	R1 (HL3)	ISO 5659-2

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7. Specification & Requirements for Decorative Layer

7.1.1 Properties

The properties of decorative layer separately shall conform to the requirements indicated in Table VI & VII.

TABLE-VI (For Decorative layer)

SN	Property	Required Value	Method of Test
1.	Resistance of surface wear	Index 3 IP>150 IP>350	IS: 2046, Appendix-C
2.	Water absorption (%) Max.	0.05%	ASTM D 570
3.	Resistance to staining for a) acetone, b) Black tea	Should not show any visible changes on the surface	IS: 2046
4.	Resistance to color change in xenon arc light	Not worse than 5	IS:2046
5.	Resistance to solvent (Toluene)	No change	ASTM D 543
6.	Wear and cleanability	Pass	ISO 19712-2
7.	Resistance to Crack	No crack was observed	ASTM D 903

TABLE-VII (For Decorative layer)

(FIRE PROPERTIES)

SN	Property	Required Value	Method of Test
1.	Spread of Flame	R1 (HL3)	ISO 5658-2
2.	MARHE (Maximum Average Rate of Heat Emission)	R1 (HL3)	ISO 5660-1
3.	Ds (4) Optical density at 4th minute	R1 (HL3)	ISO 5659-2
4.	CITG (conventional Index of Toxicity)	R1 (HL3)	ISO 5659-2
5.	VOF (4) cumulative Optical density at 4th minute	R1 (HL3)	ISO 5659-2

8. 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 of parameters of specification from:

(a) Any NABL accredited lab (in-house or outside) having tests & test method mentioned in Table-I, III IV & VI of this 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.

(c) Fire property test (Table-II, V & VII of this specification) shall be conducted at any 'CERTIFER' lab or lab empanelled by RDSO, to perform test as per EN-45545-2, R1 & HL3.

(d) The above submitted test reports shall not be more than one (01) years old from the date of prototype offer.

ii. Material and Safety date sheets.

iii. 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.

Note: In addition to above, tests & inspection of sample of material for compliance of the specification for material properties only shall be done by MCF for first time suppliers as per this specification. Adequate size of sample along with the reports as per this specification shall be submitted to MCF, well in advance.

9. QUALITY ASSURANCE, TESTS & DOCUMENTS:

The following table provides the overview of the system for quality assurance.

Requirement Description	Requirement Detail	Remarks
Quality Assurance Plan	The manufacturer shall have the detailed quality assurance plan. The Plan shall be submitted for approval to MCF/RBL. 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 Test 6. Acceptance tests 7. Raw Materials	The QAP shall be submitted in PDF as per MCF format (Annexure-A of MCF Specification MMDTS 24004, Rev-nil). Quality control requirement will be done as per clause no. 5 (Section-B) of MCF specification MMDTS24004, Rev-nil
Type Test	These tests shall be done on a sampled lot of prototype. Such Tests are required on initial approval, change of design and chance of manufacturing process or raw material. These tests are to be repeated as detailed in prototype approval process after every 36 months or as specified in PO as quality control measure. All other tests which are part of Routine test & Acceptance test shall be conducted during Type test. Fire property test (Table- II, V & VII of this specification) as type test shall be conducted at any laboratory which is assessed by "CERTIFER" Railway Certification Agency (list enclosed) or lab empanelled by RDSO, to perform	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

	test as per EN-45545-2, R1 &HL3. In this regard report to be submitted to Consignee. The cost of testing will be borne by the manufacturer. MCF/Purchaser reserves the rights to get FST property tested for any lot, for which charges will be borne by the firm. 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 three (03) years 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.	
Routine Test	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 (Table-I, III, IV & VI) are to be repeated after every 12 months or as specified. All other test which is part of Acceptance test shall be conducted during Routine test.	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.
Acceptance Test	These tests shall be done on all or samples of lot for bulk supply. Sampling shall be done as per IS: 2500. All tests as laid down in Table-I, III, IV & VI shall be considered as acceptance tests. Documents for routine test & type test with above detailed periodicity & validity shall also be checked during acceptance test & enclosed with acceptance test documents. The cutting of sample for testing at consignee end will be done from the extended piece of the TDPCP part without damaging the part. This provision will be made in the part drawing by the manufacturer to cut test samples for testing at consignee end. MCF/Purchaser reserves the rights to get FST property tested for any lot, for which charges will be borne by the firm. Two TDPCP test panels of 300 mm x 300 mm to be manufactured from	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.

	each batch and clearly marked with batch number and date of manufacture. One panel of each batch will be for testing and the other, after being duly marked, shall be stored till the material is tested and accepted at the consignee end. This is for cross checking and traceability and to maintain the highest standards of quality.	

Note:

1. Supplier shall submit test certificate of parameters (Table-I,II,III,IV,V ,VI & VII) 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 Table-I, III, IV & VI of this 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.

   (c) Fire property test (Table-II, V & VII of this specification) shall be conducted at any 'CERTIFER' lab or Lab empaneled by RDSO, to perform test as per EN-45545-2, R1 & HL3.

2. Assembly of Toilet module in the coach

Design of all type of FRP Modules will be in 03 pieces similar to Non AC Coaches so as it can be easily assembled inside the coach. The component of the module shall be assembled using stainless steel cross recessed head screws with or without adhesives at locations shown in the assembly drawing. Flat square head inserts (Blind rivet Nuts) of low carbon steel (galvanized) shall be provided on the panels at the relevant locations for installation of power panel in Non-AC coach toilets.

10.1 The assembled module shall meet the outer dimensions as present in the coach layout internal dimensions. There shall be no damage to the surface in terms of cracks or deep scratches on the surface in course of assembly.

10.2 Dimension and tolerances:

(i) Dimension of Lavatory module shall be as per tendered drawing.

(ii) If preparation of drawing is in scope of supplier, supplier shall ensure that drawings are prepared to accommodate Lavatory module within available envelope specified by the purchaser and comply other requirements of the purchaser. Design/Drawings of Lavatory module in 3D and 2D Format shall be approved from the purchaser before bulk supply (If drawings prepared by firm and in their scope) and should adhere to the internal dimensions of the coach for proper interface.

10.3 Scope of supply of Toilet modules:

The scope of supply of Lavatory module shall include all the items shown in the respective general arrangement drawings.

10.3.1 Plumbing:

KITEC (PE-AL-PE) or similar flexible pipe and connections with aluminum core encased within 2 HDPE layers with strong adhesive tie layer on both side of the aluminum core shall be used for plumbing including the connection from water tanks. The material used for the piping system shall conform to

IS-15450-2004.The connecting fittings of the system shall be made of non-corroding materials. Line valves shall be located to facilitate easy accessibility for maintenance. The complete plumbing arrangement shall be leak- proof and maintenance free. It shall be possible to isolate different water circuits/fittings for repairs without total dismantling. All item of pipe laying for water in Lavatory shall be as per reference drawing no. LE63157, LE63160, LS63100, LG63128, LG63267, LG63268 and LH63186.

10.3.2 Water Taps & Health Faucet:

Two-way Tap with Health Faucet with mounting arrangement and should not dispense more than 700 ml of water at 1 go. Length of flexible pipe to be approx. 900 mm.
Bib Cock to be of Kohler Model No.- 27493IN-CP or equivalent model of ToTo/ Hindware / CERA
Health Faucet to be of MAKE- M/s Hindware or M/s Parryware or M/s Jaquar- or M/s Kohler- or equivalent model of ToTo / CERA.

10.3.3 Inside Wash Basin:

Inside wash basin shall be as per drg. no. MI007948 (LH) & MI007955 (RH).

10.3.4 Outside Wash Basin:

Outside wash basin shall be as per drg. no. MI008058.
All hardware to be of Industrilas, Dirak, Southco, Sugatsune, Darshana or equivalent as used in airlines or International Railways.

10.3.5 Inside Dustbin:

Inside Dustbin shall be as per drg. no. MI006488.
All hardware to be of Industrilas, Dirak, Southco, Sugatsune, Darshana or equivalent as used in airlines or International Railways.

10.3.6 Outside Dustbin:

Outside Dustbin shall be as per drg. no. MI008061 with Mounting plate as per drg. no. MI008062 and drain pipe as per drg. no. MI008064.
All hardware to be of Industrilas, Dirak, Southco, Sugatsune, Darshana or equivalent as used in airlines or International Railways.

10.3.7 Waste bin arrgt. above with Fire Extinguisher :

Waste bin arrgt. above with Fire Extinguisher shall be as per drg. no. MI008029.
All hardware to be of Industrilas, Dirak, Southco, Sugatsune, Darshana or equivalent as used in airlines or International Railways.

10.3.8 Wash basin drain pipe:

Nylon Braided drain Hoses (fitted with coupling) shall be provided below inside Wash basin and shall be properly clamped as shown in drg. no. MI004725 , LE63157 & LE63160 .

10.3.9 Mirror & Frame:

Frame Less Mirror to be put inside & outside toilet with concealed lights all around for making it aesthetically pleasing. Additionally, Frame can also be used if desired as per in TDPCP material.

10.3.10 Lavatory Trough Floor:

Floor shall be anti skid /non attaching dirt with easy to clean and water should not stagnate. Special corundum "Trocor"0.5-1 mm, Non Ferrous (0.8 kg) shall be provided as per RCF specification MDTS092. Any other proven method for introducing anti skid property on toilet shall also be acceptable if approved by CDE on the basis of detailed technical justification submitted by supplier.

10.3.11 Lavatory Door:

Lavatory door shall be provided as per drg. no. LW56424 (RH) & LW56475 (LH).
All hardware to be of Industrilas, Dirak, Southco, Sugatsune or equivalent as used in airlines or International Railways. Wherever required branded latches/panel locks/hinges of make Southco, Industrialas, Dirak, Dorma, Sugatsune to be used. For door opening & closing arrangement, recommended makes are Dorma, Dirak, Southco.

10.3.12 Attachment wall:

Fixed attachment wall (outside the Lavatory) with inspection covers (to attend electrical, plumbing and pneumatic fittings) shall be provided to drg. no. MI008007 (LH) and MI008028 (RH). For LWSCN coaches, Attachment wall at lavatory module (having Electric panel) shall be provided as per drg. no. MI008166 and for LWSDDG & LWSCZ coaches, Attachment wall at lavatory module (having Electric panel) shall be provided as per drg. no. MI008149.
All hardware to be of Industrilas, Dirak, Southco, Sugatsune, Darshana or equivalent as used in airlines or International Railways.

10.3.13 Grab Hand Rails :

Grab Rail as per drg. no. ED63048 and ED63051 for Oriental Style Lavatory and Euro Style Lavatory respectively shall be provided on side wall panel below Lavatory window. Grab Rail shall be provided considering the cut-out (as shown in drg. no. MMI000150) provided at Lavatory side wall for fixing Venturi grill arrgt. (drg. no. MMI000150) (which is provided at MCF LHB coaches only) for Oriental Style Lavatory and Euro Style Lavatory.

10.3.14 Shelf/ cabinet:

Cabinet above Wash basin to be made up of TDPCP material shall be provided in reserved LHB coaches. It should have Sunk-in type in-built shelves & space for utilities for ease of cleaning & operation. Cabinet to be light weight & easy to install. Hanging arrangement along with space for keeping accessories to be provided.

All hardware to be of Industrilas, Dirak, Southco, Sugatsune or equivalent as used in airlines or International Railways.

10.3.15 Toilet Paper Holder:

To maintain the Hygiene, and to avoid pilferage, misuses & mishandling of Toilet paper should be in complete enclosed dispenser/holder. Toilet paper holder shall be sunk-in type with material stainless steel toilet paper holder and shall be provided in Western style Lavatory only. Tissue Paper Holder of Somany (Model no. SKU-27273111031) / Jaquar/ Kohler/ Cera or other brands as approved by CDE.

10.3.16 Liquid Soap Dispenser:

Manual operated wall mounted liquid soap dispenser with easy liquid soap filling arrangement of material Stainless Steel of capacity approximately 800 – 1000ml shall be provided in AC coaches Lavatory.
Brand- Bobrick, Dolphin, Gojo, Merida.

10.3.17 Soap Dish:

Stainless steel soap dish devoid of sharp edges shall be provided at suitable location.

10.3.18 Bacteria Neutralizer Dispenser:

Automatic hygiene & odor control system (Bacteria neutralizer dispenser) with inbuilt air circulation system along with bio-enzyme bacterial refills in built with fragrance as per Specification

RDSO/2008/CG- 11 (Latest). Capacity- 600ML or above for uninterrupted service.

Brand-TOTO, Water berry or any other established make.

10.3.19 Coat Hooks:

Foldable Stainless Steel shall be provided at convenient location. Folding is required to avoid any injury to passengers in case of any mishappening.

10.3.20 Handles:

Stainless Steel Handles (material-AISI-304) shall be provided inside the lavatory module at convenient locations for disabled and senior citizenship passengers.

10.3.21 Light Fitting

Toilet shall be equipped with inbuilt LED type aluminum spring free lights with aluminum screw concealer 3-5W/110V ACDC of diameter 76 +/-1mm and 1 number of 6- 9W/110V ACDC of diameter 100+/-1mm with 60000 hours LEDs and CRI>80 color temperature 6000-7000K. Fire rating EN 45515 HL3 and tested as per RDSO Specification- RDSO/PE/SPEC/ TL/0091-2016 (Rev-1). Cove Light across the ceiling to be provided to give aesthetically pleasing look.

Note: Scope of supply and other details of Lavatory module in the para 10 of this specification is for reference purpose only. Scope of supply and design for supply shall be as per requirements of purchaser, as specified in the tender documents.

III: Quality, Traceability, Warranty, Training & Trial

11.

11.1 Surface finish of TDPCP panel

The TDPCP components shall meet the parameters of Gloss as described below. The surface of panel shall have minimum gloss retention of 90% of its critical value. The supplier shall also provide the repairing method of TDPCP panels for maintenance at Depots.

SN	Characteristics	Required Value	Method of Test
1.	Gloss at 20°, 60°, 85° angle of incidence	> 90 (For glossy Finish) 5-30 (For matt Finish)	Gloss Meter

11.2 Marking and Packing

11.3 Marking:

Before dispatch, each pack shall be legibly marked with inedible marking ink/paint showing the following details:

- Manufacturers name with address and recognized trademark if any.
- PO details
- Date of manufacture.
- Lot or batch number.
- Quantity Packed
- Name and address of the consignee

In addition to above, a metallic name plate is also to be provided on lavatory wall with the above details.

11.4 Packing:

After inspection and approval, panels shall be suitably packed to prevent damage in transit. The method of packing used shall be as agreed between the purchaser/inspector and the supplier. Material shall be supplied with surface/ self-protective film to avoid scratches at the time of transit and fitment. Suitable rubber packing/ spacers shall be used for packing. Complete details of packing shall be furnished on the pallet.

11.5 Warranty:

78 months from the date of supply or 72 months from the date of fitment, whichever is earlier, the product shall be warranted against natural cracking or bending or color/gloss loss or any other functional parameter loss due to manufacturing defect. Cracking due to mishandling, deliberate damage shall not be considered as a manufacturing defect. Warranty Certificate is required to be submitted through OEM.

11.6 Training:

The firm shall conduct training for user Railway staff for installation, operation, troubleshooting, repairs and preventive maintenance of the TDPCP panels for paneling and modular toilet system free of cost.

11.7 Field Trial:

(i) As product is being developed and no detailed technical literature could be found for this, a field trial to evaluate performance for minimum of 6 months will be conducted for TDPCP panels in approx. 10 coach sets (i.e. Side wall panels, Ceiling panels and Lavatory modules).

(ii) On satisfactory performance report during product development & above mentioned field trial, specification will be considered for further procurements for extended limited field trial in coaches. Performance of one shop schedule (18 months) cycle of at least 10 coaches shall be monitoring before bulk application of material as per this specification in coaches.

(iii) Moreover, whenever material of any new supplier as per this specification is used in coaches approx. 10 coaches with material of the supplier as per this specification shall be put under service trial for 6 months. Material of the supplier for further coaches shall be applied after successful performance during service trial. For trial of each new supplier, intimation shall be sent to MCF by purchaser for monitoring of service trial.

(iv) Satisfactory performance for above paras shall mean-

- There shall be no loss in functional & physical characteristics of items during trials.
- There shall be no failure/breakage/ Screw Withdrawal complaint for offered items under trial.
- Proper working of system including all assemblies, subassemblies and components fitted in this system.
- The surface of the sheets shall not show any blisters, crack etc. during trials.
- The TDPCP Panel should not wrap, delaminate, loose shape, straightness, and profile during trials.
- The TDPCP Panel should also resists and withstand against attacks from termite and rodents during trials.

Note: Feedback for supply wise performance of material as per this specification shall be submitted to MCF on quarterly basis by user Railways. Field trial of Sidewall panels, Ceiling panel or Lavatory module shall be required to be completed separately for being considered for bulk supply of respective item.

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

Audit of OEMs for manufacturing & testing infrastructure and processes of material will be done by M/s RITES or any agency authorized by MCF in every 3 years.

It shall be responsibility of OEM to get audit done by M/s RITES or any agency authorized by MCF at its own cost. During audit, all tests except type test (Fire and smoke characteristics as per EN 45545-2, R1 & HL 3 in Table-II, V & VII of this specification) 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) years shall be submitted during audit.

SECTION-B

Requirements of infrastructure facilities to manufacture TDPCP components

1. Scope:

This section covers the infrastructural requirements for manufacturing of Composite Thermoformable Decorative Polymerized Composite Panel (TDPCP) for Paneling of IR Passenger Coaches.

2. Documents to be submitted by tenderer

2.1 The tenderer shall be either OEM or its authorized dealer. Documentary proof of being OEM or their authorized dealer to be submitted by the tenderer along with the offer. Para-2 of Section – A may be referred in this regard.

3. Plant, Machinery, and Infrastructure Requirements

3.1 The manufacturers of shall have adequate space and a covered area with cemented floor to accommodate the following:

a) Damp free place for storage of raw materials i.e., Thermoplastics, Additives, Fillers and other raw materials.
b) Independent manufacturing area for composite extrusion TDPCP panels.
c) Inspection & quality control area.
d) Independent area for compression molding process
e) Independent areas for design film stocking
f) **Continuous extrusion machine** of bed size width-1220mm or above. However, the machine should be suitable for width, length & thickness as mentioned in this specification as mentioned in this specification & the Purchase order/drawings.

4. Testing facilities:

4.1 The testing lab should have a facility for temperature and humidity control.

4.2 (i) The firm should have in-house testing facilities, complying with the test mentioned in following table:

SN	Section of this specification	Para no. of the section of this specification	Table no.
1	A	5.2	I
2	A	6.1.1	III & IV
3	A	7.1.1	VI

(ii) As already specified, RDSO letter no. MC/Testing, dated 24.06.2022 containing list of lab empaneled to perform test as per EN45545 as on date is enclosed for ready reference. Moreover, latest list of empaneled labs issued by RDSO shall be applicable.

4.3 The firm should have the following instruments.

a) Vernier calipers with Digital display
b) Micrometers with Digital display/Dial Thickness Gauge
c) Moisture meter with Digital display
d) Hydrometer
e) Measuring scale
f) Measuring tape

4.4 The firm should have arrangements for periodical calibration of all the gauges & instruments.

5. Quality Control Requirements

5.1 There should be a system to ensure the traceability of the product from raw material stage to finished product stage. The system should also facilitate identifying the raw material composition from the finish product stage.

5.1 It should be ensured that there is a Quality Assurance Plan for the product detailing the following various aspects:

- Organization chart
- Process flowchart
- Stage inspection details from raw materials stage to finish product stage.
- Various parameters to be checked and level of acceptance of such parameters indicated and method to ensure control over them.
- Disposal system of rejected raw material and components.

5.2 The firm must ensure that a proper analysis is done monthly to study the rejections at various internal stages, and it is documented.

5.3 The firm should ensure that the latest version of all the relevant specifications and IS standards are available with the firm.

5.4 For first time supplier, verification of manufacturing, infrastructural & testing facilities or CCA against LOA or PO as per Section-B of this specification shall be done by M/s RITES or any other agency authorized by MCF. For this purpose, purchaser shall make a response to MCF Design office.

6. Documentation: Firm shall maintain following documents/records:

6.1 A well-documented Quality Plan.

6.2 Incoming raw material register with Test Certificates references of suppliers and internal test results.

6.3 Stage inspection results including finished products results.

6.4 Records of internal rejection and its analysis vis-a-vis action plan.

6.5 Records for maintenance of dies/moulds.

6.6 Records for checking plates of the press and its frequency.

6.7 Ensure that proper systems are available for dealing with customer complaints.

7. Inspection:

7.1 100% of the Lot offered for inspection shall be visually examined for color & surface finish.

7.2 Dimensional Check as per drawing shall be carried out on 25% of the offered lot, minimum being 08 nos./ 02 coach sets.

7.3 One in ten pieces of the bottom trough shall be subjected to a load of 1000 N over an area of 250X250 mm at any location with support as provided in the drawing and the deflection shall not exceed 1 % of the maximum span of the trough. The same trough shall be subjected to the same load as given above at two different locations (total 2000 N).There shall be no sign of deformity under such loads.

8. Training:

Training needs should be identified for all concerned officials and regular training should Be organized and imparted on maintenance of machines, quality assurance, safety parameters etc.

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Annexure-A

MCF QAP format (Annexure-1 of MCF document no. MMDF0011, Rev-01, dated 08.02.2022)

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

1	Company Profile	3
2	Certificates and Essential Documents	3
3	Process Flow Chart/Installation Flow Chart	3
4	Details of Procurement - Raw material/Components/Sub-assemblies	3
5	Inspection Procedure	4
6	Rejection Handling Plan	4
7	Tool and Machine Calibration Plan	4
8	Requirement of Qualified/Experienced Personnel as per Specification	5

Approved by	Issued by	Page Number
Signature with date and stamp	Signature with date and stamp	2 of X

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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./Computer 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.

***

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

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भारत सरकार रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226 011
EPBX (0522) 2451200
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Government of India Ministry of Railways
Research Designs & Standards Organisation
Lucknow - 226 011
DID (0522) 2450115
DID (0522) 2465310

MC/Testing

Dated 24.06.2022

Principal Chief Mechanical Engineer,

01. Central Railway, HQ office, CSTM, Mumbai - 400 001
02. Eastern Railway, HQ office, Fairly Place, Kolkata- 700 001
03. Northern Railway, HQ office, Baroda House, New Delhi-110 001
04. Southern Railway, HQ office, Park Town, Chennai - 600 003
05. South Central Railway, HQ office, Secunderabad-500 071
06. South Eastern Railway, HQ office, Garden Reach, Kolkata-700 043
07. North Eastern Railway, Gorakhpur-273 001
08. North East Frontier Railway, HQ office, Maligaon, Guwahati- 781 011
09. Western Railway, HQ office, Churchgate, Mumbai-400020
10. East Central Railway, HQ office, Hazipur-844 101
11. East Coast Railway, Railway Complex, Bhubaneshwar- 751 023
12. North Central Railway, HQ office, Subedarganj, Prayagraj- 211015
13. North Western Railway, HQ office, Jaipur-302 006
14. South Western Railway, HQ office, Hubli- 580023
15. West Central Railway, HQ office, Jabalpur- 482 001
16. South East Central Railway, HQ office, Bilaspur- 495 004
17. Integral Coach Factory, Chennai - 600038
18. Rail Coach Factory, Kapurthala – 144 602
19. Modern Coach Factory, Rae Bareli – 229212

Sub: Testing of Fire Properties for coach furnishing materials.
Ref: (i)This office letter of even no. dated 01.04.2019
(ii)This office letter of even no. dated 20.01.2022

Vide ref (i) and (ii), the list of external laboratories for testing of coach furnishing materials had been issued to Zonal Railways / Production Units covering testing for the following fire properties:

a. Toxicity as per specification No. NCD-1409
b. Limiting Oxygen Index IS-13501/IS-13360
c. Deterioration of visibility due to smoke as per specification No. UIC-564-2 OR
d. Resistance to spread of Flame as per specification No. UIC-564-2 OR
e. Heat Release Rate (HRR) with test method as per ISO-5660-1

ICF/Chennai has already set up a fire testing lab for testing of coach furnishing material as per EN 45545. These facilities may be utilized by PUs/ZRs. Additionally, two NABL Accredited Labs are also appended to the list under reference which may be used if facilities at ICF cannot be made available.

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A.	Integral Coach Factory, Chennai	
S.N	Parameters	Standards as per EN 45545
1	Heat Release Rate (MARHE)	ISO 5660-1
2	Smoke Density (Ds ,VOF_4)	ISO 5659-2
3	Smoke Toxicity (CIT_g) & (CIT_{NLP})	ISO 5659-2 & NFX70-100-1&2
4	Lateral Spread of flame (CFE)	ISO 5658-2
5	Radiant Panel (CHF)	ISO 9239-1
6	Oxygen Index (OI)	ISO 4589-2
7	Single-Flame Source Test	ISO 11925-2
8.	Vertical Flame Test	ISO 60695-11-10

B.	M/s Ignito Labs Pvt. Ltd., Domkan, Anangpur, Fridabad, Haryana	
S.N	Parameters	Standards as per EN 45545
1	Heat Release Rate (MARHE)	ISO 5660-1
2	Smoke Density (Ds ,VOF_4)	ISO 5659-2
3	Smoke Toxicity (CIT_g)	ISO 5659-2
4	Lateral Spread of flame (CFE)	ISO 5658-2
5	Radiant Panel (CHF)	ISO 9239-1
6	Oxygen Index (OI)	ISO 4589-2
7	Single-Flame Source Test	ISO 11925-2
8.	Vertical Flame Test	ISO 60695-11-10

C.	M/s Spectro Analytical labs Pvt. Ltd, S-1, GNEPIP, Surajpur Industrial Area, Phase-V, Kasna, Greater Noida, Gautam Buddha Nagar, U.P-201308.	
S.N	Parameters	Standards as per EN 45545
1	Heat Release Rate (MARHE)	ISO 5660-1
2	Smoke Density (Ds ,VOF_4)	ISO 5659-2
3	Smoke Toxicity (CIT_g)	ISO 5659-2, ISO 17084
4	Lateral Spread of flame (CFE)	ISO 5658-2
5	Radiant Panel (CHF)	ISO 9239-1
6	Oxygen Index (OI)	ISO 4589-2

Zonal Railways / Production Units may utilize these facilities for independent Quality audits of furnishing materials whenever required.

DA: RDSO letter no. MC/Testing dated 01.04.2019 & 20.01.2022.

(Samir Lohani)
Executive Director (Standards)/Carriage

Copy to:

1. ED/QA, RITES Ltd. , 6th Floor, Plot No. 1, Sector -29, Gurgaon- 122001
2. EDME (Chg) Railway Board, Rail Bhawan, New Delhi-110001
3. PED/RS, RDSO, Lucknow-226011.
4. [illegible] 226011

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MCF/RBL