

रेल डिब्बा कारखाना, कपूरथला
RAIL COACH FACTORY, KAPURTHALA

MD35131

Date:02.05.2025

Sub: Issue of specification MDTs-23420 Rev.Nil

Please find enclosed a copy of under mentioned specification MDTs-23420 Rev. Nil, for information and necessary action at your end.

Description: TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR

Dy.CME/FD

CQM-I,II	CPL	CWE/Fur	CMM/ HSQ	CMM/TKJ	CWE/Shell
Dy.CMM/LHB/HSQ	Dy.CMM/G	CMT	Dy. CPL-I,II	Dy.CMM/Fur	

SSE/Filing Section

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Dy.CME/BD

SME/Design

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 1 OF 62 DATED 02.05.2025
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Name (Sh.)	Designation	Signature	Reason
Rakesh Duggal	SSE/Fur-I		PREPARED
T P Singh	SSE/Fur-II		PREPARED
Devender Singh	SSE/Fur-III		PREPARED
Y K Sharma	SSE/Fur-IV		PREPARED
Nitin Yadav	Dy.CME/Fur/Design		CHECKED &REVIEWED
Lalit Kishor	Chief Design Engineer		APPROVED

LIST OF AMENDMENTS

S. No.	Amendment Date	Revision	Details
Nil	Nil	Nil	Nil

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 2 OF 62 DATED 02.05.2025
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1. Introduction

This specification covers scope of work as “Design, Supply & fitment of complete furnishing of Oscillation Monitoring System Car” by the firm on Turnkey Basis, general requirements & other guidelines regarding execution of work.

2. Objective of this document

This document contains the techno-commercial requirements for enabling a tender and contract and post contract activities for the items included in the scope.

This document is to be read along with the other tender documents i.e.

1. Notice Inviting Tender
2. RCF Bid Document
3. GCC or other standard conditions as applicable.

3. Scope of the specification

This document is a specification for enabling purchase and installation of interior furnishing items for Oscillation Monitoring System Car. The document specifies the requirements for scope of supply, quality assurance requirements, prototype approval and inspection requirements, as supplied requirements, project schedule, payment milestones and guarantee warranty.

This document is planned to be used as part of the tender specifications for the purchase of Furnishing item kits and turnkey interior furnishing for manufacture of Oscillation Monitoring System Car.

4. Abbreviations / Terminology

S. No.	Abbreviations / Terminology	Expansion / Explanation
1.	BoM	Bill of Materials
2.	IR	Indian Railway
3.	KXH	Indian Railways station code for Kapurthala
4.	LHB	Linke-Hofmann-Busch the ToT partner for RCF/KXH.
5.	QAP	Quality Assurance Plan
6.	RCF	Rail Coach Factory
7.	ToT	Transfer of Technology.

Table 1: Abbreviations / Terminology

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 3 OF 62 DATED 02.05.2025
---	---	--

5. Salient features of the coach:

1. Switch Board Cabinet.
2. Equipment control Panel for VESDA, DG control panel, Inverter display panel
3. High quality amenities items like sofas, snack tables, mirror, toilet fittings, taps, Bottle Holders, Coat Hooks, Mobile Holders etc.
4. Hygienic bathrooms
5. Aesthetically pleasant interior paneling and molding.
6. Provision of 2x 40KVA Underslung DA set with On Board Control panel.
7. Provision of 1x 2.5KVA Underslung Bulkinverter 110VDC/230VAC with On Board Control panel.
8. Provision of LED type Luminaries with better aesthetics.
9. Provision of Bracket type Fans with better aesthetics.
10. Provision of Modular Type Switches/Socket with better aesthetics.
11. Provision of two nos. RMPU for AC area similar to LHB coaches.
12. Provision of Modular pantry equipments.
13. Electro pneumatic pressurized flushing system

6. Climatic and Environmental Conditions

The climatic and environmental conditions to be considered for the design and Manufacture of Oscillation car coaches are given below:

Atmospheric temperature.	Maximum temperature: 50 degree Celsius Maximum touch temperature of metallic surface under the Sun: 75 degree Celsius and in shade: 55 degree Celsius Minimum temperature: -10 degree Celsius.
Humidity	100% saturation during rainy season
Solar radiation	1 kW/m ²
Altitude	1776 meter above mean sea level

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 4 OF 62 DATED 02.05.2025
---	---	--

Rain fall	Very heavy and continuous rainfall in certain areas (up to 2500mm during rainy season)
Atmospheric conditions	Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach a high value of 1.6 mg/m ³ . In many iron ore and coal mine areas, the dust concentration is very high affecting the filter and air ventilation system
Coastal area	Humid and salt laden atmosphere. The equipment shall function in accordance with this Specification when subjected continuously to a humid and salt laden atmosphere with maximum pH value as per IEC 60571 sulphate content of 7 mg per litre, maximum concentration of chlorine 6 mg per litres and maximum conductivity of 130 micro Siemens / cm.
Vibration	<p>The vibration and shock levels recorded on various Sub-systems in existing Trains of IR are generally more than the limits given in IEC 61373 particularly at axle box, and traction motor.</p> <p>Accelerations over 50g have been recorded at axle box levels during run. Vibrations during wheel slips are of even higher magnitude. High level of vibrations above 30g have been measured at traction motor on IR's Trains, which increase up to 50g with worn gear-pinion.</p>
Wind speed	High wind speed in certain areas, with wind pressure reaching 216 kg/m ² as per IS:875-Part 3(2015)

Table 2: Climatic & Environmental conditions

In developing the detailed design, the supplier shall acquaint himself and take note of the environmental operating conditions prevailing on IR especially during heavy monsoon, track flooding conditions, saline, humid and dusty atmosphere etc.

7. Scope of supply & apply:

The scope of supply shall include detailed design (including process planning), manufacture, assembly and supply of furnishing kits, assembly of furnishing for Oscillation Monitoring System Car.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 5 OF 62 DATED 02.05.2025
---	---	--

7.1 Design:

S. No.	Description	Drawing / 3D Model	Remarks
1.	Design of Oscillation Monitoring System Car (Mechanical)	Solid Model in NX native format and hard copy of all drawings as per Layout No. TY90013 Alt B or latest version	<ul style="list-style-type: none"> Firm shall design the Oscillation Monitoring System Car in compliance to Layout No. TY90013 Alt B or latest version & this specification. Firm's design shall comply with reference drawing, specification & scope of work in specification. Design approval shall be done by RCF. Each item & manufacturing activity shall be in compliance to approved drawings only. The initial coach shall be a prototype coach. The prototype coach shall be reviewed jointly and a go-ahead for series production shall be granted upon prototype clearance. All modification at stage of prototype need to be incorporated in design by firm.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 6 OF 62 DATED 02.05.2025
---	---	--

	Design & development of drawings for Oscillation Monitoring System Car (Electrical)	2D/3D Drawings	<ul style="list-style-type: none"> Firm shall Design development and supply Electrical 2D drawings for Oscillograph car to layout TY90013 Alt. b as per drawing details mentioned at Cl 7.1.2.1. Interface of Coach electric equipment drawings with coach shell to clear routing path for laying of cables via. placing equipments in 3D model of the coach shell. Cable tray laying drawings in under-frame area for routing of cables. Pipe arrangement drawings (3D) for laying of feeder cables and there interfaces in the under-frame. Preparation of drawings for location of terminal strips inside coach for routing of jumper cables and branch cables Generation of detailed B.O.M. for Complete coach with above mentioned drawings. Work is to be done under supervision of SSE/JE Electrical Design. If any deficiencies observed by RCF representative, the same shall have to be rectified by contractor. Final set of drawings shall be submitted after joint inspection with RCF Elect./D /Mech.-D representatives. List of electrical drawings to be submitted listed in Para 23.
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Table 3: Design Requirement

7.2 Scope of Mechanical Items: -Firm shall supply& apply following mechanical items as per approved design by RCF: -

S. No.	Scope of Work	Specification/Scope of Work	Reference drawing
1.	Layout drawing no.		TY90013 Alt B or latest version

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 7 OF 62 DATED 02.05.2025
---	---	--

2.	General Installation Existing drawings will be used along with upgraded features as mentioned in below paras.		
3.	Complete Flooring Coach Floor Complete Floor BoardDecouplingElementFloor Covering Arrangement	Para 8.1	
4.	Seats and Berths	Para 8.2	
5.	Upper Berth Climbing Arrangement	Para 8.3	
6.	Door Arrangements should be similar to Layout Drawing	Para 8.4	
7.	Paneling and Ceiling Complete Paneling Arrangement Complete Ceiling Arrangement	Para 8.5	
8.	Doorway& Gangway ceiling and Door Frame Portal/Paneling	Para 8.6	
9.	Partition Frames & Pillar assembly	Para 8.7	TY 10010
10.	Grips & Labels Arrgt.	Para 8.8	
11.	Lavatories & sanitary facilities	Para 8.9	
12.	Air Circulation System &Ducting	Para 8.10	TY 44320
13.	Windows /Emergency Windows/Lavatory Windows Fixing Arrangement:	Para 8.11	
14.	Passenger Amenity Items.	Para 8.13	

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 8 OF 62 DATED 02.05.2025
---	---	--

15.	Marking diagram outside The marking diagram shall be as per MDTS-156	Para 8.8	
16.	Automatic Odour Control System With Cage RDSO/2008/CG-12 Rev.Nil		
17.	Equipment control panel for VESDA,DG Control Panel, Inverter Display Panel	Para 8.12	
18.	Hammer Box Arrangement	Para 8.14	
19.	Fire Extinguishers		MDTS – 46270 Rev 2
20.	Superstructure painting outside	Para 8.8	
21.	Coach insulation	Para 8.8	

Table 4

Note: - The scope of supply and installation covers major items and not limited to the above. The contractor shall supply the items as required for installation as per the scope of supply. Firm shall get prior approval of OGA, Make, drawings, specification and schematics from RCF before procurement.

7.3 Electrical Items:

The following types of light fittings shall be provided in the Coach, however exact design, type, model and layout to be described in the offer:

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 9 OF 62 DATED 02.05.2025
---	---	--

(A). Light Fitting:

S.N.	Description of items	Qty/ Coach	Scope	Reference RCF drawing
Light Fittings				
1	LED Light Fitting, Type-L (18W) (110V AC/DC) with Polycarbonate Front Cover Arrangement (For Officer Room (01 No.), Kitchen Area (01 No.), Panel Room (01 No.)	3 nos.	RCF/IC F/ MCF Appvd. Sources	LW76090 Alt “b”
2	LED Light Fitting with Night Light for LHB Coaches, Type-M (9W + 1W) (For Staff Room (08 Nos.), Officer Room (01 No.)	9 nos.		LW76091 Alt “b”
3	LED Light Fitting for LHB Coaches, Type-N (9W), 110V AC/DC (For Recording Room (04 Nos.), Middle Doorway Area (03Nos), Panel Room (01 No.)	8 nos.		LW76099 Alt “b”
4	LED Light Fitting for Mirror/Lavatory Area (9W) (110V AC/DC), Type-D (For Lavatory Area (01 each))	04 nos.		CC76471
5	Emergency light unit as per RDSO Spec. No. RDSO/PE/SPEC/AC/0180-2016 (Latest Rev.), (For Corridor Area)	01 Set		Type-2 (1 set Consist of 4no. light)
6	LED Light Fitting for Passenger Alarm Chain Indication, Type-I (3W) 110V AC/DC	02 Nos.		LW76098 Alt a
7	LED Light Fitting Round Type (9W) (White) (110V AC/DC) (For Recording Room (02), Kitchen (01))	03 Nos.		CC76475
8	LED Light Fitting Round Type with NL (9W+1W) (White) (110V AC/DC) (For Corridor Area (06), Kitchen Area (01),	08 Nos.		CC76468

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 10 OF 62 DATED 02.05.2025
---	---	---

	Recording Room (01))			
9	LED type Bed Reading lights, (02W) (110V AC/DC) (For Officer Room (02 Nos. each)	04 Nos.		CC76469
10	LED type Berth Reading lights, (01W) (110V AC/DC)(LOWER BERTH) (For Officer & Staff Room) (01 Nos. each))	10Nos.		LW76093Alt'a"
11	LED type Berth Reading lights, (01W) (110V AC/DC)(UPPER BERTH) (For Officer & Staff Room) (01 Nos. each))	10Nos.		LW76094 Alt "a"
12	LED type Focusing Light (9W), 110V AC/DC (For Recording Room (02 Nos.), Officer Room (01 No.))	03 Nos.		CC76470
13	LED type Spot Light (5W) (110V AC/DC) (For Lavatory Area (01 each))	04 Nos.		CC76467
14	LED Foot Step Light (9W) 110V AC/DC (Coach Doors)	04 Nos.		CC76473
(B)	FANS			
1)	Wall Bracket type, 225 mm Sweep with SS Guard , 110V DC Fan. (Lavatory (03), Staff Room (08), Officer Room (02), Kitchen (01) , Panel Room (01) & Recording Room (01).	16 nos.	--	IS:6680
2)	Exhaust Fan (with Metallic Blades) (For Lavatory Area (01no. each) except in PP End side Lavatory)	03 nos.		ICF Drg. No.: ICF/SK-7-6-177 Alt. b
3)	Double inlet centrifugal blower fan 3-Phase 190VAC	01 no.		EDTS 431 REV. A
(C)	Set of Modular type Switch Plate Assemblies for LHB Oscillation Monitoring System Car	01 Set	RCF/ ICF/ MCF	EDML - 249 (Ref. Note-C)
(D)	Call bell cum Annunciator	01 Set	Appvd. Sources	EDTS 117, Rev-A (Ref. Note-D)
(E)	Microcontroller based Electronics Speed Indicating System	01no.		MP-0-3700-07 Rev-7 - Aug 2017with RCF Annexure-B. (Ref. Note-E).

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 11 OF 62 DATED 02.05.2025
---	---	---

(F)	Set of Terminal Strip for LHB Oscillation Monitoring System Car..	01no.	--	EDML 250
(G)	MCB distribution Box for pantry equipments.	01no.	-	EDML 251 (Ref. Note-H).

Note:

- **The Supply of Cable Harness, Cable Protection System, and other accessories other than Tools and Test Instruments will be in the scope of RCF. However, the Installation, Termination and Commissioning inside the coach will be in contractors scope.**
- LED Light Fittings shall be procured from RCF/ICF/MCF approved sources only by the contractor and provided on FRP PANELs inside the coach keeping the fixing/interface requirements as per existing design. The LED light fitting shall comply with the RDSO spec. No. RDSO/PE/SPEC/TL /0091-2016 (with latest Rev.). However, Prototype design approval for general layout arrangement of light fittings shall be taken from CEDE/RCF.
- 110VDC Wall bracket fans with SS guard shall be procured from RCF/ICF/MCF approved sources only by the contractor
- Stainless Steel Hardware of suitable size shall be used for installation of Light fittings inside the coach & will be in firm's scope of supply.

B). FANS:

(i). Wall mounted Bracket fan (300mm Sweep)

110VDC, 225MM Sweep with SS guard Wall Bracket Mounted type shall be provided in (Lavatory (03), Staff Room (08), officer room (02) , kitchen (01), Panel Room (01) & Recording Room (01) and shall be procured from RCF/MCF/ICF Appvd. sources.

The Fans shall be provided with Male & Female 'WAGO' type connectors to part no. **721-603/721-103** or equivalent for interconnections inside the coach.

Stainless Steel Hardware of suitable size shall be used for installation of fans inside the coach & will be in firms' scope of supply

(ii). Exhaust Fan Assly: - (Reference Document No.: ICF/SK-7-6-177, Alt-b)

1 no. exhaust fan for Lavatory suitable for 110VAC shall be generally conforming to Drg. No. **ICF/SK-7-6-177, Alt b (with metallic blades)** shall be suitably integrated in each Lavatory module to exhaust the foul air from the lavatories. However suitable aluminum ducting arrangement similar to LHB Coaches shall be provided .

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 12 OF 62 DATED 02.05.2025
---	---	---

The fans shall be procured from RCF/ICF/MCF approved sources only by the contractor and provided in coaches keeping the fixing/interface requirements as per existing design.

Stainless Steel Hardware of suitable size shall be used for installation of fans inside the coach & will be in firms' scope of supply

C). Switch Plate Assembly:-

Reference Document No. - EDML-249 (IS: 3854 & IS: 1293 (Latest))

The general construction of the complete Modular type switch plate assembly in different areas of the coach shall generally be as per **EDML 249**.

The above switch plate assemblies shall be procured from RCF/ICF/MCF proven sources only by the contractor and provided in coaches keeping the fixing/interface requirements as per existing design. The Switches/Sockets will be developed/ designed blending with the interiors of the coach.

Stainless Steel Hardwares of suitable size shall be used for installation of Switch plate assemblies inside the coach & will be in firm's scope of supply.

C-1: Laptop/Mobile Charging point:-

Laptop/Mobile Charging points (i.e. 3-Pin Sockets, 6A, 110V AC) shall be provided at the various locations in coach as per EDML-249

S.N.	Area	No. of Points
1.	Staff Room	16 nos.
2.	Officer Room (Near berths & near Foldable table)	05 nos.
3.	Kitchen Area	01 no.
4.	Recording Room	02 nos.
	Total	24 nos.

C-2: 3-Pin Socket 6A, 220V AC shall be provided as per under given details:

S.No	Area	No. of Points
1.	In Kitchen area for Water Purifier and Refrigerator	02 nos.
2.	In recording room for 01 no. for Smart LED TV & 2 Nos. spare	03 nos.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 13 OF 62 DATED 02.05.2025
---	---	---

3.	Officer Room	02 nos.
	Total	07 nos.

C-3: 05-Pin Socket 16A, 220V shall be provided as per under given details:

S.N.	Area	No. of Points
1.	For Dryer & Electric Iron at PP End side	02 nos.
2.	For Geyser at PP end in Lavatory area	01 no.
3.	For Geyser at (Officer Room) Lavatory area	01 no.
4.	For 1no. Microwave, 1 no. Geyser , 2 No. induction Based cooking system	04 nos.
	Total	08 nos.

NOTE: Any items mentioned at Cl. 7.3 above required additionally as per site requirement will be in firms scope of supply without any financial implications

(D). The Call bell cum Annunciator system to ref. spec. EDTS-117, Rev-A shall be in Firm's Scope of Supply including Installation, Testing and Commissioning of the complete system in the coach.

(E). Micro controller based Electronics Speed Indicating System (Ref. spec. no. MP-0-3700-07 Rev-7 - Aug 2017) **with RCF Annexure-B:** The Micro controller based electronics Speed indicating system shall be in RCF scope of Supply; **however Installation, Testing and Commissioning of the complete system will be in firm's scope.**

(G). MCB distribution Box for pantry equipments shall be suitably fixed on the partition wall with SS hardware.

Special Note:-Installation/Commissioning of Electrical Items which are in firm's scope shall also include hardware (SS)/Crimping Lugs /WAGO Connectors / or any other additional material etc. as per site requirement.

7.3.1 :Scope of Installation and Commissioning of Free Supply Electrical Items:

Lifting, Loading, Installation & Commissioning including connections of free supply items as per under given details shall be in the scope of the contractor:

SN	Item Description	Ref. Spec./Doc. No.	LOCATION
1	60 KVA Transformer	RDSO/PE/SPEC/AC/0080, Rev-2	U/F

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 14 OF 62 DATED 02.05.2025
---	---	---

SN	Item Description	Ref. Spec./Doc. No.	LOCATION
	5 KVA Transformer	EDTS366	U/F
2	Regulated Battery Charger	RDSO/PE/SPEC/AC/0183, Rev-2	U/F
3	Feeder Junction Box + IVC Couplers (set) + Feeder Pipes	EDTS-328 (Latest) & RDSO/PE/SPEC/AC/0177, Rev-1 (Latest)	U/F
4	Battery Modules 120 Ah + 2 Nos. Battery Set	RDSO/PE/SPEC/AC/0009, Rev-3	U/F
5	Battery fuse box +ve	LW71001 Alt "i"	U/F
6	Battery fuse box -ve	LW71002 Alt "j"	U/F
7	Pump Equipment	EDTS-186 (Latest)	U/F
8	Capacitor Bank	EDML-130, Rev-1, Corr-5	U/F
9	2.5 KVA Inverter (U/s) with On Board Inverter Display Panel	EDTS032 Rev. D	U/F
10	Switch Board Cabinet (On Board)	RDSO/PE/SPEC/AC/0184 REV. 1	ON BOARD
11	Roof Mounted Package Unit (7T)	RDSO/PE/SPEC/AC/0061, Rev-2	ROOF
12	Coach Electrical Wiring complete	--	-
13	Chain Assembly for securing IV coupler	CC71074	ENDWALL
14	Wire rope Assembly for 55 + 5 KVA transformer	EDML-152 Rev-A	U/F
15	External supply Socket 125A	02Nos.	END WALL

Note:-

- Any other additional work as per site requirements will be in firm's scope.
- Mounting of all electrical equipments referred at Cl 7.3.1 above, Refer Mech/D drawing no. TY90116 Alt "latest".
- All hardwares required for mounting of electrical equipments will be in firms scope of supply.

7.3.2 List of standards and documents referred:

S. No.	Standard / Document	Title
1.	TY90013 Alt-b	Layout Drgs
2.	RDSO/PE/SPEC/TL/0091-2016, Rev.1 (or latest)	Specification
3.	EDTS215, Rev-Nil, AM-3	
4.	EDTS117, Rev-A	
5.	ELPS/TP/AC/01 , JAN-94	
6. (i)	EL/SPEC/EOG/001.	Code of Practice
(ii)	RDSO/PE/O/0008-2005 (Rev.-0).	

7.4 Installation:

Installation of complete furnishing of coach is in scope of contractor except for the items specifically mentioned in specification which are to be installed by RCF.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 15 OF 62 DATED 02.05.2025
---	---	---

Contractor shall abide by installation guidelines provided in the specification. The scope of supply installation testing commissioning includes all accessories including necessary hardware and consumables etc. All items shall be proposed for approval by CDE/RCF during the design approval process. Only approved items shall be used.

7.5 As-built Design & Documentation:

The contractor shall submit the following design documents and artefacts:

- 1) All the drawings required for installation/fitment of furnishings & fittings.
- 2) Parametric 3D CAD model of coach with 3D models of the items in native NX files with complete details.
- 3) Bill of materials.
- 4) Sources of supply with approximate cost (more than one alternative indigenously sources)
- 5) Complete catalogue for items, fittings instruction including trouble shooting for easy maintenance by the Railways.
- 6) Any other documentation, as identified and required, by RCF during the process of design development.

7.6 Operation and Maintenance manuals :

Operation and Maintenance manuals/instructions with trouble shooting guides, shall be supplied for all the items under the scope of the contractor. Maintenance manuals /instructions shall be supplied in the form of A4 size book, giving exploded views of assemblies, 3D snap shots, part numbers, drawings & dimensions. Photos shall be incorporated to the manual for easy identification of the process. The manuals shall be submitted both in hard and soft copies and in a presentable manner. 15 hard. copies in each manual shall be supplied. This is prerequisite for claiming 100% payment

Note: All design and drawings of successful bidder as approved by RCF shall be the property of the RCF. RCF shall have the proprietary rights of these design.

7.7 Spares

The Scope of supply shall also include set of spares for maintenance depot. The set of spares shall be as per Clause 22.

7.8 Trial & coach commissioning in user railways

Contractor shall be responsible for design validation during trial of coach & for coach commissioning in user railways.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 16 OF 62 DATED 02.05.2025
---	---	---

8. Item wise technical requirements: -

8.1 Floor covering Arrangement:

Scope:	<p>(i) Floor board & decoupling elements arrangement to Drg. no. TY41157 alt-nil to be supplied & installed by contractor. Floor board shall be as per MDTs- 44387.</p> <p>(ii) Floor end profile. Firm has to fit 2.5mm thick aluminium floor end profile to drg. no. LW41112 alt-nil over floor boards along both the side walls in slots provided on floor boards in order to keep top surfaces of floor end profile & floor boards flushed.(Reference drawing LW 41108 Alt Nil)</p> <p>(iii)Skirting. (Firm has to fit 2mm thick stainless steel skirting over floor boards around FRP modular toilets in the slots provided on floor boards in order to keep top surfaces of skirting & floor boards flushed. (reference drawing LW41108 Alt Nil) (skirting reference drg. no. - - - -210113.0.21.220.123 alt-B, 2 10113.0.21.220.124 alt-B , 2 10113.0.21.220.126 alt-B, 2 10113.0.21.220.127 alt-B, 2 10113.0.21.220.128 alt-B, 2 10113.0.21.220.139 alt-A, 2 10113.0.21.220.147 alt-nil, 2 10113.0.21.220.148 alt-nil)</p> <p>(iv)2mm thick PVC sheet as per the RDSO specification RDSO/2006/CG-12 rev.-2 to be pasted over floor boards, floor end profile & skirting with fire retardant adhesive to MDTs-237 complying fire characteristics as per EN-45545 HL-3 (reference drawing LA41115 alt-nil). Procedure for laying PVC sheet over floor boards to be followed as per carriage maintenance instructions no. RDSO/2008/CG/CMI-04.</p> <p>(v) Door stopper to drg. no. MI004112 alt-a to be provided at suitable location for each body side entrance door ensuring maximum opening of door.</p> <p>(vi) In kitchen area, Z web medium traffic Scrapper matting below induction-based cooking system to prevent water ingress meeting following parameters as stated & Scrapper mating in remaining area (meeting following parameters as stated below).</p> <p style="text-align: center;">Z-Web Medium Traffic Scrapper Matting</p> <table border="1"> <thead> <tr> <th>S N</th><th>Requirement</th><th>Parameters</th><th>Test</th></tr> </thead> <tbody> <tr> <td>1.</td><td>Material</td><td>Structure of vinyl filaments bonded to supporting ribs,</td><td></td></tr> </tbody> </table>			S N	Requirement	Parameters	Test	1.	Material	Structure of vinyl filaments bonded to supporting ribs,	
S N	Requirement	Parameters	Test								
1.	Material	Structure of vinyl filaments bonded to supporting ribs,									

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 17 OF 62 DATED 02.05.2025
---	---	---

		embedded in a durable Vinyl backing.	
2.	Total thickness	10.5-11.5 mm	ASTM D418
3.	Total weight	4-4.5 kg/m ²	ASTM D418
4.	Flammability (no ignition) Meets or exceeds requirement for NFPA Class I. Recommended critical average radiant flux to b.	Pill Test-Passes Flooring Radiant 0.80-0.85 watts/cm ²	OC FF 1-70 ASTM E-648
5.	Microbiological Properties	Passes – Inhibiting to fungal growth in the mat.	ASTM G-21-90
6.	Chemical resistant	7 days test	
Scraper Matting			
S N	Requirement	Parameters	Test
1.	Material	Unbacked, non-woven, open and porous floor matting made from continuous vinyl 1 Filamentsbonded together.	
2.	Total thickness	16-17 mm	ASTM D418-68
3.	Total weight	4-4.5 kg/m ²	ASTM D418-68
4.	Flammability	SmokedensityDM=404	ASTM-662-95
5.	Microbiological Properties	Passes–Inhibiting to fungal growth in the Mat Electrical.	ASTMG-21-90

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 18 OF 62 DATED 02.05.2025
---	---	---

	6	Dielectric Strength	12.0 Kilovolts	ASTM D149
Special Condi- tions	<ul style="list-style-type: none"> (i) The texture and color of the PVC shall match with the interior furnishing. (ii) Firm may offer any better alternative design meeting all parameters specified in the relevant RCF/RDSO specification. (iii) May have option for modular floor panels for easy replacement. (iv) Covering of PVC with tetron cloth etc., to avoid damage/scratches during working in coach. (v) Use of materials with certified anti-slip coatings or textures. (vi) May include self-cleaning technologies. (vii) Flooring with anti-bacterial/anti-fungal coatings, especially for hygiene-sensitive areas like lavatories and pantries. (viii) Detailed installation protocols to ensure uniformity and prevent air pockets beneath the flooring. (ix) Specification of flooring resistance to cleaning agents, oils, and other chemicals likely to be encountered during maintenance. (xi) Use of materials with certified anti-slip coatings or textures. (xii) Testing protocols for slip resistance under wet and dry conditions. 			

8.2 Seats and Berths & climbing arrangement:

Scope	<p>i) Seats and Berths Arrgt.:</p> <ol style="list-style-type: none"> 1. Seats and berths arrgt. in staff room should be similar to LHB AC 2-tier (Longitudinal side) to reference drawing no. LW61008 (latest alteration) 2. Upper Berth arrgt. in officer's room should be similar to LHB First AC coach to reference drawing no. LA61003 (latest alteration) 3. Berth mounting arrgt. shall be sturdy and concealed. 4. Tenderer may submit alternative offers giving adequate technical justifications for the same. <p>ii) Cushioning material:</p> <p>PU Foam to RDSO Specification RDSO/2007/CG-04 (Rev.-1) or Silicon Foam to RDSO/2013/CG-13 (Rev-1) or with latest Rev. and amendment.</p>
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SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 19 OF 62 DATED 02.05.2025
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	<p>iii) Upholstery: Vinyl Coated Upholstery Fabric (Artificial leather) with RDSO specification no. RDSO/2008/CG-07 (Rev-1) or superior synthetic fire resistant EN45545-2 complied cloth/fabric in aesthetically pleasing hues/colors design pattern and having better material properties as specified RDSO spec</p>
	<p>(i) General arrangement of seat and berth fixing shall be as per the layout of the coach.</p> <p>(ii) The firm may offer superior material for structural members, foam, upholstery or assembly. The firm shall submit test certificates meeting criterion as laid down in the respective specification/ drawings.</p> <p>(iii) The firm shall submit the test certificate for load testing of seats & berth as per the para 7 of MDTS 114 for alternate proposed design.</p> <p>(iv) The firm shall submit strength/stress analysis for alternate design.</p> <p>(v) The firm shall submit prototype sample to RCF for seat and berth along with fittings, prior to fitment on coach for approval of color scheme, pattern, aesthetics etc. The firm shall incorporate necessary changes as suggested by RCF in the first prototype coach.</p> <p>(vi)Ergonomics:</p> <p>a. Design seats and berths with ergonomic principles to maximize comfort for long durations.</p> <p>b. Adjustable lumbar support for seats.</p> <p>(vii) Materials:</p> <p>a. Incorporate anti-stain, water-resistant, and easy-to-clean materials for upholstery and cushioning.</p> <p>b. Use hypoallergenic materials to enhance passenger safety.</p> <p>(viii) Modularity: Modular seat and berth designs for easy replacement or maintenance.</p>

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 20 OF 62 DATED 02.05.2025
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	<p>(ix) Weight Optimization:</p> <ul style="list-style-type: none"> a. Lightweight materials for seat and berth frames to reduce overall coach weight. <p>(x) Maintenance and Durability:</p> <ul style="list-style-type: none"> a. Design with detachable and washable components for easy cleaning. b. High-durability components that withstand frequent usage. <p>(xi) Additional Storage:</p> <ul style="list-style-type: none"> a. Under-seat storage compartments with locking arrangement. b. Overhead racks designed with ease of access and secure holding mechanisms. <p>(xii) Climbing Arrangement Enhancements:</p> <ul style="list-style-type: none"> a. Anti-slip steps with glow-in-the-dark markers for safety. b. Foldable climbing arrangements to save space when not in use.
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 21 OF 62 DATED 02.05.2025
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8.3 Upper Berth Climbing Arrangement:

Scope &Special Condition	<ol style="list-style-type: none"> 1) Climbing arrangement shall be injury free and shall have minimum protrusion. 2) The upper berth climbing arrangement may be designed as integral part of the partition pillar. 3) The bidder shall submit the detailed design of climbing arrangement. 4) The drawing wherever mentioned to be followed for the reference. 5) Ergonomics: <ol style="list-style-type: none"> a. Ensure the steps or ladders are designed with ergonomically appropriate heights and distances between steps. b. Use anti-slip materials for step surfaces to enhance safety. 6) Safety Features: <ol style="list-style-type: none"> a. Include handrails on sides of the climbing arrangement for additional support. b. Rounded edges and corners to avoid injuries during use. 7) Space Optimization: <ol style="list-style-type: none"> a. Design foldable or retractable ladders to maximize space utilization when not in use. b. Integrate climbing structures into existing partitions or furniture. 8) Aesthetic Integration: <ol style="list-style-type: none"> a. Ensure the climbing arrangement matches the overall interior design of the coach, including colors and finishes. b. Hidden or camouflaged designs that blend with partition walls when not in use. 9) Ease of Maintenance: <ol style="list-style-type: none"> a. Design with modular components that can be easily replaced or repaired. b. Smooth surfaces to prevent dirt accumulation and facilitate. 10) Testing and Validation: <ol style="list-style-type: none"> a. Subject climbing arrangements to rigorous testing for load capacity, endurance, and safety under operational conditions. b. Include stress analysis testing reports as part of the design submission.
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 22 OF 62 DATED 02.05.2025
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8.4 Doorsarrangement :

Scope:	<p>Doorssupply and installation shall be in the firm's scope to drawing no. TY56005. For item-1 to 3 of drawing no. TY56005, supply& installation is in RCF scope.</p> <p>A. Arrangement of saloon Sliding Door for entrance to staff rooms, officer room & Kitchen.</p> <ol style="list-style-type: none"> 1. All saloon sliding doors of the coach must open at a minimum of 700 mm or more if possible. 2. The sliding Door shall not be infringing with any of the door/coach equipment/parts. 3. For mounting of move mechanism suitable arrangement/back pieces to be provided/ensured by firm. 4. All the Saloon Sliding doors of the coach should be compliance to MDTs082 (excluding clause 2.1) and similar to drawing no. LA56106. 5. Locking arrangement& glass of the door should be strictly as per latest alt of LA56106. <p>B. Sliding Doors for entrance to ac area.</p> <ol style="list-style-type: none"> 1. All sliding doors are similar to above Sr. No.(A) Saloon sliding Door except locking arrangement, glass and clear opening. 2. All the Saloon Sliding doors of the coach must open at a minimum 600 mm clear opening or more if Possible. 3. Tower bolt locking arrangement to be provided for door lock in fully open and close (Both) positions. 4. Glass of the door should be as per MDTs082. <p>C. Swing type Compartment Door.</p> <ol style="list-style-type: none"> 1. Swing type Compartment Door should be similar to drawing no. RA56118 for reference. <p>D. Lavatory Door Complete.</p> <ol style="list-style-type: none"> 1. Lavatory Door Should be as per referred Location of Doors to drawing no. TY56005. 2. All the door related amenities/fittings should be followed to ICF letter no. MD/Trainset/RB Contracts/186G Dated 06.01.2024. <p>Supply & installation of Body side door & end wall door shall be in scope of RCF.</p>
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 23 OF 62 DATED 02.05.2025
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Special Condition:	<ul style="list-style-type: none"> ○ Height of the door Leaf to be kept 1910 mm minimum and thickness 25 mm minimum for sliding doors(Entrance to staff rooms, officer room & Kitchen and Sliding Doors for entrance to AC area). ○ Total height from the floor level to the top of the mechanism to be kept 2133 mm max. ○ All the Drawing numbers of doors arrangement mention above are for reference only however any final drawings/design by firm to be prior approved by CDE/RCF before bulk supply. ○ The firm shall submit prototype samples of doors for approval along with test certificates to CDE/RCF before supply. ○ The firm has to incorporate necessary changes as suggested by RCF in the first prototype coach if required any. ○ All the door to be filled with rigid phenolic foam to IS:13204-1991 density 32 kg/m³ inside the door leaf. <p>(i) Material Enhancements:</p> <p>a) Use lightweight yet high-strength materials such as composite aluminium or stainless steel for durability and reduced maintenance.</p> <p>(ii) Aesthetic Integration:</p> <p>a) Ensure the doors are visually aligned with the interior paneling and overall coach design.</p> <p>(iii) Noise Reduction:</p> <p>a) Gaskets or seals to reduce vibration, noise from door movements.</p> <p>(iv) Maintenance Considerations:</p> <p>a) Modular components for easy replacement and repair.</p> <p>(v) Compliance and Certifications:</p> <p>a) UIC-566 for mechanical strength.</p> <p>b) Fire Test for rubber items shall be as per EN45545</p> <p>c) Fire Test for rigid phenolic foam shall as per appendix-6 of UIC-564.</p> <p>(vi) EmergencyFeatures:</p> <p>a) Quick-release systems or hold doors in open condition mechanisms forrapid evacuation during emergencies</p>
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 24 OF 62 DATED 02.05.2025
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8.5 Paneling and Ceiling:

Scope:	<ul style="list-style-type: none"> i. Al/ACP Ceiling Panels and associated accessory required for installation. ii. Al/ACP Side Panels and associated accessory required for installation. iii. Al/ACP End Panels and associated accessory required for installation. iv. Al/ACP Partition Panels and associated accessory required for installation. v. Al/ACP Door pillar covering Panels and associated accessory required for installation. vi. Suitable brackets/backpieces required to be welded /bolted on the Shell for mounting the panels/accessory.
Specification:	The interior paneling will be predominantly with Aluminum sheets & Aluminum Extrusion/ Aluminum composite panel (ACP). Aluminum shall be of 2 mm thickness to 19000 Grade as per IS 737. ACP shall be of 3 mm thickness to specification ICF/MD/Spec-234.
Special Condition:	<ul style="list-style-type: none"> 1) The reference Layout is to be followed for models and drawings. Some reference drawings are: <ul style="list-style-type: none"> a. Side wall panelling :- LJ42145, LJ42146 b. End wall panelling :- TY43145 c. Door frame panelling :- LE43100 d. Partition frame panelling :- TY43147, LZ43119 e. Officer's room ceiling:- RA44404 2) Panels around door pillar should be so designed that no gaps should be visible. 3) Side panels should be designed in such a way that, the interface with window panels should be proper. 4) Side panels should be designed in such a way that, the interface with floor at bottom and with roof panel at top should be proper and no gaps should be there. 5) Al/ACP ceiling panels are to be provided in officer room, staff room & corridor area besides officer's room-kitchen area.

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 25 OF 62 DATED 02.05.2025
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	<p>6) The Design of the Panels shall be aesthetically pleasant & colour scheme (approved by RCF) should suit overall ambience with flooring / seat & berth etc. The contours and curves shall be such to provide maximum space envelop to the passenger.</p> <p>7) The Bidder may offer a suitable design for the panels, having suitable noise and heat insulation characteristics.</p> <p>8) Panels and ceilings shall have necessary cut outs/back pieces for luminaries fittings.</p> <p>9) There shall be no sharp edges/corners/ protrusions.</p> <p>10) All panelling shall have no visibility of screws, easy to fit and replace. There should be no gaps and if unavoidable it should be uniform at the interfaces of side wall panels, roof ceiling and partition frames. Aluminium Extrusions may be used to enhance aesthetics</p> <p>11) Design should eliminate drumming effect due to vibrations induced by the motion of the coach. Anti drumming material to be provided in sufficient quantity. Firm to provide suitable design calculations for it.</p> <p>12) There shall be no loss of air conditioning through joints.</p> <p>13) Bidder may submit alternative material options superior to proposed arrangement in the light of availability of World Class Interiors.</p> <p>14) There shall be suitable mechanism for opening of the panels for maintenance purpose.</p> <p>15) The firm shall submit the location drawing of back pieces required for mounting of Panel and all accessory/electrical items in the panels for approval before fitment.</p> <p>16) The Gaps between the side Panels, Partition frame and Ceiling</p>
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 26 OF 62 DATED 02.05.2025
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	<p>Panel are to be suitably covered. There should not be any open shell area which can be used for insertion/collection of any foreign material by the passengers. All such pockets should be aesthetically covered.</p> <p>17) Ceiling panels should have aesthetically pleasant interface with AC duct. The flow of conditioned air from ac duct to cabin area should be properly diffused and uniform in such a way that there is no leakage of air into shell members and the air is not creating any noise or whistling sounds in cabin area.</p> <p>18) Material Enhancements:</p> <ul style="list-style-type: none"> a) Advanced Material Options: Offer lightweight, fire-retardant materials like honeycomb aluminum panels or advanced composites. b) Eco-friendly Materials: Use recyclable or sustainable materials that reduce the environmental impact. c) Anti-Microbial Coating: Apply anti-bacterial or anti-fungal coatings to improve hygiene d) Quick-Release Mechanism: Include panels with an easily removable mechanism for maintenance or cleaning purposes. e) Scratch-Resistant Coating: Add scratch-resistant finishes to maintain aesthetics over time. f) Easy Cleaning: Use non-porous surfaces that are stain-resistant and easy to wipe clean. <p>19) Design and Aesthetic Integration:</p> <ul style="list-style-type: none"> a) Customizable Textures: Allow the integration of textured finishes or customizable patterns for premium segments. b) Integrated LED Strips: Offer ambient lighting with concealed LED strips in the ceiling panels. c) Color Consistency: Ensure panels are color-matched with adjacent fixtures like berths, flooring, and sidewalls.
Requirement:	<ul style="list-style-type: none"> (i) Light weight (ii) Aesthetically pleasant (iii) No gaps in side wall and roof ceiling should be visible to

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 27 OF 62 DATED 02.05.2025
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	passengers.
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8.6 Doorway& Gangway Ceiling & Door Frame Paneling :

Scope:	<ul style="list-style-type: none"> (i) Door guidance covering complete (ii) Non-AC Area ceiling and Paneling at SBC area PP End, Recording room and Middle Doorway/Gangway area. (iii) Paneling to cover the gaps in Electrical Panel area (iv) Suitable brackets required to be welded/ bolted on the Shell for mounting the accessory.
Special Condition	<ul style="list-style-type: none"> (i) The Doorway ceiling panels shall be made of material compliant to RCF specification MDTs-44388. (ii) The bidder may use alternate material than specified in the reference drawing. The panels shall be long lasting, aesthetically pleasant and no screws should be visible. Cut out for fixing of smoke sensors, lights, and other accessories are to be provided. (iii) There shall be no gaps at corner and Edges. gaps shall not be visible at the joints. The Surface at the edges shall be smooth and merging to the mating panels. (iv) Panel shall be Modular and suitable maintenance window with square key lock of M/s Southco or Dirak make shall be provided in the Doorway Panels (v) Light weight design, meeting load characteristics shall be given preference. (vi) Center doorway ceiling shall be provided along roof profile to facilitate loading & unloading of water tanks.
Requirement:	<ul style="list-style-type: none"> (i) Light weight (ii) Aesthetically pleasant (iii) No gaps in side wall and roof ceiling should be visible .

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 28 OF 62 DATED 02.05.2025
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8.7 Partition Frames & Pillar assembly:

Scope:	<ol style="list-style-type: none"> 1) The reference drawing for partition frame is TY10010. 2) The dimensions of partition frame shall be confirmed to the coach layout and its boundary condition. All partition to be bolted type. 3) <ol style="list-style-type: none"> a) The partition frames for bathroom area shall be made from square tube of 2x20x20 section using material SS/AISI-304. b) Height of partition frame shall be as per coach requirement. c) Door opening in partition frame shall be as per door requirement d) Metallic partition frame shall be covered with ACP sheet both sides as per interior colour scheme of the coach. 4) <ol style="list-style-type: none"> a) Partition for officer lavatory shall be made from square tube of 2x20x20 section using material SS/AISI-304. b) Height of partition frame shall be as per coach requirement. c) Door opening in partition frame shall be as per door requirement d) Metallic partition frame shall be covered with ACP sheet both sides as per interior colour scheme of the coach. 5) Partition in centre doorway area to be designed in such a way that water tank insertion is possible on both sides. 6) Except bathroom area and officers lavatory area, all partition frames will be made of material complaint to MDTS-44388. 7) Partition frame between electrical panel and dryer area shall be honeycomb type with 20mm thick. 8) Partition frame between staff room and Vesda control panel shall be hollow type with 20mm thick material complaint to MDTS-44388 P/F at both sides having gap of 70mm. Also, the opening for sliding door shall be as per requirement. 9) Transverse partition frame in all the staff cabins shall be of 20mm thickness honeycomb partition frame & 25mm* 75mm rectangular tube 4mm thick with proper cross section as per berth requirement using material SS/AISI-304. 10) Electrical fan would be mounted on rectangular tube with proper back piece. 11) Partition frame for staff cabin shall be of material complaint to MDTS-44388 with 20mm thickness with proper sliding door opening as per requirement. 12) Partition frame between staff room and lavatory shall be same as mentioned in above point no.8. 13) Officers cabin Partition shall of honeycomb type with 20mm thickness.
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SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 29 OF 62 DATED 02.05.2025
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	<p>14) Partition frame between officers room and kitchen shall be honeycomb type with 20mm thickness and rectangular tube for berth requirement. Steel insert with 3mm thickness to be provided in honeycomb partition frame for lightweight accessories.</p> <p>15) Partition frame for kitchen and corridor area shall be of 20mm thickness.</p> <p>16) Partition frame between recording room and kitchen will be same as per above point no.8.</p> <p>17) All inserts in honeycomb partition frame shall be embedded in appropriate adhesive for proper strength.</p>
Special Condition:	Rectangular tube shall be unpainted with brushed Stainless-steel finish. (Processes: FLAP WHEEL 180 GRIT STATION, 320 GRIT 2 STATION, 320 GRIT 1 STATION, 400 GRIT 1 STATION AND NON-WOVEN WHEEL A60 2 STATION)

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 30 OF 62 DATED 02.05.2025
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8.8 Grip, Label, Marking, Gangway & Insulation: -

Scope:	<ul style="list-style-type: none"> • Marking Diagram: Exterior markings to be provided on Sidewalls as well as endwalls. Material to be as per MDTS-156. Drawing to be prepared and reference drawing LE24100 shall be referred. • Superstructure Painting Outside: Fleetgraphic film to be supplied as per RDSO specification RDSO/2010/CG-08, MD34431 dtd. 12.12.2023 & color scheme shall be as advised by RDSO, vide para '4' sub clause 'c' of RDSO letter no. RM-2/G/7/RSP: 2017-18 dtd. 02.07.2024. Drawing to be prepared and reference drawing LE83143 shall be referred. Application of fleet graphic film shall also be firms scope. • Coach Insulation: Thermal insulation to be provided similar to RCF built AC coaches. Material to be as per MDTS-207 and MDTS-28001. Drawing to be prepared and reference drawing LE80101 shall be referred. • Grips, Labels and Mounting Arrgt: End wall Handle, Builder Plate, Padlock, Tail Lamp Bracket to be provided. Drawing to be prepared and reference drawing LE24100 shall be referred. • Collapsible door to be provided on both end vestibule door. Indian Railways design to be followed for reference. <p>Items in RCF's scope of supply & installation</p> <ul style="list-style-type: none"> • Intercar Gangway Mounting: To be as per Drg no. 1 10113.0.24.100.001. • Entrance handrail • Painting of coach including sound insulation. Final coat/fleet graphic film supply & application shall be contractor's scope.
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 31 OF 62 DATED 02.05.2025
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8.9 Lavatories & sanitary facilities:

Scope:	<ul style="list-style-type: none"> (i) FRP Lavatory Module with Euro bowl & Orient bowl as per layout having Internal Wash basin, Internal & external Dustbin, Sanitary facilities, inside Mirror & Fire extinguisher. (ii) Odor control system as per RDSO specification No.: RDSO 2008/CG-11. (iii) Exhaust fans to spec. no. EDTS-331, (Latest) shall be provided to exhaust air from the lavatories.
	<ul style="list-style-type: none"> i) Bath room and Lavatory adjacent to officer room shall be of Stainless Steel partition frame and lavatories for staff shall be FRP modular toilet (MDTS 214 Rev-12 or latest with amendments) with gel coated suitably sloped floor and with anti-graffiti coating surface finish panel with improved toilet seat mounting arrangement and all the amenities like mirror, water tap, soap dispenser and tissue paper dispenser. Light and mirror of lavatory shall be sunk-in type. ii) Lavatory fittings should have suitable hydrophobic coating. iii) Water circulation system consisting of under slung water tank (450 ltrs.), overhead 390 liters water tanks, Auxiliary water tank and piping arrangements (underslung stainless steel piping, mounting of side filling piping for 450L, side filling for 390L overhead water tank for officers lavatory towards almirah cum dressing area, water piping arrangement for lavatories of bath room & kitchen area) and all sanitary facilities shall be in scope of supplier. All brackets for clamping of plumbing pipes will also be in scope of supplier/vendor. iv) Drawings LP63138, LW63150, LP63160, LG63140, LG63105, LG63106, LG63263, LG63129, LG63128 and LS63100 shall be referred for Under slung water tank 450L, auxiliary water tank 30L. piping arrangement for aux. water tank from under slung water tank to aux. water tank, overhead water tanks, equalizing connections for 390L tanks, side filling arrangement and pipe connections from 390 liters water tanks for lavatories respectively. v) Dustbin integrated with outside wash basin and fire extinguisher pocket merged with corner of the lavatory. The bin shall be of Stainless-steel grade AISI 304. vi) Large view mirror above the washbasin in lavatory. vii) All the lighting arrangements of lavatory shall be in scope of supplier. viii) Attachment wall with inspection covers shall be integral part of lavatory and there should be no visible gap in joints. There shall

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 32 OF 62 DATED 02.05.2025
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Special Condition:	<p>be a maintenance window with square key opening.</p> <p>ix) Lavatory window to drg. no. LW54188. Bidder may also offer any other elegant swing type window design with frosted glass and SS grill.</p> <p>x) Electro Pneumatic Pressurizing System EPFS shall be provided by RCF and Lavatory module and Lavatory with partition frames shall have suitable provision for the same.</p> <p>xi) Bio tanks to drg MI006418 (2number) and MI007339 (1 number) shall be provided for staff and officer lavatory</p> <p>xii) Water tank flap arrangement of ACP to be provided in center door way area.</p> <p>xiii) Provision of shower room with curtain arrangement of world class facilities in lavatory module for Officers room. Amrit Bharat pantry bathroom Drg no. LA63152</p> <p>xiv) Fuel tank mounting arrangement shall be in scope of Supplier/Vendor. Drg. No. LP90102, LP90150 shall be referred.</p> <p>xv) Hygiene Enhancements:</p> <p>(a) Anti-Microbial Coatings: All surfaces and fittings should have anti-bacterial and anti-fungal coatings to reduce the risk of contamination.</p> <p>(b) Self-Cleaning Systems: Integration of automatic self-cleaning systems for bowls and washbasins after each use.</p> <p>(c) Touchless Controls: Motion sensor-based water taps, soap dispensers, and flushing systems to minimize physical contact.</p> <p>xvi) Odor Management:</p> <p>(a) Advanced Odor Control Systems: Use of UV-based or ionizer systems for improved Odor elimination beyond standard specifications.</p> <p>(b) Ventilation Optimization: Exhaust fans with higher air exchange rates and noise reduction to maintain Odor-free conditions.</p> <p>xvii)Durability and Maintenance:</p> <p>(a) Scratch-Resistant Surfaces: Use scratch-proof FRP or stainless-steel surfaces to maintain aesthetics over time.</p> <p>(b) Easy Maintenance Panels: Design maintenance panels with quick-access mechanisms for servicing internal components.</p> <p>(c) .Corrosion Resistance: All fittings, pipes, and accessories should be corrosion-resistant for prolonged durability.</p> <p>xviii) Safety Features:</p> <p>(a) Anti-Slip Flooring: Ensure sloped floors are also equipped with anti-slip textures to prevent accidents.</p> <p>(b) Grab Rails: Provide stainless steel grab handles or rails for safety, especially for elderly or differently-abled passengers.</p> <p>(c) .Fire Safety: Fire extinguishers should be integrated discreetly but accessible, and the lavatory module should be fire-resistant.</p> <p>xix) Water Management:</p> <p>(a) Efficient Water Use: Low-flow taps and flushing systems to conserve water without compromising functionality.</p> <p>b.Automatic Water Level Monitoring: Sensors to alert maintenance staff about low water levels in tanks.</p>
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SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 33 OF 62 DATED 02.05.2025
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Requirements:	<ul style="list-style-type: none"> (i) No water clogging (ii) Failure proof working of flushing system with clogging (iii) No water clogging (iv) No dust ingress on the fittings (v) Neat and clean toilets during whole journey time
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8.10 Air Circulation System and Ducting:

Scope:	<ol style="list-style-type: none"> 1. Complete ducting arrangement for conditioned air and return air circulation inside the compartments of staff room, Officer Room, Kitchen and Recording room with diffuser grills. Diffusers size/area shall be as per LHB AC 2T coaches (Ref. drg. No. -LW44377) for proper air distribution. 2. All transition Ducting for Return Air and Fresh air with diffuser grills.
Requirement:	<ol style="list-style-type: none"> i. Air conditioning system shall generally conform to Schematic arrangement shown in drg. no. TY44320. ii. Material specification for the ducting shall be IS:737, 31000 H2. iii. Return air arrangement on Staff Room area (PP End) shall be taken from middle Corridor area. iv. On NPP End, return air shall be taken from Aisle and Recording room. v. Suitable Sized Ducting with end Connectors to connect with roof mounted RMPU. vi. The Ducting need to be enclosed in the space provided as per layout vii. Firm shall provide the CFD analysis for the ducting arrangement and the duct size shall be as per the CFD report. viii. The Ducting shall have provision of Diffusers such as to have uniform cooling inside the Coach without any abnormal noise. ix. Adjustable AC vents should be provided in all Cabins/Rooms. x. The Duct shall be adequately insulated with melamine foam as per MDTS-116 to avoid losses. xi. The duct for connecting the return air and main duct shall be in scope of the firm. xii. Firm may offer better design with requisite documents for approval by RCF.

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 34 OF 62 DATED 02.05.2025
---	---	---

	<p>Durability and Safety:</p> <ol style="list-style-type: none"> 1. Withstand high air pressure and accidental impacts. <p>Airflow Distribution:</p> <ol style="list-style-type: none"> 1. Conduct CFD (Computational Fluid Dynamics) analysis to optimize airflow. 2. Ensure uniform air dispersion without creating dead zones or hotspots. <p>Mounting and Suspension:</p> <ol style="list-style-type: none"> 1. Use vibration-dampening suspension hardware to reduce noise and wear during coach operation. <p>Noise Reduction:</p> <ol style="list-style-type: none"> 1. Provide optional acoustic lining for additional noise dampening. <p>Modularity and Maintenance:</p> <ol style="list-style-type: none"> 1. Ensure the ducts can be quickly detached using fasteners for inspection, cleaning, or replacement. 2. Provide modular sections to facilitate partial replacement without dismantling the entire duct. 3. To determine the Efficacy of the supply, return and branch air ducts for the Air conditioning system, the firm shall carry out the Pull-Down test as per RDSO specification ELPS/TP/AC/01, JAN-94- "Test program for air-conditioned Coaches." 4. Any modification required in the ducting to achieve the results as per the test program shall be carried out by the firm without any financial implication on either side.
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8.11 Windows and Roller Blind :

Scope:	<p>(i) Fixed glass windows (all windows of staff room and officer room) with slider/ hooper type opening glass in upper portion only, to drawing no. LG54127 and LG54128 shall be used.</p> <p>(ii) Sealed Window with Manual operated blinds to specification MDTS078 Rev 03 with concealed mechanism in the Aluminum panel. Roller Blinds to be provided on all the windows</p> <p>(iii) Window blinds to be designed in such a way that it is fitted in the recess provided in side wall and has minimum protrusion outside the side wall</p>
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 35 OF 62 DATED 02.05.2025
---	---	---

	<p>panel and does not infringe with the berth mountings and interior fittings.</p> <p>(iv) S.S. Metal wire mesh to be provided over all windows except EOW on the outer side.</p> <p>(v) Fire retardant rubber to MDTs 49830 to be used.</p>
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8.12 Equipment Control Panel :

Scope	<p>Equipment control panel for VESDA, DG control & Invertor panel</p> <p>(i) The Equipment control panel shall be modular as per standard rack confirming to Conforms to DIN 41494 OR equivalent ISO Standards</p> <p>(ii) The Panel shall have suitable No's of shelves to accommodate the Panels of VESDA, DG control & Invertor panel in separate doors.</p> <p>(iii) The Panel shall be of AISI- 304 with 2B mat finish.</p> <p>(iv) All incoming and outgoing cables to be sealed properly for the Gaps using Rotex or Equivalent make entry & exit sealing.</p> <p>(v) The Panel door shall use reputed make locks of Dirak or Southco only.</p> <p>(vi) The Panel should be completely sealed.</p> <p>(vii) All gaps between Roof panel and Electrical panels and between The Electrical switch board cabinet and VESDA, DG control & Invertor panel to be covered suitably with FRP Paneling.</p> <p>(viii) The Equipment Control panel door opening should not interfere with the compartment sliding door.</p>
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8.13 Amenity Items:

	<p>1. Amenities in Staff Room:</p> <p>i) Coat hook</p> <p>ii) Almirah with table top</p> <p>iii) Sunk-in Snack Table</p> <p>iv) Lockers below seats</p> <p>v) Cabin Mirror</p> <p>vi) Mobile holder near charging sockets</p> <p>vii) Water Bottle Holder</p> <p>viii) Glass Holder</p> <p>ix) Odour Control units to RDSO Spec. RDSO/2008/CG-12 in middle corridor</p> <p>2. Amenities in Recording Room:</p> <p>i) L-shape Fixed/foldable Table with four cushioned Chairs</p> <p>ii) Drawers below L-shape fixed table</p> <p>iii) Coat hook</p>
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SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 36 OF 62 DATED 02.05.2025
---	---	---

	<ul style="list-style-type: none"> iv) Cabin Mirror v) Mobile holder near charging sockets vi) Water Bottle Holder vii) Glass Holder viii) Automatic hand sanitizer ix) Wooden Dining Table with two chairs as approved by RCF x) Selves above dining table xi) Sofa cum Single Bed xii) 43" 4K Smart LED TV (Sony/Samsung/LG) xiii) Digital Clock with Thermometer xiv) 200 Kmph speedometer with Pressure Gauge xv) Shoe shining machine xvi) Odour Control units to RDSO Spec. RDSO/2008/CG-12 <p>3. Amenities in Officer's Room:</p> <ul style="list-style-type: none"> i) Bed (Two nos.) BOX type ii) Foldable work Table with Chair iii) Foldable Snack Table iv) Light Luggage Rack v) Almirah cum Dressing Table (with double flap hinge door) vi) Coat hook vii) Cabin Mirror viii) Mobile holder near charging sockets ix) Water Bottle Holder x) Glass Holder xi) Automatic hand sanitizer xii) Digital Clock with Thermometer xiii) Odour Control units to RDSO Spec. RDSO/2008/CG-12 <p>4. Other Amenities:</p> <ul style="list-style-type: none"> i) Ironing Table Top near SBC ii) 6-7 Kg washing machine (LG/Samsung/Whirlpool) iii) Storage Cabinet above ironing table iv) Cupboard for Linen near Officer's room v) Overhead Cupboard/cabinets vi) Any other amenities will also to be provided as conveyed at the time of prototype. <p>General:</p> <ul style="list-style-type: none"> 1. All amenities shall be approved by RCF for make & model. For each item, prototype to be provided before supply of item for approval. 2. All the amenities shall be designed to suit the complete aesthetic of the cabin in the available space as per layout.
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 37 OF 62 DATED 02.05.2025
---	---	---

	<ol style="list-style-type: none"> 3. All the amenities shall be of sunk-in type with minimum protrusion and crashworthy features (No injury in case of derailment and other accidents). 4. Seasoned teak wood shall be used for manufacturing all the wooden furniture and color shade shall be got approved from RCF. 5. MDF/Composite board of reputed make of suitable thickness with laminates of Formica or make approved by RCF shall be used for manufacturing the cupboards, tables etc. 6. Plywood shall be used as per IS:303-1989 of BWR quality and plywood to be treated against fungi, termite, marine borers & other insect according to requirements of preservation treatment to IS: 5539-69, type-iv (copper chrome arsenic composition). 7. Material of all fasteners and accessories (screws, hinges, handles, lock etc.) used in furniture shall be AISI-304. All fasteners and accessories shall have concealed design. 8. PU Foam to RDSO Specification RDSO/2007/CG-04 (Rev.-1) or Silicon Foam to RDSO/2013/CG-13 (Rev-1) or with latest Rev. and amendment shall be used for manufacturing all the cushioned furniture like sofa, cushioned chairs, cushioned stool etc. Cushioning Material to be procured from the approved sources of RCF Vendor Directory. 9. 6”/5” Memory foam mattress of make Wake-fit / Sleepy-cat / COIR FIT / Kurl-on with Pillows to be provided for bed in officer’s room. 10. Almirah cum Dressing Table in officer’s room: The inner surface area of wardrobe should be pasted with blazer cloth of maroon shade. LED Lights provided inside ward robe should switch on as soon as wardrobe is opened and should switch off as soon as it is closed. The rating of limit switch should be 0.5A(max) and should be of reputed make 11. EN45545-2 (HL3) complied woolen upholstery fabric or superior synthetic fire resistant cloth/fabric in aesthetically pleasing hues/colors design pattern and having better material properties shall be used for covering all the cushioned furniture like sofa, bed cushion, cushioned chairs, cushioned stool etc. 12. All stainless steel amenities shall confirm to spec. AISI-304 and should have an elegant polished surface finish. 13. Only FR (fire resistance) grade adhesive shall be used for pasting the cushion and upholstery wherever needed. 14. There should be no any sharp edges in any amenities. 15. Any other amenity mentioned in layout shall also be in scope of contractor <p>Snack Table:</p> <ol style="list-style-type: none"> (i) Suitable Foldable sunk-in Snack table should be provided in Officer’s room. It
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SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 38 OF 62 DATED 02.05.2025
---	---	---

	<p>shall bear minimum 80Kg weight at the end and 100Kg weight in the center of the table. The Release / Folding mechanism should be sturdy and firm shall submit test certificate for 50000 Nos. of cycles.</p> <p>(ii) There should be no rattling noise in the snack table mechanism in folded and open condition.</p> <p>(iii) It shall have hydrophobic dust proof surface finish.</p> <p>Dimension of snack table shall be minimum of 300X 350 mm</p>
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8.14 HAMMER BOX MOUNTING:

Scope:	<p>1. 2 Nos. of hammer box shall be provided as per the location given below:</p> <p>A. On the partition frame of Linen room at the middle doorway towards doorway side.</p> <p>B. On the sliding door partition frame towards PP end outside staff room.</p>
Specification:	<p>1. For fitment reference drawing LW64169 may be followed.</p> <p>2. For hammer box reference drawing CC64333 may be followed.</p>

8.15 Kitchen Arrangement :

Scope:	The mini pantry comprises of the following items as per under given details & working at 230VAC :			
	Sno.	Item Desc.	Make	QPC
	1.	Induction Based cooking system , 1.5-2kW (02 nos.). (with Stainless steel cover plate over heating element)	Any Commercial standard brand	01
	2.	Chimney	Any Commercial standard brand	01
	3.	Refrigerator, 165Ltr	Any Commercial	01

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 39 OF 62 DATED 02.05.2025
---	---	---

			standard brand	
4.		Microwave Oven, 28L	Any Commercial standard brand	01
5.		Water Purifier with RO capacity 20 LPH	Any Commercial standard brand	01
6.		1.5kW- 2kW, 230VAC, Horizontal Storage type Geyser of 15Ltrs. Capacity.	Any Commercial standard brand	01
<p>(i) The Pantry Equipments are to be fitted within the space as per the layout RA 90030 alt f.</p> <p>(ii) The pantry Equipments shall be stacked in modular way for easy access by the passengers</p> <p>(iii) The complete Pantry Shall be Modular In Stainless Steel Sandwich construction and the cupboards and storage spaces shall be in Stainless Steel only. The locks shall be of standard make of Hettich, South Co or Dirak.</p> <p>(iv) The water connection with required storage and water lifting mechanism is in the scope of the firm.</p> <p>(v) All the brackets, Back Pieces shall be in the scope of the Firm</p> <p>(vi) All the Equipments shall comply electrical safety standards.</p> <p>(vii) The microwave oven and the heating burner shall be integrated unit of size suitable to the layout.</p> <p>The contractor shall submit the complete details of the pantry equipments along with load calculation to the office of CEDE/RCF before execution of the pantry equipments in the coach.</p> <p>Notes:</p> <ul style="list-style-type: none"> • All tools & machineries required for the furnishing and fitment of Electrical items will be provided by the tenderer. • • Supply of all electrical items in the scope of bidder shall be taken up after prototype approval from CEDE/RCF 				
Special Condition:	<ul style="list-style-type: none"> • Granite top of Jet Black colour. • Stainless steel sink with drain board of KAFF/GLEN/FRANKE make. • Dish rack with drip tray of KAFF/GLEN or commercially available standard makes to be provided. Proper ward robe has to be provided to cover the dish rack. 			

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 40 OF 62 DATED 02.05.2025
---	---	---

	<ul style="list-style-type: none"> • Proper cup boards of suitable height, starting from floor level of 1600 mm should be provided across the width of coach (excluding electrical cubicle) on end wall. • Pull out multipurpose baskets (telescopic slides) of commercially available standard make to be used. There should be proper wardrobe for pull out baskets suiting to interior decor of kitchen. • Cupboards & racks to suit kitchen requirements. • Drain pipe & bottom of stainless steel sink should be covered with suitable leaf type hinged panels. There should be provision for keeping detergent powder, soaps & scrapper etc. required for washing utensils. • There should be foldable table in space between cubicle panel and kitchen table. There should be space for keeping two LPG cylinders of standard size. If required, pocket in head stock can be used for keeping cylinders. • Chimney arrangement of commercially available standard make (power supply requirements should not exceed 350W) with proper cup boards of suitable height, starting at a height of 1600mm from floor level, covering the chimney arrangement. • Supply Fixing of Refrigerator on proper wooden stand of 165 Ltr capacity of suitable size to be provided • 2 nos. of fire extinguishers to Drg. No. CC64181. • 2 No stainless steel stool of appropriate size for sitting in kitchen. • All type of Piping from Auxiliary tank to taps & drainage. • 2 No Metallic Dustbin.
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9. Probable sources for the Items under scope of work:

S.N.	Item description	Probable sources
1.	Coach Insulation	To be sourced from proven vendors with prior approval of RCF with regard to specification and OEM
2.	Seats	To be sourced from proven vendors with prior approval of RCF with regard to specification and OEM
3.	Interior signage	Proven OEMs
4.	Exhaust Fan in lavatory	Regular suppliers to IR PUS for Single/Double inlet blower and Exhaust fan. For new design, RCF approval to be taken.
5.	Coach interior LED Light Fitting (Passenger area, Lavatory, Doorway area, Gang way area)	Regular suppliers to IR PUS.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 41 OF 62 DATED 02.05.2025
---	---	---

6.	110V AC, Mobile charging socket USB type A and Type C port and stand.	Regular suppliers to IR PUS.
7.	Hinges and Locks	EMKA/South Co/Dirak/Sugatsune
8.	Lavatory fittings and amenities	Shall be sourced from list of sources approved in ICF spec ICF/Mech/ 436
9.	Fire retardant EDPM rubber	MDTS-49380
10.	Floorboard & top floor	To be sourced from proven vendors with prior approval of RCF with regard to specification and OEM

Note :- Any item in contractor scope must be procured only from regular/approved supplier of Indian railways.

10. Design and development:

- (i). Contractor shall engage suitable design consultant having experience in interior design. of passenger rolling stock. The complete interior shall be designed by the contractor.
- (ii). Firm shall depute a team in RCF for design development work.
- (iii) Firm shall give regular report of design development as per requirement of RCF. In case of non-compliance firm may be levied any suitable penalty such as monetary penalty or even termination of contract.
- (iv) Contractor shall follow RCF procedure for design approval.
- (v) Layouts and drawings have been enclosed for guidance. The contractor has to design the complete interiors under the scope of work. The contractor shall submit soft copy of drawings/ detailed Bill of Material (BOM) in 2D, 3D model (NX) files drawing in editable format to RCF for approval.
- (vi) The contractor shall work on offering light weight material and appropriate design taking into consideration light weight, strength, acoustic properties, water absorption, Fire retardant (FST) properties and functional requirement. The contractor shall submit design, technical details, weight and source of the proposed material for floor, insulation and air duct for approval by RCF.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 42 OF 62 DATED 02.05.2025
---	---	---

- (vii) RCF will share basic design inputs based on which contractor shall develop detailed design and submit to RCF for approval.
- (viii) The contractor shall submit weight details of the all the items under the scope of work, during design approval stage.
- (ix) RCF will share car body drawings in 3D model (NX) files. Contractor shall make necessary alterations in car body model suiting their interior furnishing requirements and submit the altered shell model in 3D to RCF, after which RCF will issue drawings for production. Alterations in the 3D model shall be limited to back pieces, holes, cutaways etc. Basic structure, window and door size locations shall not be altered. Firm shall use NX software only for alteration in the car body model.
- (x) The drawings / 3D models shared by RCF are the Intellectual property of RCF and shall not be shared, used or saved in any form except for fulfilling the requirement of manufacture of the coaches as per this scope. These drawings are IPR of RCF and Firms should submit NDA for RCF drawings.
- (xi) Any changes/improvements required in the specification for improvement in reliability and aesthetics shall be considered if provided with full technical details.
- (xii) Contractor shall submit final 3D model (NX) files and 2D editable drawings of the interiors to RCF, which will be property of RCF.
- (xiii) The furnishing kits shall be prepared in conformance to assembly stages. Each assembly stage shall be separated by a quality gate from the other.
- (xiv) The kits and their constituents, the quality gate checklists shall be prepared and approved for use in the actual assembly process.
- (xv) The contractor while furnishing the coaches shall strictly adhere to the maximum moving dimensions (MMD) of the coach such that no parts of the coach shall infringe the MMD. The overall dimensions of the coach after complete furnishing shall be maintained as specified in the layout.
- (xvi) The contractor shall submit weight details of the all the items under the scope of work, during design approval stage.
- (xvii) Minor variations are likely in dimensions of the coach shell, due to fabrication tolerances. The same shall be taken into consideration.
- (xviii) Management of expected shock and vibration for improved NVH .During installation, it shall be ensured to control vibrations of items so that reliability/life is not affected and no damages take place.
- (xix) Aesthetically pleasing and safe, anti-pilferage All interior fittings should have aesthetic look and flush with the interior decor. Sharp edges shall be avoided. All the interior fittings should have anti-pilferage feature.

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 43 OF 62 DATED 02.05.2025
---	---	---

- (xx) Availability of Raw Materials Raw material such as special upholstery for seats, special paint with specified shades should readily be available with the firm for repair and maintenance.
- (xxi) Fire retardant rubber to MDTS 49830 to be used.
- (xxii) The drawings required for installation/fitment of furnishings & fittings.
- (xxiii) All 3D CAD data of the items in native NXfiles with complete details.
- (xxiv) Firm will submit complete parametric 3D models of all assemblies along with its all components in NX to approve the concept design to satisfaction of RCF.
- (xxv) The firm will submit final 2D drawings after provisional approval of concept design by competent authority on NX platform in soft copy as well as in hard copy.
- (xxvi) The firm will manufacture first prototype coach as per the drawings submitted in RCF.
- (xxvii) The necessary amendments, if required during prototype manufacturing and inspection, will be incorporated in the drawings and models by the firm.
- (xxviii) The firm will submit updated models and drawings after validation on first prototype coach.
- (xxix) Firm will manufacture second prototype coach on the basis of updated drawings and models.
- (xxx) The final drawings and design will be approved by competent authority after successful validation .
- (xxxi) The supplier shall guarantee all interfaces of the concept design.
- (xxxii) QAP & Test certificates should be submitted by firm before drawing submission.
- (xxxiii) All design and drawings of successful bidder as approved by RCF shall be the property of the RCF. RCF shall have the proprietary rights of these design.
- (xxxiv) Bill of Materials.
- (xxxv) Sources of supply with approximate cost (more than one alternative indigenously sources)
- (xxxvi) Operations Instructions & Installation manuals in soft and hard (3copies) formats.
- (xxxvii) Maintenance manuals soft and hard (3 copies) formats.
- (xxxviii) Complete catalogue for items, fittings instruction including trouble shooting for easy maintenance by the Railways
- (xxxix) Any other documentation, as identified and required, by RCF during the process of design development.
- (xl) Complete Interior Color Scheme along with 3-D colored images (rendering) of the coach for all the applicable items for approval.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 44 OF 62 DATED 02.05.2025
---	---	---

11. Sequence of Design approval:-

RCF shall provide the design of shell body only in NX native format in 3D model s and other concomitant files. The files shall be uploaded on an internet accessible server. Bidders shall be able to access and download the files from the provided URL.

Note: This is being provisioned as above IREPS permits only PDF files to be uploaded.

11.1 Permission to download and NDA/End use undertaking:

Bidders shall be required to submit a Non-Disclosure and End-Use Undertaking.

The undertaking shall be generated as a digitally signed PDF copy and the same shall be mailed to designrcf08@gmail.com requesting access for downloading the files.

11.2 Development of QAP and approval:

The contractor's team in collaboration with RCF Team shall develop a QAP documenting the Hold and Witness points (stages, pre-dispatch, post-receipt and final inspections) for the project.

The final QAP shall be approved by RCF Design and Quality Assurance Divisions.

11.3 Approval of design :

Contractor shall develop the detailed manufacturing designs, BoM, and processes in a collaborative process with RCF Team. RCF shall approve the detailed design / processes for manufacture of shell furnishing kits.

The bidder will be responsible for ensuring that the design, materials and construction of the carriages and parts thereof are to the best quality standards prevailing in the industry and satisfactory in all respects. Tenderer shall not be relieved from such responsibility notwithstanding any approval which may have been given by the Purchaser.

Notwithstanding approval, the contractor shall be completely responsible for the satisfactory performance of the coaches supplied.

Dispatch of prototype furnishing kits to RCF/KXH

Contractor shall manufacture the furnishing kits as per the approved designs and in conformance to the approved QAP and dispatch the same to RCF as per the advised schedule.

SPECIFICATION NO. MDTS-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 45 OF 62 DATED 02.05.2025
---	---	---

11.4 Assembly of furnishing kits at RCF/KXH:

Work on the supplied furnishing kits, at RCF, shall be done as follows.

Note: The furnishing kits assembly at RCF shall be done by contractor's manpower (as per scope). RCF team shall inspect the activity. Modifications required to be done on the supplied items for enabling assembly shall also be done by the contractor's manpower.

11.4.1 Installation of the furnishing kits on the prototype coach shells at RCF:

The furnishing Contractor's team shall install the furnishing kits in the coach shells at RCF. One coach shall be furnished and finished.

11.4.2 Prototype Review:

RCF and Contractor's teams shall jointly conduct detailed review. Observations shall be made during this exercise for improving the tolerances and quality of the final coach. Drawing & BOM revision shall be done by firm.

11.5 Review of modifications required in furnishing kits:

The detailed observations and required modification information collected in the preceding activities shall be compiled and designs shall be updated in a collaborative process by the Contractor's and RCF teams.

11.6 Supply of change validation kits to RCF and fitment:

The design changes planned in the preceding activities shall be implemented and the supply of remaining furnishing kits shall be made as per the updated designs.

The furnishing kits shall be supplied to RCF for assembly into shells as detailed earlier. Detailed observations shall be made for validating all design changes.

11.7 Go-ahead for series furnishing of complete shells:

A go-ahead shall be given to the contractor for supply of remaining furnishing kits and its installation on the successful completion of the previous activities.

11.8 Series manufacture and supply of furnishing kits and its installation:

Once the go-ahead for series production is granted, the contractor shall start series production and supply the furnishing kits and its installation as per the advised schedule.

The contractor's team at RCF shall install these kits into the coach shells as per the schedule advised by RCF.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 46 OF 62 DATED 02.05.2025
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11.9 Review and sign-off of final detailed design documents:

The final set of all documents/drawings/models etc. of the coach furnishing as-built shall be submitted to CDE/RCF team and a sign off completed.

12. Completeness of coach :

Except for the items listed in specification under RCF scope, all other required activities & material to manufacture coach as per applicable layout shall be in scope of contractor. Any activity/material not mentioned in specification but required for final quality clearance shall be provided/executed by contractor.

13. Project Schedule :

The planned project schedule is expected as detailed in the following table.

S.N.	Activity	Agency Responsible	Expected Duration (Days)	Expected Milestone Completion (Days)
1	Tender Finalization	RCF/KXH	0	D+0
2	Preparation of detailed Design	CONTRACTOR	30	D+30
3	Design Review and approval of submitted design/production documents	RCF/KXH	10	D+40
4	Manufacture and supply of prototype furnishing kits	CONTRACTOR	30	D+70
5	Installation of furnishing kits in prototype coaches	BOTH	15	D+85
6	Submission of BoM, Drawings.	CONTRACTOR	10	D+95
7	Validation check and go ahead for series production	BOTH	5	D+100
8	Review and sign-off of final detailed design Documents "as-built"	BOTH	15	D+115
9	Furnishing of coaches as per production plan	BOTH	As per RCF production Plan	As per RCF production Plan

Table 8: Project Schedule

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 47 OF 62 DATED 02.05.2025
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14. Quality Assurance and Inspection Plan:

The contractor shall use the same and prepare a QAP to ensure requisite quality throughout the progress of the project.

14.1 Quality Assurance, Tests & Documents:

The following table provides the overview of the system for quality assurance: -

Requirement Description	Requirement Detail	Remarks
Quality Assurance Plan	<p>The manufacturer shall have a detailed quality assurance plan. The plan shall be submitted for approval by the indenter/purchaser.</p> <p>The QAP document shall clearly document the following and control the test record formats.</p> <ol style="list-style-type: none"> 1.Control over outsourced products and processes 2.Testing of raw material and establishing it traceability. 3.Sampling Plan 4.Type Tests 5.Routine Tests 6.Acceptance Tests 7.Witness & Hold Points 	The QAP shall be submitted in PDF softcopy, digitally signed by the Head of Quality Department of the manufacturer.
Type Tests	These tests shall be conducted as per the QAP and are normally required in case of change of design.	Therecords 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	<p>The manufacturer shall conduct routine tests as per the approved QAP.</p> <p>The records of tests conducted shall be verifiable upon request.</p>	The records of the routine tests shall be maintained by the manufacturer and shall be made available upon demand. These records shall be traceable and verifiable.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 48 OF 62 DATED 02.05.2025
---	---	---

Acceptance Tests	The acceptance test shall be conducted on batches offered for delivery. The tests shall be conducted as per the details mentioned elsewhere in the document.	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.
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Table 9: Quality Assurance Tests & Documents

14.2 Inspection Plan

The inspection plan shall be proposed by the contractor based on the QAP framework provided as an annexure to this document. This plan shall be proposed as a set of the following events:

- (i). **Hold Points:** means an identified point in a process beyond which the Contractor must not proceed without written authorization or the release of a designated authority of RCF or 3rd party agency duly authorized by RCF.
- (ii). **Witness Points:** means an identified point in a process where the Contractor must give prior notice to RCF to allow a designated authority of RCF or 3rd party agency duly authorized by RCF, to attend and witness the point in the work process should it choose to do so.

The inspection plan shall be reviewed and agreed jointly by RCF and the contractor.

15. Provisioning of facilities for working:

The following shall be the distribution of provisioning of facilities for working during the course of the project.

15.1 Facilities to be provisioned by RCF at RCF/KXH:

RCF shall provide the following provisions, free of costs, for enabling the contractor working at RCF premises only.

- (i). RCF shall provide limited space inside covered shed (not enclosed) to the contractor for keeping the material/consumables & tools required for day-to-day work.
- (ii). RCF will provide suitable cranes with drivers, as available at RCF/KXH, for loading and unloading of sub-assemblies at RCF/KXH.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 49 OF 62 DATED 02.05.2025
---	---	---

- (iv) RCF will provide bare coach shells fitted atop dip-lorries at the designated places for working. The necessary assistance for movement of shells to the designated places shall be done by RCF/KXH.
- (v) Power supply, Compressed Air (@ approximately 2-3 kg/cm² pressure) and water etc. for working at site shall be provided by RCF/KXH. These shall be put to judicious use and only for activities related to the project.
- (vi) Access to toilets and drinking water facilities shall be provided at RCF/KXH.

15.2 Facilities to be provisioned by the contractor:

- 1) Contractor shall deploy a site office structure in ISO container(s) to function as site office and site tools and material storage. The site office shall be setup by the contractor and removed and taken away by the contractor at the end of the contract.
 - 1.1 The site office shall be self-contained, however electrical supply shall be provided by RCF at RCF/KXH.
 - 1.2 The maximum footprint of the site office and store shall be limited to 2x40' containers. Double stacking can be permitted where required
 - 1.3 Special cranes & lifting tackles for deployment and removal of the containers shall be provided where needed.
- 2) Material handling equipment and forklifts with drivers.
- 3) Welding and other consumables required for assembly activities and modifications done at RCF/KXH.
- 4) All workbenches, hand tools, IMTE's with their respective spares and consumables.
- 5) Ladders / Maintenance Access Platforms / Manlifts Hand trolleys / powered trolleys for transporting tools and IMTE's.
- 6) Any other tools & plants required for progress of work (and not explicitly listed in facilities provided by RCF/KXH) shall be the contractors responsibility.

15.2.1 Safety and performance of tools and equipment of the contractor

All the tools and equipment e.g., drills, lighting arrangement inside the coach, work benches, ladder & working platform etc. as required to execute work as per scope of work shall be arranged by the contractor. The contractor shall use safe tools. Proper extension

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 50 OF 62 DATED 02.05.2025
---	---	---

boards shall be used. Extension wires with joints and without insulation shall not be used. All the electrical power tools shall be equipped with proper electrical plugs.

Note: The contractor shall be responsible for keeping all assigned areas clean and injury free during the progress of the contract.

16. Installation guidelines:

- (i) Contractor shall deploy skilled supervisor & worker as per RCF requirement.
- (ii) Contractor shall install all the items under the scope of work.
- (iii) Work on coach to be commenced only after allotment of coach by Furnishing shop.
- (iv) The scope of supply installation testing commissioning includes all accessories including necessary hardware and consumables etc.
- (v) All items shall be proposed for approval by CDE/RCF during the design approval process. Only approved items shall be used.
- (vi) Installation procedure and process for the items under the scope of work shall be submitted to RCF design for approval.
- (vii) All hinges, latches and locks used shall be of proven make viz. Southco / Dirak / Emka/ Sugatsune, as approved by RCF.
- (viii) Sealant of make M/s. Henkel, 3M & Sika shall be used and the same shall be approved by RCF.
- (ix) The contractor shall supply and install all items as per requirements specified in this scope of work.
- (x) The coach interior shall be based on modern aesthetics with considerations to optimize passenger comfort, safety and security as well as to minimize noise in the coach
- (xi) All furnishing items including electrical items should be of superior quality in nature. as per specification and approval of RCF in respect of capacity, type and make should be taken prior to supply.
- (xii) The design of interior fittings shall be safe under all conditions of passenger impact, during emergency braking and buffing under fully loaded condition.
- (xiii) The coaches shall be furnished with lightweight, fire retardant, non-toxic materials as per EN 45545-2, HL2. The furnishing shall be of highest international standards. The material for interior panelling shall be FRP as per specification ICF/MD/SPEC-385 latest revision. Use of ACP/Aluminium can be permitted with prior approval
- (xiv) For Electrical items, RDSO Specification No.RDSO/PE/SPEC/EMU/0196-2019 (Rev.0) with all addendum/corrigendum and annexures should generally be referred to. Any deviation should be got approved by RCF.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 51 OF 62 DATED 02.05.2025
---	---	---

- (xv) All interiors must be finished with good blending and slow ageing properties to provide a pleasant, high-quality interior and for ease of cleaning and maintenance.
- (xvi) As far as possible, fastening devices, fixings and securing screws shall not be visible from within the saloon.
- (xvii) All holes and gaps in the shell structure shall be provided with proven sealing arrangement to avoid water and dust entry, before doing panelling.
- (xviii) For fitment of all items under the scope of contractor as mentioned in scope, supply and fitment of back pieces in coach Shell shall rest with the contractor. Fitment of new back pieces/modifications to the existing back pieces or any minor alterations in the coach Shell in this regard, shall be made with the approval of RCF.
- (xix) Stainless steel hardware's shall be used for the fitment of all items in the scope of contractor. All hardware viz. screws, bolts, nuts and other fasteners required for installation of items under the scope of work shall rest with the contractor.
- (xx) Adhesives, brackets, fasteners, back pieces and moulding used for installation of items under scope of work, shall be of reputed brand.
- (xxi) No welding activity is permitted in RCF furnishing division. Welding activity of all items viz. partitions, back pieces etc. in the scope of work of contractor shall be done by the contractor at RCF shell division. Items shall be planned accordingly by the contractor.
- (xxii) During installation of all items under the scope of contractor, it shall be en control vibrations of items so that reliability/life is not affected and no take place. All interior fittings should have aesthetic look and flush with décor. Sharp edges shall be avoided. All the interior fittings should pilferage feature.
- (xxiii) The composition and finish of all the materials covered under contractor's supply shall meet respective specification requirements as covered in the relevant drawings/specifications.
- (xxiv) The contractor shall execute any modifications/improvements in coach body shell with the approval of RCF as suggested by competent authority without any financial implication.
- (xxv) For all electrical equipment access hatch opening to be provided for maintenance which will be decided during detailed design stage.
- (xxvi) Coach dimensions such as furnished thickness of sidewall, partition, roof, end wall shall be strictly followed as per layout drawing.
- (xxvii) RCF will provide bare shell for carrying out the furnishing work, Electricity, air & water shall be provided free of cost by RCF.
- (xxviii) The furnishing of the coach shall be carried out at a place nominated by RCF.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 52 OF 62 DATED 02.05.2025
---	---	---

(xxix) The Electricity act 2003: Relevant provisions stipulated in the Electricity act 2003 shall strictly be followed in the interest of safety of users/staff as well as for equipment/ instruments provided in the Cars.

(xxx) The skilled labour proposed to be engaged for the Electrical work shall have minimum technical qualification of ITI or equivalent in the respective fields. The firm or supervisor in-charge should have valid appropriate electrical contractor license.

17. General Terms & Conditions:

The following terms and conditions shall be applicable for the project. These are considered in addition to statutory, regulatory requirements and IRS standard conditions.

17.1 Intellectual Property Rights (IPR):

Any 3D Models and manufacturing processes documentation provided by RCF shall be providing detailed to the bidders / contractors. The contractors are expected to ensure that all such documents having IPRs are not transferred to third parties without prior written approval of CDE/RCF.

The contractor is expected to create detailed manufacturing design and process documentation for the manufacture of the items detailed in this document. All such 3D models, drawings, process documentation etc., shall the property of RCF/KXH and the same shall form a part of deliverables of the contract.

Note: The models, drawings, documents etc. shall be provided in the respective native formats. If there is a need for conversion of formats, the same shall be mutually agreed.

The contractor can seek permission to use the available IPR for third party applications from CDE/RCF. The same shall be sought in writing prior to such use.

Note-2: All information shared and developed during the progress of this contract shall be the property intellectual property of RCF/KXH. As such, the contractor shall ensure that this information is not shared to a 3rd party or put to any other end use (other than to work as per the scope of this contract) Kindly also see the undertaking mandated at Annexure 4.

The decision of CDE/RCF, regarding permission to use such IPR for third party applications shall be final and binding.

17.2 Subcontracting and outsourcing:

The contractor may sub-contract or outsource as per requirement. The following must be complied under these conditions

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 53 OF 62 DATED 02.05.2025
---	---	---

- 1) Prior approval shall be taken from RCF/KXH.
- 2) The confidentiality of shared information is ensured.
- 3) The contractor shall remain responsible for meet all conditions and requirements of this contract, even in case of outsourced items and services. (The responsibility does not shift to the sub-contractor).

17.3 Electrical Contractor License:

The bidder shall undertake in the bid to submit a valid class "A" Electrical contractor's License as applicable from the concerned statutory authority before start of execution of the work.

OR

The bidder shall provide an undertaking in the bid to submit a formal agreement with suitable Sub contractor, holding a valid class A" Electrical contractor's license as applicable from the concerned statutory authority, for executing electrical portion of work. The bidder shall submit a formal agreement duly notarized, legally enforceable in the court of law, between the bidder and sub contractor for the Electrical component of work proposed to be executed by the sub-contractor, before start of execution of work.

17.4 Follow RCF production plan:

All body shells to be furnished as per production plan of RCF; Supply schedule of each variant will be in staggered manner and will be manufactured and supplied as per schedule of supply advised by RCF from time to time.

17.5 Safekeep during storage and transit:

The contractor shall be responsible for safe transporting and loading/un-loading of supplied products. Adequate measures shall be taken to avoid damage to surface body shell surface during transport/storage.

17.6 RCF right to inspect and audit:

RCF shall have the right to take item/assembly supplied by the firm into Audit for checking of parameters as per laid down procedure.

17.7 Handling of changes post approvals:

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 54 OF 62 DATED 02.05.2025
---	---	---

Any changes from approved models, detailed part drawings, BoM, material specifications shall be done via a design approval process and be released for implementation with the approval of CDE/RCF.

Any modification arising out of design review process shall be incorporated by the firm in bulk supply without any financial implication.

17.8 Change in quantity distribution:

The quantity distribution between successful bidders can be changed based on the performance in due course of the turnkey project. The firm lagging in completion of work or with poor quality shall be penalized with reduced quantity as decided by the competent authority.

17.9 Damage to RCF property:

In case of any damage to RCF property, Coach Item or Shell during commissioning, the same shall be repaired/replaced by the Firm. In case any alternation in shell is required, prior approval of competent authority is required.

17.10 Damaged to supplied / fitted materials:

Any item supplied by firm damaged during commissioning or before the issue of Completion Certificate; the same is to be replaced by the firm as free of cost.

17.11 Requirement of Contractor's Personnel:

17.11.1 Site Manager:

Contractor shall deploy at least 1 dedicated site manager in charge of all activities at the work sites including workers safety and management of materials.

17.11.2 Identification

All contractors' workers shall be duly identified and shall always carry a contractor provided ID card on their person during their presence on the shop floor at RCF/KXH.

17.11.3 Qualifications of personnel:

The contractor shall ensure that all personnel deputed are duly qualified and have adequate experience to handle the delegated jobs.

Note: The contractor shall provide the detailed CV of all personnel of their team deputed to work at RCF/KXH.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 55 OF 62 DATED 02.05.2025
---	---	---

The contractor shall ensure that the technicians having experienced on working on first prototype coaches are not changed/replace till the execution of whole contract.

17.11.4 Adequate manpower:

All coaches to be furnished as per production plan of RCF. Contractor shall depute adequate manpower to ensure the production targets.

17.11.5 Working dress and PPE:

All contractors' workers shall be suitable attired and shall be wearing the requisite PPE's for the job.

The following minimal PPE's shall be worn by all contractor personnel at all times during their presence on shop floors of RCF/KXH

- 1) Hardhat with contractor's logo / name
- 2) High visibility vest with contractor's logo / name
- 3) Industrial safety shoes

Note-1: Jeans and T-shirts with the contractor's logo / name, may be considered as shop floor uniform for the contractor's team.

Note-2: The contractor shall be solely responsible for the orderly and proper conduct of his staff during the period of work inside the RCF/KXH. The staff shall be polite and courteous.

17.11.6 Workplace maintenance and housekeeping:

The contractors' personnel shall ensure that the necessary housekeeping activities are done constantly to keep the assigned workplace neat and tidy all through the working periods. This is required to ensure safety of personnel on the shop floor.

Proper housekeeping processes shall be followed to clean the work areas at the end of shifts to ensure a clean workplace is handed over for the next shift.

17.11.7 Fines

- 1) If any safety instruction is not adhered to and if any of the contract worker is found without PPE, penalty for the same shall be applied @ ₹ 500/person-day.
- 2) Chewing of Pan/Gutka/ any intoxicant is strictly prohibited at workplace, violations shall attract a penalty @ ₹ 500/person-day.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 56 OF 62 DATED 02.05.2025
---	---	---

- 3) A penalty @ ₹ 1000/- per shift shall be applicable if the workplace is found short on housekeeping activities.

17.12 Compliance of Statutory & Regulatory requirements:

All compliances with respect to statutory and regulatory requirements for the activities handled by the contractor shall be ensured by them.

17.13 Indemnification of RCF:

The contractor shall provide a written undertaking to indemnify RCF from action resulting from breach of compliance of statutory and regulatory requirements for activities handled by them.

17.14 Quality Management:

The Contractor shall maintain prescribed quality of work and good workmanship.

If any quality deviation is identified, necessary corrective and preventive actions shall be taken by the Contractor at the first instance of identification. If the Contractor fails to maintain the required quality standards and gets repeated rejection/rework, the contract will be terminated. Further action may be taken to duly disqualify the firm from quoting for future tenders. Quality check of each stage to be offered to Furnishing shop for approval.

17.14.1 Communication & Coordination:

The contractor shall ensure proper communication and coordination with nominated personnel of RCF/KXH for progress connected to the project.

17.14.2 Stage inspection Hold & Witness Points:

Stage Inspections, as required work shall be carried out by authorized personnel of RCF/KXH. The schedule of such inspections shall be prepared jointly by the RCF and contractor in the form of "Hold & Witness Points"

The contractor shall offer for inspection in writing after completion of work duly indicating the date of work and Shell number. Any inspection points raised on the installation work done till the dispatch of the coach, shall be cleared by the Contractor before turning out of coach.

RCF may nominate third party for inspection of coaches at any stage inspection/final inspection.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 57 OF 62 DATED 02.05.2025
---	---	---

17.14.3 Record of activities, instructions, and compliances:

The contractor shall maintain proper record of all activities, instructions and compliances in a register which will be checked periodically by concerned nominated personnel of RCF/KXH.

17.15 Errors omissions & discrepancies:

The bidder(s)/contractor shall not take advantage of any misinterpretation of the conditions due to typing or any other error and if any doubt shall bring it to the notice of CDE/RCF without delay in case of any contradiction.

Only the printed rules and books should be followed and no claim for the misinterpretation shall be entertained.

17.16 Worksites :

The furnishing work shall be carried out at designated places at RCF/KXH. However, if situation warrants and corrective activities may be required to be carried out at the coach holding depots. No extra charges shall be acceptable on the change of worksite.

18. Guarantee/Warranty and Spares:

The expected life of the coach furnishing is more than 6 years. The supplier shall provide a warranty for all supplied items for a period of 3 (three) years from date of turnout of coaches for items whose specification is not given in this specification/approved drawing.

For items whose specification has been referred in this document/approved drawing individually & specification has warranty period, then warranty period shall be as per item specification. However minimum warranty period of 3 (three) years from date of turnout of coaches should be there for all items.

The expected life for LED type Luminaries shall be for 60 months from date of commissioning or 72 months from date of supply which is earlier as per Cl .11.0 of RDSO Specification RDSO/PE/SPEC/TL/ 0091 Rev.-1(latest).

This warranty shall survive notwithstanding the act that the goods/stores/articles may have been inspected, accepted and payment hereof made by the Purchaser. In case any part/assembly/full assembly of the items under the scope of work failing or proving unsatisfactory in service due to defective design, material or poor workmanship, shall be replaced by the contractor on his own expense. Further, should any design modification be made in any part of the equipment offered, the period of 24 months would commence, when the modified part commissioned in the service.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 58 OF 62 DATED 02.05.2025
---	---	---

Design guarantee:

All aspects of workmanship and design shall be covered by this guarantee for a minimum period of 10 years. The contractor shall provide free of cost assistance, as/if required, in affecting rectification of design defects and replacements of defective components / assemblies on coaches. Only wearing parts which require routine replacement during maintenance schedule shall be excluded. A list of such wearing parts should be furnished by contractor in his technical offer.

18.1 Attention on site:

Warranty claims will be applicable as per IRS terms and conditions. The warranty complaints/issues to be attended at respective depot.

18.2 Preventive Maintenance during warranty:

Preventive maintenance of all the items in the scope of turnkey is to be carried out by the contractor for a period specified at the primary maintenance depot from the date of dispatch of coach from RCF.

19. Payment Milestones and Terms:

- 1) The supply of the furnishing kits and its installation shall be made as per the schedule specified by RCF.

Note: No payment claim is tenable for supplies / installation out of the agreed schedule.

- 2) Prerequisite of start of payment: -

- 2.1) The prototypes of coaches successfully assembled and cleared in quality checks.

- 2.2) Drawings & 3D models approval by RCF Design office

- 3) Coach wise payment shall be released upon successful completion (including quality clearance) of the furnishing and finishing of the coaches.
- 4) 90% of the installation bills shall be payable on the successful completion of the deliverables. The remaining 10% shall be retained as the performance guarantee for the duration of the warrantee period. The firm may submit an irrevocable bank guarantee, or any other suitable / acceptable instrument mandated by the purchase officer, to release the 10% amount withheld.

Note: Performance guarantee shall be released on NOC provided by the primary maintenance depot of the coaches.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 59 OF 62 DATED 02.05.2025
---	---	---

20. Penalties:

20.1 Penalty for non-completion of the coach work:

Penalty of Rs. 5000 per day per coach shall be levied upon the contractor if he/she is not able to fit/install the material supplied and clear the coach from the Quality department as per the agreed scope and schedule.

20.2 Attention during warranty

A trouble-free operation of contractor supplied items is expected.

In case of breakdown, a grace period of 72 HRS shall be given, from time of intimation to time of attention, beyond which penalty of ₹10,000 per coach-day downtime shall be levied.

21. Safety norms / Environmental Management System Norms to be followed by the Contractor:

- 21.1** The contractor should take all precautionary measures in order to ensure the protection of his own personnel moving about or working on the Railway premises, and should conform to the rules and regulations of the Railway.
- 21.2** The contractor should abide by all railway regulations in force from time to time and ensure that the same are followed by his representative, agents or sub-contractors. or workmen.
- 21.3** The contractor should ensure that unauthorized, careless or inadvertent operation of installed equipment which may result in accident to staff and/or damage to equipment does not occur.
- 21.4** The Contractor should indemnify and keep the purchaser indemnified and harmless against all actions, suits, claims, demands, costs, charges or expenses arising in connection with any accident, death or injury, sustained by any person or persons. within the Railway premises at RCF and any loss or damage to Railway/RCF property sustained due to the Acts or omissions of the contractor irrespective of whether such liability arises under the workmen's compensation Act or the fatal accidents Act or any other statute in force from time to time. The Jurisdiction lies in the state of Tamil Nadu, Chennai city.
- 21.5** To ensure Human safety the Contractor should use 24V hand lamp wherever lighting is not adequate inside the coach and Pneumatic drilling/tapping machines should be used for coach wiring and other related works wherever required.

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 60 OF 62 DATED 02.05.2025
---	---	---

- 21.6** The contractor shall ensure that all his workmen wear PPEs (Personal protection equipment's) commensurate with the severity of work.
- 21.7** The contractor shall ensure industrial safety methods in executing his work at RCF. The contractor shall ensure that all wastes (includes cable bits, packing materials, wooden crates) generated during their activities/work both on coach as well as on the shop floor are segregated and moved to the respective dump sites or earmarked drums kept in shop floor on the day of the completion of the work.
- 21.8** The contractor has to give prior information whether any hazardous chemical is used in his work and if so, the operational control has to be exercised.
- 21.9** The contractor has to ensure that all his material handling equipment's/ transport vehicles are emission tested. Emission test certificate issued by competent Authority for fitness of the vehicle should be submitted.
- 21.10** The contractor has to ensure that his activities are in tune with the RCF EMS Policy (to be incorporated as part of contract).
- 21.11** The contractor's staff must be aware of contents of Material safety data sheet (M in respect of chemicals/materials (if any).
- 21.12** The contractor's staff shall be competent to operate emergency appliance extinguishers.
- 21.13** For any Welding process carried out in the work, the Contractor shall certify Welders to be engaged shall possess minimum ITI qualification or have sufficient experience and sufficient working knowledge.

22. Spares:

The contractor shall provide these spares in individual vacuum sealed packing with labeling carrying the following details:

- 1) Name /Logo of the manufacturer.
- 2) Date of manufacture
- 3) Estimated shelf life
- 4) Parts list inside the packing with part/drawing numbers
- 5) Contact phone/address for support.

S.NO	DESCRIPTION	DRAWING NO.	Quantity Per Rake
1	EMERGENCY OPENABLE WINDOW		01 coach sets
2	LAVATORY WINDOW		01 coach sets
3	FIXED WINDOW		01 coach sets
4	SNACK TABLE		01 coach sets

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 61 OF 62 DATED 02.05.2025
---	---	---

5	BOTTLE HOLDER	Approved drawings of RCF to be referred for spares	01 coach sets
6	FOLDING TABLE FOR FAC		01 coach sets
7	LIGHT LUGGAGE RACK		01 coach sets
9	SWIVEL COAT HOOK 3 PEG		01 coach sets
11	STEP COMPLETE		01 coach sets
12	PVC FLOORING ROLL		01 coach sets
13	CABIN MIRROR		01 coach sets
14	ENTRANCE HAND RAIL		01 coach sets
15	LAVATORY COCKS & FITTINGS		01 coach sets
16	MIRROR ASSEMBLY WITH HOLDING ARRANGEMENT FOR LAV. & DOORWAY		01 coach sets
17	ENDWALL DOOR		01 coach sets
18	GLASS FOR COMPARTMENT DOOR		01 coach sets
19	ROLLER BLIND		01 coach sets
20	ENTRANCE COMPARTMENT DOOR COMPLETE		01 coach sets
21	MOBILE HOLDER		01 coach sets
23	COMPLETE NOTICE INTERIORS		01 coach sets

SPECIFICATION NO. MDTs-23420 REV - NIL	TECHNICAL SPECIFICATION FOR OSCILLATION MONITORING SYSTEM CAR (MDTS-23420)	PAGE 62 OF 62 DATED 02.05.2025
---	---	---

23. Electrical Drawings to be submitted by firm:

S.NO.	DESCRIPTION
1.	GENERAL INSTALLATION
2.	SCHEMATIC DIAGRAM FOR ROOF
3.	WIRING ARRANGEMENT FOR ROOF
4.	HARNESS CHART ROOF WITH CABLE FERRULING WIRING
5.	ROOF WIRING ARRANGEMENT
6.	BLOCK , WIRING DIAGRAM & HARNESS CHART FOR U/F WIRING
7.	UNDERFRAME WIRING ARRANGEMENT
8.	LAYOUT OF SWITCH INSTALLATION FOR SIDEWALL (RH & LH SIDE)
9.	ARRGT. OF ENDWALL WIRING ON PP-END
10.	ARRGT. OF ENDWALL WIRING ON NPP-END
11.	TLTB WIRING ARRAGT.
12.	CUBICLE WIRING ARRGT AND TERMINITIONS
13.	CABLE MARKER DATA CHART