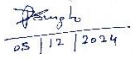


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DOCUMENT CONTROL

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LIST OF AMENDMENTS

SN	Amendment Date	Revision	Details
1.	14/7/2022	0	First Issue
2.	05/12/2024	1	<ol style="list-style-type: none"> 1. Manufacturing Process of VARTM (Vacuum Assisted Resin Transfer Molding) instead of Hand Lay Process added. Clause 1 and 2 updated accordingly. 2. Clause 5 and 6 merged to clause '5'. 3. Clause 5 updated accordingly. 4. Scope of Electrical requirements reviewed and updated. 5. Clause 11 for Warranty added.

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1 Introduction

This technical requirement laid down general / technical requirements of FRP modular Toilet (for AC & Non-AC Coaches) manufacturing by VARTM (Vacuum assisted resin transfer molding) process with proven composition as per the available standards to meet the technical requirement specified in the specification.

2 Forward and Scope:

This specification covers the general and technical requirements of FRP composite modular toilet (fitted with required amenities) using VARTM process for manufacturing. Modular Toilet shall be supplied in three walls and to be assembled inside the coach. The tenderer should offer clause-wise comments in its offer against this specification and shall also submit deviation statement, if any. RCF reserves the right to summarily reject the offer submitted without clause wise comments.

3 List of standards Referred:

SN	Standard	Title
1	IS:11551 -1996	Glass fibre chopped strand mat for the reinforcement of epoxy, phenolic and polyester resin systems.
2	IS :11273-1992	Woven roving fabrics of 'E' glass fibre
3	IS:2500-2000	Sampling procedures for inspection
4	ASTM-D792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
5	IS: 1998-1962	Methods of test for thermosetting synthetic resin bonded laminated sheets
6	BS:4994	Specification for Design and Construction of Vessels and Tanks in Reinforced Plastics
7	ASTM-D-2583-81	BARCO Hardness
8	EN 62262	Resistance or impact strength
9	IS: 13411	Glass reinforced polyester dough moulding compounds
10	ASTM D-570-2018	Test Method for Water Absorption of Plastics

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11	ASTM –D-2863	Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics
12	EN45545-2	European standard for Fire retardancy
13	MDTS- 44374	Fire Retardant Rigid Foam
14	MDTS-092	Granular corundum particles
15	MDTS-118	Painting system for FRP components
16	MDTS-115	3D Glass Fabric
17	MDTS-094	Painting System
18	IS:101	Methods of sampling and test for paints
19	EN 10204	Inspection documents for steel (and other) product

Table 1: List of referred standards

4 Abbreviation/Terminology:

S.N.	Abbreviation /Terminology	Expansion/Explanation
1	FRP	Fibre Reinforced Plastic
2	FAI	First Article Inspection
3	QAP	Quality Assurance Plan
4	RCF	Rail Coach Factory
5	KXH	Indian Railways station code for Kapurthala
6	LHB	Linke-Hofmann-Busch the transfer of technology partner for RCF/KXH.
7	VARTM	Vacuum Assisted Resin Transfer Molding

Table 2: Abbreviations & Terminology

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5 Scope, Material & Specification:

- a) Firm should develop the final detailed drawings and submit to RCF both 2D & 3D for approval before taking up manufacturing. Tender drawings given are for general guidance for maintaining overall dimensions of the components. The contractor is expected to improve upon the FRP Modular toilet and drawings to get the best finish, with due approval from RCF.
- b) FRP components shall be as per RCF's technical specification for all passenger coaches to MDTS-43373 Rev-1. Manufacturing process shall be VARTM
- c) Fire retardant Rigid Foam to MDTS_44374 Rev-00 shall be used as sandwich material in the walls and Floor of FRP Modular Toilet.
- d) For AC Coaches gel coated surface finish panels with granite granular effect finish or other suitable pattern/finish approved by CDE/RCF shall be provided for improved aesthetic and longer performance of interior surface. For Non-AC Coaches gel coated surface finish panels shall be provided.
- e) All bought out items shall be of reputed brands/proven make & should be approved by RCF.
- f) Design developments and prototype manufacturing should be carried out by suppliers inline with inputs of RCF's Design Department.
- g) Supply of loose items shall be as per Annexure 'A'.
- h) All interior surface finish should be good of blending with interior fittings to provide a pleasant look and shall have ease of cleaning and maintenance.
- i) Interior panels should be coated with anti graffiti as per RDSO specification no. M&C/PCN/127-2009. Anti graffiti coating activity shall be done by the firm at their premises itself, not after installation of a modular toilet inside the coach at the workshop.

6 Scope of Electrical Requirements:

Following Electrical items should be procured only from the sources as per RCF's approved vendor directory:

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- i. LED Light Fitting Lavatory Light to ICF drg 89076022 , of quantity 03 per Lavatory on ceiling to be provided. The supplier shall provide indelible marking of its own in addition to OEM's identification at a location which is normally not visible but can be viewed for identification in fitted condition. Grommet of suitable size shall be provided on cable entry holes.
- ii. Terminal connector to EDML-037 Rev 'a' of quantity 01 per lavatory to be provided.
- iii. Polyamide flexible conduits **NW-12** (in meters) to spec. no. RDSO/PE/SPEC/0138-2009 (Rev-1) Table-A-1, **Item-2** to be provided for wiring of lavatory light and limit switch etc. Segregation of +ve and -ve wires for lavatory light shall strictly ensured.
- iv. Clamping arrangement for double conduits to be provided over the lavatory area to drg. no. LP76001 Item-8.
- v. Cable jacket system, item-8 to EDTS138 to be provided at the ends of conduits as per requirement. No wire shall be laid without cable jackets/polyamide conduits.
- vi. Cable duct A45, Standard Slot Grey to Cat. No. CDA4545SG to be provided.
- vii. Cable duct cover A45, standard slot gray to cat. No. CCA45SG. Cable binder 3.6 x 200 to drawing no. **CC76129 Alt-'a'** shall be provided as per requirement for proper securing of cables/conduits.
- viii. E-beam copper cable of size 1.5 sq mm to be used for wiring from approved sources to RDSO Spec- ELRS/SPEC/ELC/0019, Rev-04.
- ix. Mounting arrangement for WAGO connector to be provided on wall of Module.
- x. Limit switch in the lavatory door frame & its wiring to be provided.
- xi. The route of Electrical wiring shall be as per SKED no. 598 alt-'a'.
- xii. The switch plate assembly consisting of 01 no. 6Amp ON/OFF switch and 01 no. 16Amp ON/OFF switch for Geyser and pump shall be provided in shower room lavatory module of LHB First AC coach as indicted in SKED no. 598 alt-'a'. Switches shall be conforming to IS:3854-1997.

Note: -

1. **x. and xi.** is not applicable for lavatory modules in LHB Non-AC coaches.
2. **xii.** is only applicable for lavatory module with shower room in LHB First AC coaches.

7 Key infrastructure requirements:

- The tenderer shall have plant, machinery, infrastructure requirements, testing facilities for FRP components and quality control requirements as per MDST-139.
- Firm should have inhouse VARTM facility.

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8 Quality Assurance, Tests & Documents:

Please refer clause 11 of MDTS-43373 with the latest version for Quality Assurance plan, type test, routine test & acceptance test.

9 Approval of prototype sample:

9.1 All new firms supplying the material for first time shall have to submit the pilot sample for approval of CDE/RCF

- 9.1.1 The supplier shall submit WTC (along with supply) from OEM for different constituents used for manufacture of FRP panels of lavatory module.
- 9.1.2 The supplier shall submit details about warranty, purchase bills for fittings purchased from OEM and supplied with the lavatory modules.
- 9.1.3 The supplier shall submit WTC for anti-graffiti coating.
- 9.1.4 Testing of the prototypes shall be done in the same condition as fixed in the coaches.
- 9.1.5 The following test shall be applied to prototype samples:
- 9.1.6 Dimensional checking.
 - a. Fitment interface of window cowl and lavatory window
 - b. Fitment interface of lavatory pan and S- trap of Bio Retention Tank.
 - c. Fitment interface of Attachment wall with door post.
 - d. Fitment of plumbing items and Exhaust pipe arrgt.
 - e. Back pieces for the fitment of mirror, Inner Attachment wall, SS Euro bowl and other amenities, shall be insured.
 - f. Fitment interface of FRP module with end wall sliding door for graze check.
 - g. Fitment interface of Lavatory door to be checked.
 - h. Material testing by RCF CMT lab.

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10 First Article Inspection :

10.1 First article inspection will be carried out by RCF as per ISO/TS 22163:2017: Requirement prior to submission of pilot sample to RCF, Kapurthala. Validation of special processes (including outsourced processes) will preferably be carried out as per ISO/TS 22163:2017 requirement.

10.2 The tenderer must submit approved quality assurance plan (QAP), work instructions and audit report of special processes along with a pilot sample.

10.3 The sample shall undergo following tests to assurance:

- Dimensional checking
- Tests to be conducted on FRP components as per MDTS-43373

11 Information to be provided by bidder / supplier:

The following information shall be provided by the bidder / supplier.

11.1 Information to be provided at the time of the bid:

The following information shall be included with the bid. These documents shall be used to determine suitability for placement of purchase orders.

S. No.	Information to be provided	Important Note
1.	The document indicating details of registration of the company on the MCA portal.	The document shall be verifiable from the MCA Portal.
2.	Previous supply credentials / testimonials containing the list of supplies made in the last 4 (four) years of FRP Components to MCF/ICF/RCF.	The document shall contain the contact details (phone number / email-ID) of the purchasers. These may be contacted by RCF for performance feedback.
3.	All the test certificates conducted by NABL accredited Lab for that particular test. The fire retardant tests as per EN 45545 -2 conducted by either NABL accredited Lab for these testes or Testing	The documents shall be not older than the last 3 years from the date of opening of tender.

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	lab accredited as per ISO/IEC-17025 to perform/conduct fire test as per EN45545-2.	
4.	ISO9001 / IRIS Certification as available.	

Table 3: Information to be provided with the bid

11.2 Information to be supplied upon release of letter of acceptance / purchase order:

The following information shall be supplied prior to the supply of the ordered material:

S. No.	Information to be provided	Important Note
1.	Copy of the detailed QAP for the FRP modular toilet ordered.	The document must contain the details as specified in the clause on quality assurance in this specification.
2.	Test Certificates for all tests (as detailed in the QAP) conducted by the manufacturer or third-party agencies.	The test certificates shall be traceable and verifiable.

Table 4: Information to be provided upon release of letter of acceptance / purchase order

11.3 Information to be supplied with the material consignment:

S. No.	Information to be provided	Important Note
1.	Copy of the detailed QAP for the FRP modular toilet ordered.	The document must contain the details as specified in the clause on quality assurance in this specification.
2.	Test Certificates for routine tests (as detailed in the QAP) conducted by the manufacturer or third-party agencies.	The test certificate shall be traceable and verifiable.
3.	Test Certificates for acceptance tests (as detailed in the QAP) conducted by the manufacturer or third-party agencies.	
4.	Certificates / documents establishing compliance and traceability of raw material used for the consignment.	
5.	Complete packing list for the consignment.	

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Table 5: Information to be provided upon release of letter of acceptance / purchase order

12. Warranty:

The supplier shall give warranty for the complete FRP Lavatory Module including individual parts against failing or proving unsatisfactory in service due to defective design, material or workmanship within 84 months from the date of supply or 72 months from the date of commissioning of coach, whichever is earlier and shall replace the same at his own cost and risk. Name of manufacturer with month & year of manufacture along with manufacturing details on metallic plate should be displayed at some suitable location not visible to passengers, ordinarily.

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Annexure ‘ A ’

List of items to be supplied loose by the supplier

S. NO.	Item Description
1.	Inside Mirror
2.	Outside mirror
3.	Inner attachment wall
4.	Lavatory Ceiling flap-1 mounting
5.	Lavatory Ceiling flap-2 mounting
6.	Scraper Mating
7.	Soap Dispenser with Cage
8.	Plumbing items
9.	LED Lights
10.	The items which can be broken and get opened during Transportation.

Table :6 List of items to be supplied loose by the supplier

Note:

1. Necessary clearance should be provided between the toilet floor (with covering of 3-M Scraper mating) and lavatory door, so that door shall not infringe. Toilet Door should be replaceable by opening of mounting screws.
2. Loose items (To avoid breakage during transportation) are to be fitted by RCF at shop floor after assembly of the Modular Toilet in the coach.
3. **The colour scheme for Lavatory Area shall be as per interior color scheme, issued for particular coach type.**