
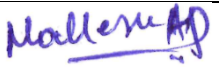




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# TRAIN B28


PTS for Modular Sub-pantry system

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## 1. INTRODUCTION

### 1.1. General

- 1.1.1. New Generation energy efficient Trainset variant is a high speed (operating speed 249 kmph and testing speed of 275kmph) 8 cars trainset being designed, developed, manufactured, testing, commissioning and maintenance by BEML. The total developmental order is for two rakes.
- 1.1.2. This Procurement Technical specification (PTS) specifies the technical requirements of Modular Sub-pantry system and its equipments to be supplied for this project. Modular Sub-pantry system shall comply in all respects with this PTS.
- 1.1.3. BEML will carry out all required works and activities as Contractor to the Employer for this project, while the Sub-contractor shall be responsible for all works required in this PTS with regard to Modular Sub-pantry system and shall be responsible for supporting BEML activities as contractor for ICF/NHSRCL project.
- 1.1.4. The scope of work covers design, development, testing, manufacture, supply, commissioning and integrated testing of Modular Sub-pantry system and the training with training manuals for Operation and Maintenance personnel of the BEML/ NHSRCL on the Modular Sub-pantry system and its equipments. The scope also covers supply of spares, O&M and spare parts manual, testing, training and diagnostic equipment, special tools for maintenance, repair and overhaul of Modular Sub-pantry system and its equipments.

### 1.2. Train Composition

The rake formation shall generally be as follows:


For 8 car formation -

DTC1 + MC1 + TC1 PRM + MC1 + MC1 + TC2 Ex+ MC1 + DTC2

DTC1 /DTC2– Driving Trailer Coach,

MC1 – Motor Coach,

TC1 PRM - Trailer Coach with PRM seat,

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TC2Ex – Trailer Coach (Executive Coach with PRM)

### 1.3. Climatic and Environmental Conditions

1.3.1. The car shall operate reliably and safely under the climatic and environmental conditions specified below. Accordingly, the Modular Sub-pantry system shall be designed to operate with satisfactory performance under the following conditions

Description	Limiting Values
Atmospheric Temperature	<p>Minimum temperature -5°C</p> <p>Maximum temperature 50°C</p> <p>Maximum touch temperature of metallic surface under the sunlit and shade shall be considered and calculated as per ASHRAE 2021.</p>
Humidity	100% saturation during rainy season
Solar radiation	Value and calculation method shall be based on ASHRAE 2021.
Altitude	1000 meter above mean sea level
Rainfall	Very heavy and continuous rainfall in certain areas (heavy continuous rainfall up to 2500mm, rainy season is as long as 5 months in some stretches)
Atmosphere conditions	Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach a high value of 1.6 mg/m <sup>3</sup> .
Coastal area	Humid, salt laden and corrosive atmosphere as prevailing in coastal region.

1.3.2. In developing the detailed design, the Sub-contractor shall acquaint himself and take note of the environmental operating conditions prevailing on the Trial Section during Heavy monsoon, track flooding conditions, saline, humid and dusty atmosphere etc.

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- The temperature of the metal surfaces of the vehicles when exposed directly to the sun, for long periods of time, may be assumed to rise to 75°C.
- Any moisture condensation shall not lead to any malfunction or failure.
- Adequate margin shall specially be built into the design particularly to take care of the higher ambient temperatures, high humidity, dusty and corrosive conditions, etc. prevailing in India.

## 1.4. Performance Requirements

1.4.1. The performance requirements of the train shall be governed according to following table.


Item	Values
Maximum operational speed during service	249 kmph
Maximum Design speed	275 kmph
Minimum deceleration during full-service braking following jerk limit as specified	0.8 m/s <sup>2</sup>
Jerk rate (Maximum)	0.7 m/s <sup>3</sup> during full service braking (for all speed range) 1 m/s <sup>3</sup> during emergency braking (for speeds >10kmph)
Passenger load	80 kg/person 2-4 standing/m <sup>2</sup>
Average running distance of a rake	2,000 km/day

1.4.2. Installation of Modular Sub-pantry system, equipment etc shall be designed for the above train parameters and ease to maintenance. All the doors with flush door handle and cover of equipment shall have proper locking system.

## 1.5. Consultancy

- 1.5.1. BEML has appointed M/s. EC Engineering as Design Consultancy for Carbody, interiors and Bogie design.
- 1.5.2. Further BEML has appointed M/s. DB E&C as Design Verification agency.
- 1.5.3. All proposals, design documents will be shared with these agencies or any other appointed agencies in future.



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1.5.4. The Sub-contractor is also required to interact with the above-mentioned agencies during the design stage for approval of design, development, manufacturing, testing and commissioning of Modular Sub-pantry system and its equipments before manufacturing.

## 2. Definitions and Abbreviations


The following definitions and abbreviations are applicable to this PTS.

### 2.1. Definitions

- **"Employer"** means ICF-Chennai, its legal successors and assignees.
- **"Nominated Agency"** shall mean NHSRCL and its representatives including an ISA (if any) deployed by NHSRCL for the purpose of carrying out Design approvals, Tests, Trials etc.
- **"BEML"** means the contractor for Design, Development, Manufacture, Testing and Commissioning of Trainsets for the project.
- **"Verification agency"** means the third-party agency to review and verify the design document and test procedures for this project
- **"Sub-contractor"** means the Sub-contractor who supplies the required Modular Sub-pantry system to BEML, Sub-contractor shall carry out the works in accordance with PTS requirements.
- **"Rolling Stock"** shall mean the train being developed to operate at a speed of 249 kmph and test speed of 275 kmph in compliance with Specifications and Standards
- **"PTS"** means BEML's Procurement Technical Specification.
- **"Modular Sub-pantry system"** means System considering the set of equipments as brought out at clause 8.4.

### 2.2. Abbreviations

- ICF : Integral Coach Factory, Chennai, Indian Railways
- NHSRCL : National High Speed Rail Corporation Limited
- EMC : Electro-Magnetic Compatibility
- EMI : Electro-Magnetic Interference
- DNP : Defect Notifications Period

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### 3. Precedence of Documents

It is the intent that all Sub-contractors providing equipment or services to BEML shall comply with the Employer's requirements as specified in this PTS. Sub-contractor must comply with the requirements stated herein unless otherwise agreed to in writing by BEML. Any conflict in this PTS shall be brought to BEML's immediate notice for resolution prior to making a contract. After making a contract, the Sub-contractor shall comply with BEML's Interpretation for any discrepancies.


In case of conflict among contract documents, the following order of priority shall govern:

Order of Precedence	Document title
1	European railway standards applicable high speed rail and Modular Sub-pantry system
2	General Terms and Condition (GTC)
3	PTS

Note: All the design, manufacture, testing, supply, installation, and commissioning of Modular Sub-pantry system shall be as per the requirement of applicable European railway standards for high-speed rail. Subcontractor's claims due to misinterpretation of the standards/PTS and oversight of any requirements mentioned there in are not entertained. Sub-contractor shall get the clarity by BEML/Nominated agency in such situations.

### 4. Qualification Criteria


- 4.1. Sub-contractor shall be an Original Equipment Manufacturer (OEM) of Modular Sub-pantry system (including walls, floor, roof) having experience in design, manufacturing, supply, apply, testing and commission of Modular Sub-pantry system and its equipments.
- 4.2. The proposed type of Modular Sub-pantry system shall be of proven design i.e., the design of equipment components etc., shall be based on sound, proven and reliable engineering practices.
- 4.3. The proposed Modular Sub-pantry system manufactured and supplied by the Sub-contractor should have been in use, have established their satisfactory performance and reliability in Rolling stock in at least two (02) projects of premium service trains prior to the bid opening date.

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- 4.4. Satisfactory revenue service performance certificates for a period 03 years or more from Rolling stock manufacturers for the above shall be submitted along with technical offer. The Sub-contractor meeting this requirement only will be considered for technical evaluation.
- 4.5. The Sub-contractor shall hold ISO 9001/ IRIS certification and shall manufacture the products accordingly. The Sub-contractor shall submit QAP, ITP, company profile with infrastructure facilities, product range etc, along with technical offer.
- 4.6. The Sub-contractor should undertake to provide the support during Testing & Commissioning, service trials and revenue service up to DNP either by themselves or through sister company or a partner in India. The Sub-contractor shall submit detailed proposal in this regard.
- 4.7. The Sub-contractor shall also supply all Spares and Consumables required to meet the comprehensive maintenance obligations at all times through entire DNP period. The firm shall submit detailed proposal in this regard.
- 4.8. The Sub-contractor should give an undertaking to supply spares for a minimum period of 15 years excluding 2 years DNP from the date of last car supplied by BEML.
- 4.9. The proposed type of Modular Sub-pantry system should not have any quality issues in the ongoing/ completed supplies. The proposed design should incorporate measures to overcome all prevailing failures of the existing supply of Modular Sub-pantry system in any rolling stock. A certificate from the customers in this regard to be submitted along with the technical offer.


## 5. Governing Standards/Specification

- 5.1. All equipments shall be in accordance with the requirements of the standards and codes specified in the PTS. The Sub-contractor may propose an alternative equivalent European railway standard applicable for high-speed rail during the design stage. The acceptance of alternative standard will however be subject to review by BEML/Nominated agency. When a Standard or Code is referred to, it shall be assumed that the revision that is current during the design finalization shall be applicable, unless otherwise stated.
- 5.2. Where no standard is identifiable, the Sub-contractor shall make a proposal, based on the best international practice, which shall be subject to review by BEML/Nominated agency.


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- 5.3. During the preliminary design phase, the Sub-contractor shall submit a consolidated list of all the standards that the Sub-contractor intends to use for the design, manufacturing and testing and other phases of the contract, for review of BEML/ Nominated agency.
- 5.4. All drawings and design calculations submitted with the tender, or in accordance with the requirements of the contract, shall use SI units.
- 5.5. The Sub-contractor shall follow the standard as mentioned in the PTS. It is highly recommended that, Sub-contractor shall go through all the standards and their respective clauses brought out in the below table and to be adopted for this High-speed rail project suitably. The Sub-contractor shall be responsible to fulfil the requirements of the below mentioned standards and any other applicable international railway standards/specifications for high-speed rail, even though the standards/specifications clauses are not brought out in this PTS specifically.

SI No.	Standard No./ Code No.	Title
1	UIC 660	Measures to ensure the technical compatibility of High-Speed Trains
2	EN 45545-1 (Part 1-7)	Railway applications - Fire protection on railway vehicles
3	EN 45545-2	Railway applications -Fire protection on railway vehicles -Part 2: Requirements for fire behavior of materials and components
4	EN 12663-1	Railway applications - Structural requirements of railway vehicle bodies - Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons).
5	EN 50126-1	Railway Applications - The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) - Part 1: Generic RAMS Process
6	EN 13272-1	Railway applications - Electrical lighting for rolling stock in public transport systems - Part 1: Heavy rail
7	EN 50155	Railway applications. Rolling stock. Electronic equipment
8	EN 50121-3-2	Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock – Apparatus
9	EN 50124-1	Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment
10	EN 50153	Railway applications - Rolling stock - Protective provisions relating to electrical hazards
11	UIC 533	Vehicles, protection by earthing of metal parts
12	IEC 60364-5-54	Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors
13	UIC 566	Loadings of coach bodies and their components

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SI No.	Standard No./ Code No.	Title
14	EN 15085	Railway applications - Welding of railway vehicles and components.
15	EN ISO 15614	Specification and qualification of welding procedures for metallic materials
16	IEC 61373	Shock and vibration test
17	UIC 563	Fittings provided in coaches in the interests of hygiene and cleanliness
18	UIC 564-2	Regulations relating to fire protection and fire-fighting measures in passenger-carrying Railway vehicles or assimilated vehicles used on international services.
19	UIC 565-2	Special comfort and constructional characteristics and rules of hygiene for restaurant cars accepted in international traffic
20	DIN 4102	Flame / fire prevention of insulating material
21	IS:7872	Freezers (Am-1)
22	IS:302	General & safety requirements for household & similar electrical Appliances
23	IS:2167	Specification for Bottle coolers
24	IS:4165	Thermostats for general purpose electric ovens
25	IS:3017	Thermostats for use with electric water heaters
26	IS:6911	Stainless steel plate, sheet & strip
27	MMDTS-20030-Rev 2	Schedule of technical requirements for design, development, supply and installation of compactor ss dustbin for LHB coaches
28	BIS 10500	Product Manual for drinking water according to IS 10500:2012
29	MDTS-236	Technical Specification for serving trolley of pantry car for Alstom-LHB Coaches
30	DIN 6701	Adhesive bonding of railway vehicles: Part 1, part2, Part 3, part 4
31	DIN 25201	Construction guidelines for railway vehicles and their components– Bolted joints– Part 2: #Design - Mechanical applications
32	ISO 2553	Welded Brazed and Soldered Joints-Symbolic Representation on Drawings
33	EN 287-1	Approval Testing of Welders for Fusion Welding
34	EN 288	Specification and approval of welding procedures for metallic materials
35	DIN EN 17863	Railway applications - Ground based services - Coach hygiene requirements
36	EN 50125–1:2014-06	Part 1: - Railway applications - Environmental conditions for equipment rolling stock and on-board Equipment
37	DIN 27203-11	State of railway vehicles – Passenger area-Part 11: Water supply installations
38	DIN 27203-12	State of railway vehicles – Passenger area-Part 12: Kitchen equipment
39	DIN 27203-12	State of railway vehicles – Passenger area-Part 14: Liquefied gas installations
40	DIN 2001-2	Drinking water supply from small units and non-stationary plants – Part 2: Non-stationary units - Guidelines for drinking water, planning, construction, operation and maintenance of units.

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## 6. Design Interface Responsibilities

### 6.1. Design Interface.

- 6.1.1. At design stage, BEML/Nominated Agency shall be responsible for defining the technical requirements and the design constraints. The location of mounting points and the design of equipment installation comprising of Modular Sub-pantry system shall be defined by the Sub-contractor and approved by BEML/Nominated agency in order to avoid any mechanical interference with other equipment/subsystem for the vehicle. The Sub-contractor shall be responsible for mounting methods and providing all requisite materials for mounting of the Modular Sub-pantry system and its equipments on the carbody.
- 6.1.2. The Sub-contractor shall provide suitable mounting brackets and interface drawings for complete installation of Modular Sub-pantry to the respective coaches. However, welding of the mounting brackets to the carbody wherever required (as proposed by the subcontractor) will be carried out by BEML.
- 6.1.3. Any changes of the components comprising of Modular Sub-pantry system shall be defined by the Sub-contractor and shall obtain an approval from BEML/Nominated Agency in order to avoid the mechanical interference with other equipment/subsystem for the vehicle. It is the responsibility of the Sub-contractor to get the approval.
- 6.1.4. In order to implement interface requirements, the Sub-contractor shall provide the information required by BEML/Nominated Agency and shall provide the interface data voluntarily for ensuring the performance of the Modular Sub-pantry system which need to be used for the mechanical interface. The Sub-contractor shall have whole responsibility for problems which will happen without any information and notification used for engineering interface with other equipment or car body structure.
- 6.1.5. Even if technical information or drawings are approved by BEML/Nominated Agency, the Sub-contractor shall have responsibility to change/ solve/ modify design failure of production, quality problems and safety issues on its own cost.
- 6.1.6. The Sub-contractor shall keep in mind that any Modular Sub-pantry system initially proposed by him should be customized to meet a situation of this project or the need of nominated agency. So, the Sub-contractor shall implement it to Modular Sub-pantry system without additional cost. Sub-contractor shall solve all issues for proper operation of Modular Sub-pantry system at subcontractor's own cost.

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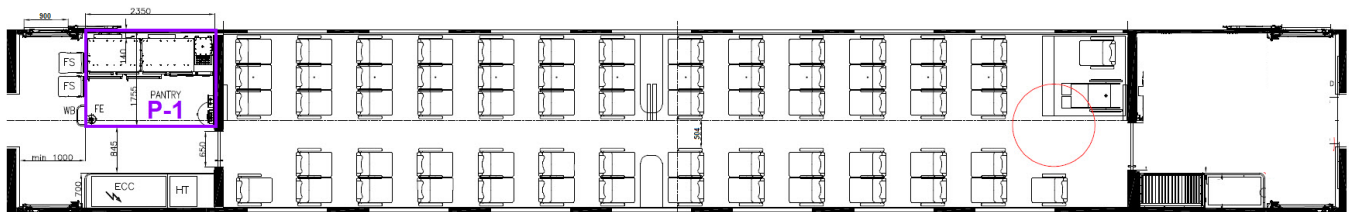
6.1.7. **Note:** “Sub-contractor shall not raise a request for the change in PO value or claim additional cost to complete the work after the placement of PO. There is no provision for the amendment of the BEML’s PO value for whatsoever reason”.

## 7. Modular Sub-pantry system arrangement

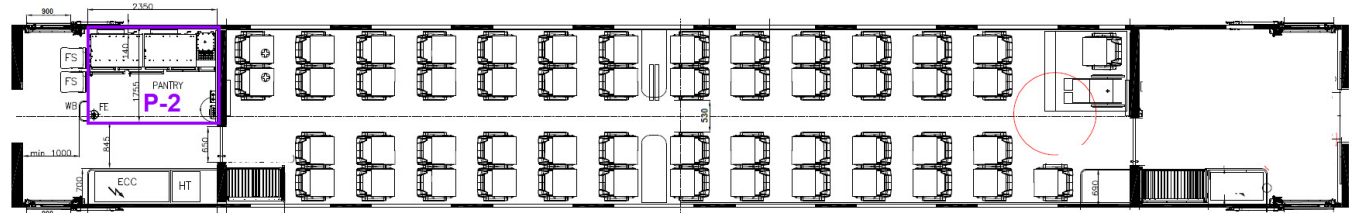
7.1. The proposed interior train layout of High-speed rail has 2 pantries of same size. The Modular Sub-pantry system layout in cars is brought out below.

Basic Unit (BU)	BU-1				BU-2			
Car Configuration	DTC1	MC1	TC1	MC1	MC1	TC2-Ex	MC1	DTC2
Modular Sub-Pantry car (P)			P-1			P-2		
Seating Capacity	61	76	66	76	76	53	76	61

7.2. The location/position of Modular Sub-pantry system in cars are shown below



TC1 - Trailer Car with PRM



TC2-Ex - Trailer Car Executive with PRM

7.3. Tentative dimensions of the Modular Sub-pantry system (P-1 & P-2) is


$$= 2.35\text{m} \times 1.755\text{m} \times 2.0\text{m}$$

$$\text{Volume} = 8.2485 \text{ m}^3$$

7.4. Tentative exterior door width is 900mm and tentative aisle space is 504 mm and 530mm respectively in TC1 and TC2 Ex car.

7.5. The equipments arrangement and quantities of equipment in each ‘Modular Sub-Pantry system’ P-1 and P-2 are same. The Modular Sub-pantry system layout and arrangement



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of equipments subject to change. Sub-contractor shall carryout any such modification without any commercial implication to BEML.

7.6. The Sub-contractor shall mount all equipments/items required for Modular Sub-pantry system with in the space of 2.35m x 1.755m x 2.0m provided in the layout shown above.

7.7. The equipments shall be arranged in proper manner by considering the ergonomic study for crew member movement inside the Modular Sub-pantry system, for ease of disassembling and maintenance of all the equipments in the Modular Sub-pantry system.

7.8. The Sub-contractor shall carryout all mechanical works like SS frame works inside the Modular Sub-Pantry system to mount all the equipments, fabrication, welding etc., and all electrical related work including materials in Modular Sub-Pantry system.

## 8. TECHNICAL REQUIREMENTS

### 8.1. General

8.1.1. The Modular Sub-pantry system and its equipments shall be designed to ensure satisfactory and safe operation under the running conditions specified herein and especially under sudden variations of load and electric supply as may arise under working conditions due to faulty operation and short circuits.


8.1.2. The design and arrangement of the Modular Sub-pantry system and its equipments shall ensure that the performance requirements of the Train are achieved under the climatic and environmental conditions prevalent in India as specified in the PTS. The equipments, Modular Sub-pantry system and their mounting arrangement shall be designed to withstand satisfactorily the vibrations and shocks encountered in service and as specified in IEC 61373.

8.1.3. Redundancy shall be built in with the design of the Modular Sub-pantry system in order to ensure reliability and availability. In the vital units of the power control circuit, where any defect/failure of a component would cause complete failure of Train's electrical system, suitable redundancy shall be provided preferably with automatic substitution features to avoid Train failure due to such defects.

8.1.4. The noise level in Sub-pantry areas shall confirm to internationally acceptable norms / standards.

8.1.5. In order to maintain uniform temperature inside the compartments, thermostatic control of M/s Rieber/Jumo/Danfoss make shall be provided. The thermostat shall be located



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inside the control box and shall be initially set at 80°C by the Modular Sub-pantry Sub-contractor. A safety thermostat at factory preset shall be provided to avoid excessive heating of the cabinet in case of blower motor failure. The thermostat shall generally conform to IS:4165-67 and withstand the test requirements as laid down in the PTS.

**8.1.6. General safety requirements:**

The Modular Sub-pantry system shall present a safe, hazard-free environment to users, crew members and the general public. Passage through the Car shall be easy and safe. Users and crew shall not be exposed to tripping hazards, exposed electrical voltage, toxic materials or similar hazards. Normal and emergency equipment and controls which the users or crew may operate, shall be clearly identified, and operating procedures shall be presented in both text and graphic formats. Emergency signs shall also be embossed in Braille raised typeface.

**8.1.7. Maintenance schedule:**

Sub-contractor shall submit the basic maintenance schedules of the proposed Modular Sub-pantry system. Minimum interval between two maintenance schedules in the depot for the Modular Sub-pantry system should be based on international standards/norms.

Average running distance of a rake may be considered 2000 kilometer per day.

The maintenance program prepared by Supplier shall have the following objectives:

- Enhancement of availability
- Minimization of maintenance costs
- Minimization of Car downtime/MTTS (meantime to restore serviceability)


**8.1.8. Ingress Protection:**

All equipment shall be suitably protected from dust and water. As a minimum, equipment shall be sealed to the standards stated below.

- Equipment mounted inside the Car body: IP54
- It may be necessary to protect some equipment to IP67 in order to meet the requirements.


**8.1.9. Environmental Protection:**

The materials likely to cause environmental damage during the manufacture, maintenance, operation and disposal of Modular Sub-pantry system and its equipments shall be avoided. The material listed in this Clause are a minimum list of


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restricted material and the Sub-contractor shall provide adequate evidence to BEML/Nominated Agency that all materials used shall not cause environmental damage. The material viz. asbestos; chlorofluorocarbons; polychlorinated biphenyls; Exposed lead and paints containing lead; chromates; cadmium, except in nickel cadmium batteries; and cyanide shall not be used. Use & disposal of all material should be governed by norms set by Government of India (Central Pollution Control Board).


- 8.1.10. All surfaces and the work top shall be a hygienic surface with an easy-to-clean surface structure and material.
- 8.1.11. All the surfaces of Modular Sub-pantry system and its equipments shall be absolutely free from fabrication defects such as waviness etc. There shall be no wavering/undulation of sheet, housing after fabrication of equipment. The sides and top cover of the outer body shall be so integrated such that it appears to be regular single piece construction of stainless-steel sheet. Design of Modular Sub-pantry system and its equipments shall be such that minimum welding is contemplated. Structural frames and the sheets shall be made in minimum no. of pieces ensuring the strength and reliability as applicable for high-speed rail. Structural frames shall not buckle/deform due to fully loaded equipment.
- 8.1.12. The individual sheet parts shall be assembled into a self- supporting plate construction and connected with each other. Insulating materials shall be worked into the gaps according to each specific task area. External and internal walls shall be fixed together by means of weld, screw or rivet connections. Cold or heat bridges i.e., areas in which energy can wander from the interior to the exterior corpuscles are not desired and must be kept at a minimum. Insulation shall also be provided between the blower compartment and food compartment to avoid heat flow towards blower motor area.
- 8.1.13. The quality, thickness and application of insulating material shall be such as to maintain the temperature inside the cabinet to set value. Sealing material shall not lose any of their essential properties such as adhesiveness, plasticity, moisture resistance due to ageing, temperature and humidity variations, in service.
- 8.1.14. All metal parts inside/outside which are exposed to atmosphere shall be corrosion resistant. Sealing material used shall not loose in service, any of their essential properties such as adhesiveness and moisture resistance due to ageing and humidity variations.
- 8.1.15. All fasteners shall be of stainless-steel material and conform to the relevant international railway standards applicable for high-speed rail.

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- 8.1.16. The Sub-contractor shall provide suitable mounting brackets and interface drawings for complete installation of Modular Sub-pantry system and its equipments to the respective coaches. However, welding of the mounting brackets to the carbody wherever required (as proposed by the subcontractor) will be carried out by BEML.
- 8.1.17. All electrical joints shall be electrically and mechanically secured/protected. Care should be taken for terminations of cables to heating elements in terms of proper clamping/insulation and protection against any mechanical damage.
- 8.1.18. The switchgears, cables, terminals, dampers and other items inside the Modular Sub-pantry system unit shall be so designed/located to avoid getting loose or overheated under normal conditions of use. Suitable mechanical and electrical protection shall be provided. Terminations shall be made with the help of crimping sockets of suitable rating and size.
- 8.1.19. All equipment installation, commissioning, fastening, partition wall, panelling, cutting, welding, bolting, plumbing, ventilation, drain out for waste water from equipment and Modular Sub-pantry area, water proofing for floor and other related works shall be Sub-contractor responsibility without any additional cost.
- 8.1.20. The design of all parts and components of Modular Sub-pantry system shall meet the requirements of UIC 564-2.
- 8.1.21. All material used are to be resistant to cleaning agents which occur in all purpose cleaners. When selecting the material (insulates seals etc.), their resistance to vermin (e.g., termites) shall be taken into consideration.
- 8.1.22. Sub-contractor shall provide all information and warning decals (stickers) of international standards for each and every equipment & as well as in Modular Sub-pantry system area as applicable. Sub-contractor shall provide additional information and warning decals required by BEML/Nominated agency without any additional cost.
- 8.1.23. Screen printed power and control circuit diagram and instruction plate on anodized aluminium sheet shall be riveted on the back side of the front panel of the equipment to enable ease in maintenance.
- 8.1.24. The Sub-contractor shall arrange valid calibrated measuring instruments for conducting the tests.
- 8.1.25. All the tests shall be carried out at BEML/Nominated agency premises at the Sub-contractor's cost. Inspecting officer shall witness the tests on each Modular Sub-pantry system and its equipments. A copy of test reports of tests conducted by the Sub-contractor shall be supplied to BEML/Nominated agency.

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- 8.1.26. A suitable stainless steel earthing boss shall be provided at the bottom of the units with M8 tapped hole for earthing. Individual earthing of the motor/component shall be done to the equipment frame or looped to the earthing terminal. One number braided copper cable of size 35 sq mm and length 300 mm shall be supplied loose for earthing of cabinet with coach for all 'Modular Sub-pantry system and its equipments' units.
- 8.1.27. The material of all parts of the Modular Sub-pantry system and its equipments being in contact with food is to be absolutely safe and non-reactive complied to applicable international standards.
- 8.1.28. When selecting the materials, the general aspects of environmental acceptability, the degradability of the materials used without residues and the later recycling are to be taken into consideration.
- 8.1.29. The positions from equipments/components should not cause any kinematic conflicts and should be ergonomic.
- 8.1.30. The equipment is to be of a light weight design. When choosing other weight-saving materials, cost and mechanical strengths and reliability are to be taken into consideration.
- 8.1.31. Pipes must be protected against blockage, filters etc. must be easily accessible for cleaning.
- 8.1.32. The compressor of the refrigerator and all other components must be accessible in case of maintenance or replacement of parts.
- 8.1.33. There shall be sufficient access to the necessary components in case of maintenance or replacement of parts.
- 8.1.34. The equipments size shall be kept in such a way that the equipments can be taken in & out comfortably with the door clearance/open width of 900mm as shown in the layout drawing (Clause 7.2 of this PTS) for easy maintenance.
- 8.1.35. All equipments in the Modular Sub-pantry system shall have flushed door handles for opening and closing of the equipment doors.
- 8.1.36. The pantry area should be ventilated efficiently, taking into account heaters, refrigerator compressor, number of staffs and other heat sources. The exhaust air from the refrigerator compressor should be directed to another location, not into the kitchen.
- 8.1.37. There shall be a first aid box in an easily accessible place in the pantry area.
- 8.1.38. Wherever BEML/Nominated agency approved make is not available, the item may be got approved before fitment.
- 8.1.39. The Sub-contractor shall carry out the supply, commissioning and testing at BEML

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Bengaluru and NHRSCS maintenance depot works at no additional cost as per project requirement.


- 8.1.40. The Sub-contractor shall support in all aspects in obtaining customer clearance of the proto type Modular Sub-pantry system after successful completion of tests like, type tests, routine tests, functionality tests, etc.
- 8.1.41. The Sub-contractor shall carry out any modification/alteration based on results of the tests on the prototype if required. The Sub-contractor shall carry out necessary modifications at no additional charge on all trains and shall support in delivering the prototype train.
- 8.1.42. The Sub-contractor shall provide the place for parking all trolleys inside cabin. Cabin may be provided below the equipment with proper locking arrangement, similar to the image shown below, to park all the trolleys.




- 8.1.43. The Sub-contractor shall provide the provision for mounting the fire extinguisher along with mounting brackets.

## 8.2. Electrical Requirements

- 8.2.1. Separate Electrical panel furnished with control switches, MCB/Breaker boxes of reputed make shall be provided for each electrical load like Hot Case 1, Hot Case2, Hot Case3, etc., Bottle cooler cum deep freezer (Refrigerator), Water Boiler, Garbage Compactor, etc.
- 8.2.2. RCCBs shall be provided appropriately to electrical load of Modular Sub-pantry system and its equipments.
- 8.2.3. Provision for Lighting system should be considered in the design. The same shall be decided during design stage.

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- 8.2.4. Mating connectors (male/female) along with pins shall be provided for power/control supply cable entry inside Modular Sub-pantry system area. All mating connector assemblies along with pins for car body side wiring shall be supplied by the Sub-contractor.
- 8.2.5. Sub-contractor shall submit technical data sheets & its scheme for all the electrical equipment of pantry along with tender submission.
- 8.2.6. Cables accessories for power/control supply cable entry for Modular Sub-pantry system shall be supplied.
- 8.2.7. Cable harness of the modular sub-pantry including lighting system shall be part of the scope of sub-contractor.
- 8.2.8. 230V AC 1ph 50Hz & 110 VDC (-35% to +25% variation) only will be provided from vehicle side to Modular Sub-pantry system and its equipments. Any other voltage level and frequency shall be met by supplier only with suitable converters.
- 8.2.9. Sub-contractor shall submit the detailed electrical scheme for Modular Sub-pantry system along with tender submission.
- 8.2.10. All electrical wiring, routing, earthing and other related electrical works as per international practices with proven design shall be the responsibility of Sub-contractor without any additional cost.
- 8.2.11. The minimum cross section of single core cable shall be 1.5 sq. mm.
- 8.2.12. Any other electrical components like switches, indicators, covered power sockets, plugs etc., required in Modular Sub-pantry system shall be supplied by Sub-contractor.
- 8.2.13. Sub-contractor shall supply one full set of connectors and its contacts as mounted on the equipment for each car-type to carry out vehicle level voltage withstand test at BEML factory. Detailed list shall be decided and finalized before first supplies.
- 8.2.14. Non-screwed and self-locking type connectors for complete system shall be ensured.
- 8.2.15. The Sub-contractor shall carry out cleaning, pickling and passivation process to all stainless-steel finished product.
- 8.2.16. Painting specification & process wherever applicable shall be as per the approved Painting Specification.
- 8.2.17. The Sub-contractor shall use SS hardware/fasteners which pass salt spray test as per international standards.
- 8.2.18. Earth pad / stud and fasteners for fastening (preferably which suits to M6 and 6 sq. mm. cable)
- 8.2.19. Rubber (packing or gasket) for the water-tightness when the subsystem or components

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are installed shall be ensured/supplied by the subcontractor,

- 8.2.20. The Cable markers provided shall be fire retardant heat shrinkable type. The cable markers shall be protected against fading by providing Fire retardant heat shrinkable clear sleeve.
- 8.2.21. The locks provided on the box covers shall be indicated with open & close markings / directions with stickers.
- 8.2.22. The copper lugs used for cable termination shall be of UL certified and high conductivity Cu (99.9%) and all other details to is:1897-83 with electro plating to is:1359-92 to grade cusn8b.
- 8.2.23. The electrical requirement in the Modular Sub-pantry system and not only limited to above.

### **8.3. Electrical Switch gear, Connector, Cables & Cable accessories**

- 8.3.1. Switch Gear/Control Gear item shall be conforming to following standard
- IEC 60947.
  - IEC 61373 - Railway applications – Rolling stock equipment Shock and vibration tests category 1, class B.
  - IEC 60077: Railway application- Part -1, Part -2, Part -3 Part -4 & Part5.
  - EN45545, HL3 - For Fire protection.
- 8.3.2. Make of the Switch Gear/Control Gear item shall be from reputed Sub-contractor like ABB/Schneider/any other equivalent as per international practices with proven design.
- 8.3.3. Cable conduit and its fitting shall be conforming to EN45545, HL2 - For Fire safety requirement.
- 8.3.4. Cable marking system/heat shrinkable sleeves procured from approved sources.
- 8.3.5. Cables shall conform to EN45545, HL2- For Fire protection.
- 8.3.6. Pushbutton, indicator & Connectors shall conform to EN45545, HL2 - For Fire safety requirement & IEC 60077-1&2
- 8.3.7. Connector shall be from reputed make like M/s. Harting/ Amphenol / souriau / wago / any other equivalent.
- 8.3.8. Pushbutton, indicator & Connectors shall conform to EN45545, HL3 - For Fire safety requirement & IEC 60077-1&2 as per international practices.
- 8.3.9. The Sub-contractor shall provide details like make, part number, data sheets for MCB, RCCB, Connector with pins, Cables and Cable accessories along with tender submission for review and approval of BEML/Nominated Agency.



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8.3.10. All the electrical technical documents and electrical wiring schematics to be provided to BEML/Nominated Agency.


8.3.11. IP Protected Electrical junction boxes, Separate breaker box/MCB for Sub-pantry equipments.

#### 8.4. Modular Sub-Pantry Equipments

Each **Modular Sub-pantry system** shall contain the items mentioned in the table below

Sl No	Description	Minimum requirement (Capacity)	Remarks
1	Bottle cooler cum deep freezer.	Sufficient to store 1. About 150 no of 300ml beverage bottles 2. About 150 no of 1 litre water bottles 3. About 150 no of 90 ml Ice cream cups	Preferably of the type used in high-speed train. Please refer section 8.4.1 of the PTS
2	Water Boiler	Minimum 20-liter water storage capacity.	Preferably of the type used in high-speed train. Please refer section 8.4.2 of the PTS
3	Hot case (Veg & Non veg Compartment)	Sufficient to store about 150 no of 500ml solid food container with separate compartment of Veg and nonveg of equal proportion	Preferably of the type used in high-speed train. Please refer section 8.4.3 of the PTS
4	Three number of Food serving trolleys	Each trolley shall be sufficient to cater min 50 passengers.	Preferably of the type used in high-speed train. Please refer section 8.4.5 of the PTS
5	Adequate waste disposal arrangement (Garbage Compactor)	Storage of at least 200 liters of solid waste after 1:6 compaction ratio.	Preferably of the type used in high-speed train. Please refer section 8.4.4 of the PTS




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6	IP Protected Electrical junction boxes, Separate breaker box/MCB for Sub-pantry equipments.
7	Stainless steel frames, Aluminium or stainless-steel panelling with powder coating inside modular Sub-pantry system including materials and installation related works for arrangement of Modular Sub-pantry system and its equipments
8	All electrical works within the Modular Sub-pantry system including materials and accessories.
9	Waste water drainage arrangement with plumbing (including materials) applicable to high-speed rail requirements. All cutouts shall be provided with proper sealing arrangement to comply airtightness requirement of high-speed rail.
10	Storage Space for placing the purified water can. This water will be used to fill the water boiler manually whenever hot water is required.
11	Wash basin with water tap facility and water drainage.
12	First aid box in an easily accessible place in the pantry area.

Note:

- Serial no 1 to 12 mentioned in table above makes the “one Modular Sub-pantry system”. All the items listed above table should be installed/mounted in the space of 2.35mx1.755mx2.0m allocated for Modular Sub-pantry system as shown in the general layout.
- All Sub-pantry equipments shall be made of stainless steel, SUS301 (AISI 304), however details can be discussed during the design stage.
- All equipment installation, commissioning, fastening, partition wall, panelling, cutting, welding, bolting, plumbing, ventilation, drain out for waste water from equipment and from Modular Sub-pantry area, water proofing for floor and other related works shall be Sub-contractor responsibility without any additional cost.
- The Sub-contractor shall provide detailed design drawings, installation drawings, fire safety and hygiene complying to applicable railways standards, proper drainage and sealing arrangement details for meeting the requirements of airtightness of high-speed rail as per applicable international railway standards, construction of Stainless steel or aluminium panels with powder coating for side panels, cabin panels, etc., installation and locking arrangement of panels, etc.

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- e. All electrical wiring, routing, earthing, lighting and other related electrical works as per international practices with proven design has been using in rolling stock shall be the responsibility of Sub-contractor without any additional cost.

#### **8.4.1. Bottle cooler cum deep freezer**

- i) To keep the food/drinks in cold storage, deep freezer cum bottle cooler is required for different cooling temperatures. The deep freezer cum bottle cooler shall be of modular design with ON-OFF switching for individual equipment module. The deep freezer cum bottle cooler shall consist of the following compartments with temperature adjustment facilities.
1. Deep Freezer Compartment
  2. Cooling Compartment
  3. Bottle Cooler Compartment
- ii) It is the responsibility of the Sub-contractor to get the approval for all drawings from BEML/NOMINATE AGENCY before going for production.

##### **8.4.1.1. Deep Freezer Compartment**


- i) The deep freezer is to freeze and preserve ice cream. The permanent temperature setting shall be at least -18°C. The temperature setting range shall be from -18 °C to -25 °C.

##### **8.4.1.2. Cooling Compartment**

- i) The cooling compartment is to simultaneously cool cartons to a temperature level of 3°C to 5 °C.
- ii) The unit shall have shelves/trays for storing the cartons vertically and can be easily pulled out for easy handling.


##### **8.4.1.3. Bottle Cooler Compartment**

- i) The bottle cooler is to simultaneously cool 1-liter bottles of drinking water to a temperature level of 3°C to 5°C. when the bottle cooler is not completely filled up. the falling over/rolling around of bottles is to be avoided by appropriate measures.

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#### 8.4.1.4. Technical Requirements and Bill of Material

Technical requirements and Bill of Material		
a	<ul style="list-style-type: none"> <li>•The optimized size of the Bottle cooler cum deep freezer (Refrigerator) shall be provided to suit for the product capacity requirements for this high-speed rail.</li> <li>•The Bottle cooler cum deep freezer (Refrigerator) shall be mounted within the available pantry space of 2.35mx1.755mx2m along with all other equipments for Modular Sub-pantry system.</li> <li>•The Sub-contractor shall provide all design and specification details for BEML/Nominated agency approval.</li> <li>•Quantities can be decided based on the requirement and available space for the Modular Sub-pantry system.</li> <li>• Bottle cooler cum deep freezer to be installed in a location that will permit the function for its intended purpose and to allow adequate clearance, proper drainage arrangement with proper sealing to suit for high-speed rail requirements of air tightness, proper cleaning, and maintenance access.</li> </ul>	
b	Max. Power	800 W (2x400 Watts)
c	Operating voltage	230V+/-10 %, 50 Hz+/-3%
d	Thermostat make/Range	Dan Foss KP-61 /Alco/Honeywell make. i) Deep freezer: -18° to -25°C ii) Bottle Cooler: 0° to +10 °C iii) Cooling compartment: 0° to +10 °C
e	Thermal Insulation	Foamed polystyrene (Styrofoam) with a close cell structure or polyurethane foam consists of two components. Conforming to fire prevention class B-1 flame resistance to PA - 111 2.1001, in. accordance with DIN4102
f	Compressors	R134a charged compressors as follows For bottle cooler compartment Model no. KCE444HAG/ECZ444HG of M/s Emerson or equivalent Tecumshah**/ Danfoss** For deep freezer compartment Model no. KCN372LAG/ECZ380LG of M/s Emerson or equivalent Tecumshah** / Danfoss**i
g	Condenser and evaporator Fans	M4QO45CAO351 with impeller 230mm dia type-A, 34°, air delivery 820 m3/H of M/s EBM-NADI.
	** Make and type of the compressor unit shall be got approved before fitment from BEML/Nominate Agency.	

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h	Condenser and evaporator coils	These shall be of suitable size comprising of copper tubes to IS:10773 and aluminium fins and shall withstand a pressure of 30 Kg/Sqcm to fulfill the functional requirements.
i	Shut OFF valve	Indfoss/ Danfoss make
j	ELCB (DP)	01 No. ELCB (DP) 25 Amp.30mA of M/s. Schneider/L&T/Legrand/ABB/Siemens make.
K	Product capacity	Sufficient to store 1. About 150 no of 300ml beverage bottles 2. About 150 no of 1 litre water bottles 3. About 150 no of 90 ml Ice cream cups

#### 8.4.2. Water Boiler

- The water boiler shall be rectangular type design and meets the requirements of this high-speed rail. It is the responsibility of the Sub-contractor to get the approval for all drawings from BEML/Nominate Agency before going for Production.
- The water boiler shall have provision for filling the water manually.
- A separate tap in the boiler shall be provided for crew member to wash their hands. This water shall be drawn directly from the fresh water line to the tap at the sink through boiler.
- The Sub-contractor will be responsible for routing the water line i.e., plumbing including required materials (like Pipes, connectors etc.), from the water inlet provided at the pantry area to the tap at the sink.

##### 8.4.2.1. Technical Requirements and Bill of Material


Technical requirements and Bill of Material		
a	Capacity of water boiler	Minimum 20 liters capacity
b	Power Supply	230V AC $\pm$ 10%, 50 Hz $\pm$ 3%
c	Heating Element	2x1500 watt tube type immersion heating element
d	Thermostat	Range 40°C to 110°C to IS: 3017 (latest)

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e	<ul style="list-style-type: none"> <li>•The optimized size of the Water Boiler shall be provided to suit for the product capacity requirements for this high-speed rail.</li> <li>•The Water Boiler shall be mounted with in the available pantry space of 2.35mx1.755mx2m along with all other equipments for Modular Sub-pantry system.</li> <li>•The Sub-contractor shall provide all design and specification details for BEML/Nominated agency approval.</li> <li>• Water Boiler to be installed in a location that will permit the function for its intended purpose and to allow adequate clearance, proper drainage arrangement with proper sealing to suit for high-speed rail requirements of air tightness, proper cleaning, and maintenance access.</li> </ul>	
f	Thermal insulation	Rock wool plate/Bonded mineral wool having bulk density of 40-50 Kg/Cu.m to IS: 8183-93 or conforming to EN/VDE standard
g	Water inlet	15 mm bore stainless steel pipe
h	Water outlet	15 mm bore stainless steel pipe
i	Interconnecting flexible water hoses & accessories	Reputed make prior approval shall be taken from BEML/Nominate Agency.
j	ELCB (DP)	01 No. ELCB (DP) 25 Amp.30mA of M/s. Schneider/L&T/Legrand/ABB/Siemens make.

#### 8.4.2.2. Construction details


- All the sheet metal work shall be stainless steel sheet, grade SS-304 to IS:6911 (latest edition) satin finish (PVC laminated for protection and transportation). The internal container shall be min 3.2 mm thick and outer 1mm suitably insulated with rock wool after securing syndanium sheet of proper thickness to the inner casing. In case specified size is not available next higher size as per IS shall be used.
- Suitable baffle plates of stainless steel shall be provided inside the container to avoid the water knocking during train run.
- The fitting used e.g., tap and water level indicator shall be made of chromium plated brass. The fitting shall be provided by putting suitable insulated washers to the container. Suitable safety provision shall be made to avoid spillage of hot water/steam in case of breakage/damage of water level gauge in service or during the changing of the gauge glass.

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- iv) Outlet and inlet for hot and cold water (inlet) respectively shall be by means of Ball valve of ½" of M/s STAR, Italy/RB-Italy/COMAP-France/ZOLOTO-India make. Suitable arrangement shall be made to avoid back pressure into the inlet pipe.
- v) Immersion type water heater of capacity 3 KW working on single phase 230volts 50Hz ac to IS:368 (latest edition) shall be provided of reputed make.
- vi) Suitable thermostat with temperature range 40°C to 110°C suitable for working on 230V AC 50 Hz to IS:3017 (latest edition) of reputed make shall be provided for maintaining the temp at required level.
- vii) Junction box for termination of connection of thermostat and water heater shall be provided on the front side with hinged cover for easy access to the terminals for the maintenance staff. It shall be provided with industrial type plug and socket for cable connection at the top. The following indications shall be provided on the terminal box
  - POWER ON
  - HEATER ON
- viii) Suitable removable vertical stand of stainless steel of thickness 2mm shall be part of the supply for fixing of water boiler.
- ix) Suitable Fixing bracket shall be provided for installation in the coach.
- x) The general and safety requirements shall be as per IS:302(latest edition)
- xi) The electrical wiring scheme shall be done as per IS:302 (latest edition)
- xii) An earthing screwing piece suitable for M6 tapped hole shall be provided with each unit made of copper and duly tinned as per standard practice.
- xiii) The top lid shall be sealed with suitable Neoprene rubber (5mm thick) packing with nuts and bolts.
- xiv) A relief valve shall be provided at the top to maintain the pressure inside the container at 0.6Kg/sq.cm of reputed make.
- xv) Sub-contractor shall provide suitable waste water disposal/drain arrangement with proper sealing like EPDM sealant. The arrangement shall be in such way that the water shall not spill out of water disposal/drain arrangement.

#### 8.4.3. Hot Case (Veg & Non veg Compartment)

The hot case is meant to keep warm and warm up respectively precooked dishes in casseroles.

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#### 8.4.3.1. Technical Requirements

Technical requirements and Bill of Material		
A	<ul style="list-style-type: none"> <li>The optimized size of the hot case shall be provided to suit for the product capacity requirements for this high-speed rail.</li> <li>The Hot case shall be mounted with in the available pantry space of 2.35mx1.755mx2m along with all other equipments for Modular Sub-pantry system.</li> <li>The Sub-contractor shall provide all design and specification details for BEML/Nominated agency approval.</li> <li>Quantities can be decided based on the requirement and available space for the Modular Sub-pantry system.</li> <li>The standard products come with wheel to facilitate the movement of equipment. this particular feature not required.</li> <li>Hot case to be installed in a location that will permit the oven to function for its intended purpose and to allow adequate clearance for ventilation, proper cleaning, and maintenance access.</li> </ul>	
B	Product capacity	Sufficient to store about 150 no of 500ml solid food container with separate compartment of Veg and nonveg of equal proportion
C	Power Supply	230V AC +/- 10%, 50 Hz +/- 3%
D	Thermostat	Range 30°C to 110 °C

The Hot case shall have two (2) compartments equal in size for storing veg and nonveg food of equal proportion.

#### 8.4.4. Adequate waste disposal arrangement (Garbage Compactor)

- Garbage compactor shall be based on electro-mechanical arrangement having "Sensor enabled Solid Waste Compaction System" type set-up for compacting the garbage.
- The proposed garbage compactor shall be capable to compact the garbage in minimum 1:6 compaction ratios without any human interference with a microprocessor/PLC based Communication, Governing & Control System.
- Compaction system of the garbage compactor shall be controlled by sensor-based

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operation and control system which automatically control the cycle of electromechanical compaction system when garbage bin is completely fill and reset after cycle completion. An indicator shall be provided with green light indicating 'readiness of the system for starting garbage compaction cycle. Suitable Indicator lights with stickers shall be provided for displaying processes of compactor.

- iv) The Sensor installed for solid waste level sensing must be installed in a way that no foreign particle obstructs its functioning. The accuracy level of sensor must be above 95% and power consumption must be below 110 volts DC.
- v) Compaction system of garbage compactor must be based upon electro-mechanical compaction method, in which any mechanical, electrical type may be employed but “no pneumatic line inside the pantry”. One compaction cycle must be completed within 45 seconds.
- vi) All electrical, electronic and mechanical parts of system should be shock and vibration proof and should comply with IEC 61373. The components/system should also comply with IEC 60068 for environmental protection. The bidders should submit test reports from labs authorized for this testing.
- vii) The controlling circuitry of garbage compactor should be embedded system driven and should be consisting of a micro controller/processor driven circuit board, capable to execute the programming. The Micro Controller/Processor should be reprogrammable.

#### **8.4.4.1. Technical Requirements**


- i) The garbage compactor shall be lightweight, portable robust, easy to operate and maintenance free. All the equipment and structural member of garbage compactor with compaction arrangement shall be made of non -corrosive material preferably stainless steel AISI 304 or Grade 304 to IS: 6911.
- ii) The design of garbage compactor with compaction arrangement should be compact in size and it shall fit with in the dimension of Modular Sub -pantry system space of 2.35mx1.755mx2m along with all their equipments and items.
- iii) The design of garbage compactor with compaction arrangement should be simple in design for easy handling and shall not require any special skills, tools and plants.
- iv) Total capacity of garbage compactor 80 liters.
- v) The total garbage compactor weight shall be within 90 kg.
- vi) The disposable bag should be portable in nature and can be removed and put back easily after removal of garbage. The inlet opening of garbage compactor shall be



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remain close when not in use and shall open automatically with the help of electronic sensor.

- vii) During compaction the inlet of garbage compactor must be close for safety purpose. In case of power failure, the front lid/cover can be open to put waste. The inlet opening of garbage compactor shall be maximum size to easily accommodate standard disposal food plate/ sweet boxes.
- viii) The garbage compactor shall be in two parts (the electronic and waste collector) in separate enclosures to ensure durability and long life of product.
- ix) Following compaction mechanism and electric mover to be used:
  - Telescopic Ram Type or Ball Screw with Ram (Reputed international make)
  - BLDC type electric motor of reputed make
- x) Noise during operation shall not exceed 60db.
- xi) The complete compacting mechanism such that the waste is compressed to minimum possible size and also the compacting plate should have smooth travel.
- xii) A minimum load of 500 kg should be provided for compaction process. It should not bulge due to compaction force applied by the compaction arrangement of garbage.
- xiii) The entire compaction cycle should not exceed 45 seconds. The garbage compactor shall be ready to perform and repeat designated duty cycle frequently within maximum of 45 seconds after each use. This system may be used up to 100 times for defecations in 24 hrs.
- xiv) The body of the garbage compactor unit shall be constructed with sufficient degree of resistance against safety hazards. The enclosures shall be secure, stable and should provide adequate protection against moving and electrically energized parts. Switches and controls shall be protected against penetration of fluids and shall have level of suitable degree of protection as applicable. The controls (i.e., switches, knobs etc.) shall be visible and clearly identified. Device design should prevent misinterpretation of displays and control settings.
- xv) The design of garbage compactor with compaction arrangement shall be injury free. Sharp edges and corner shall be avoided.
- xvi) The design of litterbin/litterbag of garbage compactor with compaction arrangement shall be portable, robust and easily detachable from garbage compactor unit and of optimized capacity to handle garbage generated during journey of coach. Suitable handling arrangement for litterbin shall be provided with injury free features and should


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not interface the free movement of passengers.

- xvii) The litter bin/litter bag should accommodate waste minimum 8 times of the actual capacity of litter bin after compacting. The garbage compactor must have capacity to store at least 200 liters of solid waste after 1:6 compaction ratio.
- xviii) Bought out items from a reputed and established brand shall be used or made in-house for garbage compactor.
- xix) The garbage compactor shall have appropriate indicator lights for guidance to crew members on method to use.
- xx) A suitable embedded programmer driven microprocessor/PLC shall be selected and utilized to develop operation and control system for garbage compactor in a manner so that all the dedicated system will perform in sequence and well-mannered as per desired performance.
- xxi) ALL electrical/ electronic equipment, PLC, Switch gears, junction boxes shall be of suitable degree of protection IP 65 protection.
- xxii) Appropriate indicator lights of reputed make shall be provided with stickers for ease of understanding of instructions to use and clean.

#### **8.4.5. Food serving trolleys**

- i) The trolley shall be of proven design and Sub-contractor shall submit performance certificates of the product.
- ii) The sub-contractor shall propose the standard trolley that is used in the airline.
- iii) Food serving shall accommodate minimum 50 nos. of 500ml solid food containers. In addition, it must allow storage of additional cutlery, thermos flasks and other items.
- iv) The food serving trolleys shall meet the following requirements regarding stability & maneuverability of the trolley.
  - a. Smooth movement on floor/carpet surface/resin surface.
  - b. No falling or sideward tilt after loading.
- v) Trolley shall have two side opening for easy dispersal of food.
- vi) Trolley shall have parking and locking mechanism when not in use in pantry area.
- vii) trolley shall be handled by one person without much effort.
- viii) The Food serving trolleys station shall be provided with in the available pantry space of 2.35mx1.755mx2m along with all other equipments for Modular Sub-pantry system. Also, all the trolleys shall be stationed or parked as explained with image in the clause 8.1.42.

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### 8.5. Bill of Material (BOM)

- i) All components and Sub-components used in Modular Sub-pantry system including Hot case, Bottle cooler cum deep freezer, Water Boiler, Garbage Compactor, Drainage arrangement, Food Serving Trolley, etc., shall be highly reliable and should have established its satisfactory performance in any of similar Rolling stock.
- ii) The Sub-contractor shall submit the complete Bill of Material (BOM) for Modular Sub-pantry system and its equipments along with the list of Models /make and list of projects in which these items are used, during preliminary design phase.
- iii) The Sub-contractor shall submit the complete Bill of Material (BOM) for Modular Sub-pantry system and its equipments to BEML/ Nominated agency for design approval before supply. Bill of materials of all bought out items shall be submitted with make and part number.

### 8.6. Service Life


Train is designed for minimum 30 years of life. Accordingly, the subject items & accessories shall also not deteriorate in their performance for 30 years. For the system, the desired functionality should be available for period of train design life i.e., 30 years. Accordingly, the requisite plan for 30 years lifespan may be submitted. The Life Cycle cost shall be submitted. Since components are subjected to a shorter life period, obsolescence plan to be submitted accordingly.

### 8.7. Weight

- a. To minimize energy costs, great importance will be placed on achieving practical designs of minimum car weight whilst meeting specified structural and performance requirements. Accordingly, the weight of Modular Sub-pantry system shall be kept to a minimum. The total weight of Modular Sub-pantry system shall not exceed by more than +5% of the estimated weights /as per relevant drawings.
- b. The Sub-contractor shall submit details of estimated weights and center of gravity for Modular Sub-pantry system and its equipments along with the technical offer.

### 8.8. RAMS requirements

- a. The Sub-contractor shall design the Modular Sub-pantry system and its equipments to

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ensure Guaranteed Reliability, guaranteed Availability, maintainability and high degree of safety in order to provide a dependable service. The optimization of the system with respect to reliability, availability, maintainability and safety (RAMS) shall form an integral element of this Procurement Technical Specifications. The plan for reliability, availability, maintainability and safety shall conform to EN 50126/ IEC 61709/ IEC 62278. Reliability of electronic components shall conform to IEC 61709.


- b. Sub-contractor shall ensure to identify the components critical for safety that shall fall into safe operating mode in case of malfunctioning. The system safety plan shall identify and list safety critical components and this list shall be updated periodically.
- c. Safety Assessment shall be carried out and shall include the following principles:
  - Degraded modes and emergency operations shall be considered as well as normal operations;
  - Safety risk assessment shall utilize more than one methodology to assess risks;
  - Safety risk assessment shall include the consideration of dependent failures, in particular the traction power, braking and control systems.
- d. The Sub-contractor shall submit a guaranteed Reliability target and guaranteed Availability target for an Accounting Year during detailed design to BEML/Nominated Agency for consideration.

## 8.9. Wiring and cables

- a. The insulation of all wires and cables including those used within equipment / subsystem shall be halogen-free flame- retardant and formulated to minimise generation of smoke, noxious emissions and corrosive fumes, in the case of overheating or fire in compliance with EN 45545 (Hazard level HL2) latest edition.
- b. Cables shall all comply EN 50306 (Part 1 to 4), EN 50264 (Part 1 to 3) and EN 50382 as approved by the BEML/Nominated agency.
- c. Single core cables used shall be of cross section of 1.5 sq mm. And all the electrical cables as per international practices.

## 8.10. Fire Load Calculation

- a. The maximum heat release rate per car shall be restricted to low levels.

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- b. Fire load calculation for all non-metallic materials have to be calculated with heat release rate data tested in accordance with EN 45545 HL2. The calculations shall be included in the Fire safety plan submitted as the source of heat value.
- c. Accordingly, the fire performance test reports, heat release rate as per ISO 5660-1 and gross heat of combustion as per ISO 1716 shall be submitted by Sub-contractor before FAI.


### 8.11. Maintenance Schedule

- a. Sub-contractor shall submit the basic maintenance schedules of the proposed Modular Sub-pantry system and its equipments on the Train. Minimum interval between two maintenance schedules in the depot for the Train should be based on international standards/norms. Average running distance of a rake may be considered 2000 kilometer per day.
- b. The maintenance program prepared by Sub-contractor shall have the following objectives:
  - Enhancement of availability
  - Minimization of maintenance costs
  - Minimization of Car downtime/MTTS (meantime to restore serviceability).

### 8.12. Material Properties

All non-metallic Materials used in the construction of Modular Sub-pantry system and its equipments shall be selected to reduce to the maximum extent practical the heat load, rate of heat release, propensity to ignite, rate of flame spread, smoke, emission and toxicity of combustion gases.


SI No	Deliverables
1	Fire safety plan as per EN 45545 HL2
2	Fire safety Test Reports of all non-metallic items including heat release rate, as per EN 45545 HL2

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## 9. SCOPE OF SUPPLY

### 9.1. General

- a. The Sub-contractor shall be responsible for the scope of supply of Modular Sub-pantry system mentioned in the PTS which shall comprise, unless specifically excluded, the design, manufacture, testing, delivery, commissioning and rectification of defects during the Defects Liability Period.
- b. The Sub-contractor shall meet the system requirements for Modular Sub-pantry system in accordance with this PTS, as a minimum.
- c. The Sub-contractor shall be responsible for the scope of design, manufacture, testing, supply, commissioning and integrated testing of Modular Sub-Pantry system and its equipments and rectification of defects & associated equipments necessary to facilitate operation and maintenance of Modular Sub-Pantry system and its equipments which includes testing of equipments, supply of spare parts, operation and maintenance manual and training of BEML/ nominated agencies.
- d. All design, manufacturing and Installation drawings to be submitted to BEML/Design verification agency/Nominated agency for review and approval. BEML, Design verification agency and Nominated agency approval is must before going for production. It is the responsibility of the Sub-contractor to get the approval for all design and drawings from BEML/Design Verification agency/Nominated agency before going for production.
- e. If any special tools/equipment are required for installation, maintenance and periodic overhauling of Modular Sub-Pantry system and equipments onto carbody, the Sub-contractor shall supply 4 nos. of such equipment at Sub-contractor's cost.
- f. The Sub-contractor shall meet the system technical requirements for Modular Sub-pantry system in accordance with PTS.
- g. The scope of work includes all items of work which may be required to meet the performance requirements, reliable and efficient operation of sub-pantry and meeting the best international practices even if not specifically mentioned in this PTS.
- h. The Sub-contractor shall study all the clearances required for the mounting and positioning of all equipments in Modular Sub-pantry system.

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- i. All electrical/ electronic equipment, PLC, Switch gears, junction boxes shall be of suitable degree of protection IP 65 protection.
- j. BEML/ICF/Nominated agency shall not be responsible for infringement of IPR arising due to similarity in design, manufacturing process, components used in design, development and manufacturing of Modular Sub-pantry system with equipment and any other factor, which may cause such dispute. The entire responsibility to settle any such disputes/ matters lies with the subcontractor.
- k. The Sub-contractor shall communicate well in advance about the details required to design, manufacture, testing, supply, commissioning and integrated testing of Modular Sub-pantry system and its equipments from BEML/Nominated Agency and other Sub-contractors.
- l. The Sub-contractor shall have the whole and sole responsibility of Modular Sub-pantry system and its equipments in terms of design, development, manufacture, testing, supply, installation, commissioning and integrated testing. It is the responsibility of the Sub-contractor to get the approval for all drawings from BEML/Nominated Agency before going for production.
- m. The complete kit of Modular Sub-pantry system includes its equipments, accessories and design, manufacture, testing, supply, commissioning and integrated testing of Modular Sub-pantry system and rectification of defects & associated equipment necessary to facilitate operation and maintenance of Modular Sub-pantry system which includes testing of equipment, supply of spare parts, operation and maintenance manual and training. Offers received for complete kit shall be considered for technical evaluation. Incomplete and partial offers shall not be considered for technical evaluation.
- n. The subcontractors shall provide offer as a complete kit of Modular Sub-pantry system as brought out in clause 8.4 of this PTS for all 2 train sets including design, manufacture, supply, testing, commissioning and integrated testing of Modular Sub-pantry system and rectification of defects & associated equipment necessary to facilitate operation and maintenance of Modular Sub-pantry system which includes testing of equipment, supply of spare parts, operation and maintenance manual and training.
- o. The scope of supply of complete kit for '**Modular Sub-pantry system**' for this High-speed rail project shall be as per Clause 8.4.

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## 9.2. Design & Development activity

- a. The Sub-contractor shall provide the Interior concept models in Catia 3D model.
- b. The Sub-contractor shall be responsible for following activities:
  - i. The complete Modular Sub-pantry system will be designed by Sub-contractor. The design includes 3D model and 2D drawings.
  - ii. The Sub-contractor shall develop full 3D model and 2D drawings of all aggregates including mounting details, interface with Carbody, electrical works etc.
  - iii. Rendering and walk-through model shall be developed during design stage and shall be submitted to BEML.
  - iv. Sub-contractor shall submit 3D model and 2D drawings to BEML/Nominated agency for approval before taking up for manufacture.
  - v. The quantity of the Modular Sub-pantry system, equipments, accessories and miscellaneous items shall be arrived as per the layout drawings provided along with this PTS.
  - vi. Develop required tooling for manufacturing of Modular Sub-pantry system, equipments and Accessories
  - vii. Shall carryout Type tests at any NABL approved laboratory and routine tests and submit the reports.
  - viii. Manufacture and supply all Modular Sub-pantry system.
  - ix. Installation of Modular Sub-pantry system with connections on the car at BEML Ltd.

## 9.3. Commissioning & DNP Spares

- a. The Sub-contractor shall supply commissioning and DNP spares (Defects Notification Period) & Sub-contractor shall submit to BEML/Nominated agency for review a list of minimum spare parts that are intended to make available during the installation, erection, commissioning and defect notification periods. The list shall be submitted along with technical offer, Modular Sub-pantry system wise.
- b. The Sub-contractor shall keep on site, at their own cost, throughout the installation, erection, commissioning and defect notification periods, stocks of spare parts, as per the list to enable rapid replacement of any item found to be defective or in any way in non-conformance with the specification.



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- c. Spares as per the agreed list shall be supplied prior to receipt of first Modular Sub-pantry system.
- d. The Sub-contractor should provide Technical/service support during commissioning and post commissioning period, till completion of the Defect notification period by them or from their local partner in India.

#### 9.4. Packing


- a. The Modular Sub-pantry system and its equipments shall be properly packed and due care shall be taken to ensure that no damage occurs during transit. Damages, if any, shall be replaced free of cost by the Sub-contractor.
- b. All packing materials shall comply to environmental Standards of ISO 14001.

#### 9.5. Obsolescence


In case of obsolescence, the Sub-contractor shall intimate same well in advance, suitable alternative solutions shall be implemented and full support shall be provided by the Sub-contractor so as to ensure that train performance is not affected adversely.

#### 9.6. Submission of Documents

- a) The Sub-contractor shall submit, all necessary documents viz., Design calculations and Design drawings, but not limit, to the following.
  - i) General Assembly drawings with Bill of materials and detail Component drawings of Modular Sub-pantry system and its equipments.
  - ii) 3D model of Modular Sub-pantry system and its equipments in Catia and neutral format (preferred STEP).
  - iii) Rendering and walk-through model
  - iv) The 3D model and 2D drawings of Modular Sub-pantry system and its equipments, assemblies, sub-assemblies and part level components.
  - v) Technical Description document of Modular Sub-pantry system and its equipments consisting detailed description of parts used in the Modular Sub-pantry system.
  - vi) Type test procedure document covering all the physical, mechanical & fire safety type tests.
  - vii) Type test and Routine test procedure & test report.

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- viii) Fire safety test reports on the Modular Sub-pantry system and equipments produced for this project
- ix) Raw Material test certificates and technical data sheets
- x) Dimensional check sheets for each of Modular Sub-pantry system and equipments.
- xi) Operation and Maintenance Manuals (O&M Manual)
  - 1. Operation & Maintenance manual with trouble shooting guides. The Sub-contractor shall provide operation and maintenance manuals, for use by supervisory, operating and technical staff of the employer (BEML/NHRSCCL), in English, in accordance with good industry practice.
  - 2. The manual shall be subject to review by the design verification agency/Nominated Agency.
  - 3. The Sub-contractor shall provide operation manuals explaining the purpose and operation of the complete system together with its component subsidiary systems and individual item of equipment. The characteristics, ratings and any necessary operating limits of the equipment and Sub-systems shall be provided.
  - 4. The Sub-contractor shall provide comprehensive instructions for conducting preventive maintenance, corrective maintenance, overhauling of the subsystem including the requisite frequency of maintenance, duration of maintenance, requisite manpower and material (spares, consumables, special tools, jigs, fixtures and diagnostic equipment). It shall have details of all the various systems and Sub-systems from a maintenance and fault-finding standpoint, with particulars of operating parameters, tools for dismantling and testing, methods of assembly and disassembly, tolerances, repair techniques and all other information necessary to set up a repair and servicing programme.
  - 5. The maintenance manual shall also include Maintenance Work Instructions (MWIs) of all major systems and Sub-systems in detail for troubleshooting, maintenance, repairing, overhauling, testing and acceptance parameters. The MWIs shall include details of the required materials and consumables, general tools, special tools and facilities.

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6. Maintenance manuals /instructions shall be supplied in the form of A4 size book, giving explored views of assemblies, 3D snap shots, part numbers, spare parts catalogue, 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 of each manual shall be supplied. This is prerequisite for claiming 100% payment.

7. **Spare part Catalogue**: The Sub-contractor shall submit 5 copies of spare parts catalogue for all the items under their scope of supply. The spare parts catalogue shall be standard, well organized and complete, with part numbers and drawing references. Photos shall be incorporated for easy identification of the process. Spare parts catalogue shall be submitted both in hard and soft copies in a presentable manner


- xii) List of training documents for the maintenance operators
- xiii) RAMS & LCC
- xiv) Test reports and Certifications
- xv) All drawings, calculations and design documents shall be submitted in English language.

## 9.7. Mockup

- a) The sub-contractor shall supply complete kit of 'Modular Sub-pantry system' for mockup, and shall take approval from BEML/Nominated agency before bulk supplies.
- b) The sub-contractor shall carry out support and guide for installation of 'Modular Sub-pantry system' into the mock-up car. All the items including mechanical and electricals required for proper mounting and functioning of 'Modular Sub-pantry system' are in the scope of the sub-contractor.

## 9.8. Training

- a) The Sub-contractor shall provide comprehensive training to BEML/Nominated agency staff (maintenance, operating, training instructor and engineering). The aim of training is to enable the BEML/Nominated agency personnel to effectively carry all aspects of the operation (normal, failure, recovery and emergency), maintenance and training

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requirements for item under the scope of work.

- b) Trainsets will be commissioned at NHRSCCL maintenance depot. Sub-contractor shall depute personnel to impart training to operation and maintenance staff of the various maintenance depots. Firm shall impart training regarding all sub systems within their scope of work. A minimum of days for Training shall be provided in maintenance depot.
- c) Sub-contractor shall provide colour hardcopy training materials well in advance before training,

## 10. Quality Assurance Program

### 10.1. General

The subcontractor shall hold ISO 9001/ IRIS certification and shall manufacture the product accordingly. The subcontractor shall submit a copy of ISO 9001 / IRIS certification along with the offer. The subcontractor shall monitor and control the Quality systems as per ISO 9001/IRIS guidelines. BEML and/or NHRSCCL's representative may periodically conduct compliance audits of the Subcontractor's Quality management system.


### 10.2. Quality assurance plan

The subcontractor shall develop and submit a Quality assurance plan (QAP) to BEML for review and approval based on ISO 9001 / IRIS guidelines.

## 11. Type Test & Routine Tests

### 11.1. General

- a) The Modular Sub-pantry system and its equipments proposed, shall meet the test and Inspection requirements of international railway standards applicable for high-speed rail. All test reports shall be the part of deliverables.
- b) All the 'Modular Sub-pantry system and equipments' assemblies shall be type and routine tested in accordance with relevant standards and specifications.
- c) All such tests shall be carried out at the Sub-contractor's cost, wherever performed, in the presence of and to the satisfaction of BEML/Nominated agency, who reserves the

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right to witness any or all of the tests and to require submission of any or all test specifications and reports.

- d) BEML/Nominated agency reserve the right to reasonably call for additional tests, if necessary.
- e) The type test procedure document shall be prepared by the Sub-contractor and BEML/design verification/Nominated agency approval shall be obtained before conducting the tests.
- f) The routine test reports shall be submitted along with every batch of supplies.
- g) Sub-contractor shall be responsible to get the testing done by the inspecting engineer/authority and submit the copy of test certificate duly signed by the inspecting authority for acceptance of equipment.
- h) Tests which require NABL/BIS/MOEF certificate, Sub-contractor shall conduct such tests in BIS/NABL/MOEF approved laboratory at subcontractor's cost. All test reports shall be submitted to BEML/Nominate Agency for approval. It is the responsibility of the Sub-contractor to get the approval for all test reports from BEML/Nominate Agency before going for production. Sub-contractor shall carryout the any additional test suggested by BEML/Nominate Agency without any additional cost.
- i) Sub-contractor shall get the clearance from BEML/Nominate Agency for all the type tests and routine tests before going for mass production.

## 11.2. Type Test & Routine Tests for Bottle cooler cum deep freezer

### 11.2.1. Test for cooling compartment and bottle cooler

SL No	Tests	Type test	Routine test	Cl. of IS:2167-83
a	Thermal insulation test	YES	NO	5.7.1
b	High voltage test	YES	YES	5.7.3
c	Insulation resistance test	YES	YES	5.7.2
d	No load performance test	YES	YES	5.7.4
e	Percentage running time test	YES	NO	5.7.5
f	Capacity rating test	YES	NO	5.7.6

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g	Maximum operating conditions	YES	NO	5.7.7
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### 11.2.2. Test for Deep Freezer


SL No	Tests	Type test	Routine test	Cl. of IS:7872-75
a	Door seal test	YES	YES	6.2.1
b	Test for mech. Strength of shelf & similar comp	YES	NO	6.2.2
c	Thermal insulation test	YES	NO	6.2.3
d	Pressure test	NO	YES	6.3.4
e	High voltage test	YES	YES	6.2.5
f	Insulation resistance test	YES	YES	6.2.6
g	Performance test	YES	NO	6.2.7
h	Production load test	YES	NO	6.2.8
i	Thermostat test	YES	YES	6.3.1

### 11.2.3. Test for combined Refrigerating Unit

SL No	Tests	Type test	Routine test	Cl. of IS: IEC-571
a	Endurance test	YES	NO	20
b	Earth fault test	YES	NO	Checking of protective device (ELCB) by simulating actual earth fault during testing.

### 11.3. Type Test & Routine Tests for Water Boiler

SL No	Tests	Type test	Routine test	IS:3412
a	protection against electric shock	YES	YES	8 of IS 302-2-204
b	Input & current	YES	NO	10 of IS 302-2-204
c	Insulation resistance	YES	NO	13 of IS 302-2-204
d	Provision for earthing	YES	YES	27 of IS 302-2-204
e	High voltage	YES	YES	13.2.2 of IS 302-1
f	Earth fault test	YES	NO	Checking of protective device (ELCB) by simulating actual earth fault during testing.

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#### 11.4. Type Test & Routine Tests for Hot Case

SL No	Tests	Type test	Routine test	Cl. of IS:302-1979
a	Visual inspection / dimensional/ Constructional check	YES	YES	22
b	High voltage test	YES	NO	13.3
c	Insulation resistance test	YES	YES	16
d	Clearance and creepage distance test	YES	YES	29
e	Operational/performance test	YES	NO	12
f	Uniformity of temperature	YES	NO	Clause 8.1.4 of PTS
g	Check of protective devices	YES	YES	24.1, App-G
h	Earth fault test	YES	NO	Checking of protective device (ELCB) by simulating actual earth fault during testing.

#### 11.5. Type Test & Routine Tests for Garbage Compactor

Following test shall be carried out at BIS/NABL/MOEF approved laboratory, which is authorized to conduct these tests and to issue tests certificates:

SL No	Standard/ Specification	Description
1	IEC 60571	Electronic Equipment used on rail vehicles.
2	IEC 61373	Shock and vibration test.
3	IEC 61000	EMI/EMC Compatibility test.
4	IEC 60529	Degree of Protection provided by enclosures (IP code).
5	IEC 60068	Environment Testing.
6	EN 45545	Fire Safety in rolling stock.
7	ELRS/SPEC/ELC/001 9/Rev.03*	Thin-walled flexible elastomeric cables with copper conductor for working voltages up to 750V and above 750 V up to 1.8/3.0 kV.
8	Life Cycle Test	Satisfactory and trouble-free operation of the system for minimum 10 Lakhs cycles.


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## 12. First Article Inspection (FAI)

### 12.1. General

- a) The Sub-contractor shall offer all the 'Modular Sub-pantry system' for First Article Inspection by BEML/Nominated agency in accordance with the BEML/Nominated agency approved FAI plan prior to serial production in order to confirm that the item produced fully complies with the technical specifications, System design and manufacturing process.
- b) The Sub-contractor shall ensure that the produced Modular Sub-pantry system and its equipments are compliant to all requirements prior to inviting for testing and FAI. The pre-test result prior to official testing/FAI shall be submitted with the invitation letter to request BEML/ Nominated agency witness.
- c) At the FAI, the Sub-contractor shall make available all pertinent design and manufacturing process documentation, test records, material certifications, etc.
- d) During FAI, if any inspections or tests indicate that specific hardware or documentation does not meet the specified requirements, the appropriate items shall be repaired, replaced, upgraded or added by the Sub-contractor at their own cost, as necessary to correct the noted deficiencies. After correction of deficiency, all tests necessary to verify the effectiveness of the corrective action shall be repeated.
- e) If FAI has to be repeated due to non-compliances/ deficiencies noticed, the cost towards the same and the cost towards BEML/Nominated agency visit to Sub-contractor's place for witness of re-FAI shall be to Sub-contractor's responsibility.
- f) Upon acceptance of the FAI by BEML/Nominated agency, the Sub-contractor can proceed to manufacture all pertinent hardware. The hardware must meet or exceed the quality standards set at the FAI, and must incorporate any comments made by BEML/Nominated agency at the FAI.
- g) Sub-contractor shall note that BEML/Nominated agency FAI clearance will not relieve the Sub-contractor's responsibility towards design, development, testing, manufacture and supply during the revenue service.
- h) At any point of time, during the execution of the contract, if BEML/Nominated agency has any concerns about the quality of the product supplied, BEML/ Nominated agency reserves the right to randomly draw samples from any of the supply lots and the sub-contractor shall carryout the type tests at accredited outside labs and shall submit the



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reports.

## 12.2. Installation and Commissioning

- a) After Modular Sub-pantry system are delivered, the Sub-contractor shall depute his Engineer for the installation and commissioning of the Modular Sub-pantry system and its equipments assembly on the first proto-Trainset.
- b) Modifications/ corrections, if any, shall be carried out by the Sub-contractor at his own cost.

## 12.3. Vehicle Level type test on Completed car/ Train set

- a) BEML will undertake commissioning of trains on mainline to adequately demonstrate that the requirements of this PTS have been satisfied.
- b) The Sub-contractor's design engineer shall also participate in this testing to ensure that the Modular Sub-pantry system meet the performance requirements specified in the contract. Modifications, if any, required to the Modular Sub-pantry system assembly, to meet the train level contract requirements, shall be carried out by the Sub-contractor, at his own cost.


## 12.4. Warranty

Please refer to GT & C.

## 13. Design Submission and Deliverables

### 13.1. General

- 13.1.1. The objective of the design submission process is to ensure that the proposed resulting works comply with the specifications, are capable of being produced consistently to exacting quality standards, achieve low life cycle costs and can be operated safely to the satisfaction of the Engineer.
- 13.1.2. The Sub-contractor shall submit all necessary documents viz., documents and drawings describing function description, product description, design calculations, interface requirement description, Type test, routine test and acceptance test

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specifications, list and details of spares, related calculations etc.

- 13.1.3. These drawings and documents shall be delivered in English with the data format of, respectively, latest AutoCAD (2015) release. (Document - MS Word, spread sheet - MS excel, data base files - MS Access, Presentation file - MS Power Point).
- 13.1.4. For regular exchange of data, Catia V5/Solid works for CAD platform shall be used.
- 13.1.5. The Sub-contractor shall provide 3D model of mini pantry system, arrangement and its equipment & 2D drawings to BEML for preparing engineering mock-up.
- 13.1.6. In the event that a statutory body (ISA) requires design information in a particular format, it shall be incumbent upon the Sub-contractor to provide the same, as directed by BEML/Nominated Agency.
- 13.1.7. Confidentiality – The design, documentation, reports and drawings created by the Sub-contractor as per the scope of work shall be submitted to BEML/Nominated Agency and shall be intellectual property of BEML/ Nominated Agency 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 without the written permission from BEML/ Nominated Agency.


## 13.2. Design Deliverables

- 13.2.1. The Sub-contractor shall make all communications by writing a physical/formal letter to project manager of BEML with seal and signature of the competent authority. All email communications shall be for reference only. All data transfer shall happen through FTP. Creation of FTP facility for transferring the files is responsibility of the subcontractor. All oral communications shall be only to get clarity.
- 13.2.2. All the documents Shall be provided in English only.
- 13.2.3. The following design documents/drawings shall be delivered as a minimum to BEML/Nominate Agency according to the time schedule defined by BEML/Nominated Agency.

Stage	Document/Deliverable	Submission and approval
Tender offer	Supporting documents for Qualification criteria as per Chapter. 4 of this PTS.	Along with tender

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	Vendor documents including ISO 9001/ IRIS certification, Satisfactory revenue service performance certificates, QAP, ITP, company profile with infrastructure facilities, product range etc., as per Chapter. 4 of this PTS	technical offer
	General Technical Description of proposed Modular Sub-pantry system and its equipments and concept drawings.	
	General arrangement drawings of Modular Sub-pantry system	
	Estimated weights of Modular Sub-pantry system along with each equipment (refer Cl. 8.7)	
	Tender & PTS clause by Clause compliance	
Design Review Stage	Technical description of proposed Modular Sub-pantry system and its equipments. Complete technical specification details of each equipment and its functionality.	Within 2 months of LOI/ contract award, submission and further updates including BEML/ Nominated agency approval
	'Modular Sub-pantry system and its equipments' design drawings (Dimensional Installation Drawings: Autocad or CATIA file)	
	3D model of Modular Sub-pantry system and equipments in CATIA file	
	Material specification of all components	
	Weight details	
	Interfacing with carbody and other subsystems	
	List of standards and codes	
	Quality Assurance Plan	
	Bill of Materials (BOM) of complete Modular Sub-pantry system and its equipments	
	Type test plan for Modular Sub-pantry system and its equipments	
	Rendering and walk-through model	
Detail	Final Design Drawings of complete Modular Sub-pantry	

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Design Review stage	system and equipments in Autocad or CATIA file	Within 4 months of LOI/ contract award, submission and further updates including BEML/ Nominated agency approval.
	Final 3D model of Modular Sub-pantry system and equipments in CATIA file.	
	Type Test, Routine test procedure (incl. record sheet) & test Reports if applicable	
	FAI Procedure & Report	
	Operation and maintenance manuals & Electronic manual	
	Detailed Training proposal	
	All As-Built Drawings (Final drawings) of each part of Modular Sub-pantry system and equipments in Autocad, CATIA.	
	Rendering and walk-through model	
Note: Over and above-mentioned documents, Sub-contractor shall submit any additional documents required by BEML/Nominated Agency.		

### 13.3. Engineering Support

The Sub-contractor shall provide technical assistance by attending the design review meeting with BEML/Design Consultancy/Nominated Agency, until design is approved by BEML/Nominated Agency.


## 14. Submittals with Technical Offer

14.1. The Sub-contractor shall provide as a minimum, the following along with the technical offer:

14.1.1. CBC (clause-by-clause) for PTS

**Note: The sub-contractor shall clearly mention COMPLIED/NOT COMPLIED as applicable against each clause. Offers with Non-compliance and deviations of the clauses of PTS are liable for rejection. Noted is treated as compliance and response to any clause not provided will be considered as non-compliant.**

14.1.2. Complete Technical Offer for 'Modular Sub-pantry system and its equipments' including technical description.

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- 14.1.3. Technical Data Sheet (TDS) & Material Safety Data Sheet of GFRP/, Aluminium resin, nut-insert, rubber and adhesive used to bond nut insert etc.,
- 14.1.4. Type Test reports (Mechanical & Fire performance) of similar earlier projects.
- 14.1.5. Supporting documents for Qualification Criteria compliance (PTS Clause 4).
- 14.1.6. OEM Drawing with Bill of Material for the proposed 'Modular Sub-pantry system and its equipments' assemblies.
- 14.1.7. List of commissioning & DNP spares of this PTS.
- 14.1.8. Weight details of proposed 'Modular Sub-pantry system and its equipments' and part wise weights.
- 14.1.9. Documents like ISO 9001/ IRIS certification, Satisfactory revenue service performance certificates, QAP, ITP, Company profile with infrastructure facilities, product range etc.

-----\*\*\*End of the Document\*\*\*-----