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आपको सूचित किया जाता है विनिर्देश दस्तावेज़ आधिकारिक तौर पर जारी कर दिया गया है। कृपया जानकारी और अन्य आवश्यक कार्रवाई के लिए निम्नलिखित विशिष्टताओं की संलग्न प्रति प्राप्त करें

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1.	SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES	MDTS -26406 Rev :00

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**SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES****DOCUMENT CONTROL:**

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## SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES

### 1. Preamble:

#### General

This specification covers the general & technical requirements for Procurement and testing of Seats & Berths, Partition and Chair Pillar for Amrit Bharat LWSCN coaches

#### Fire Protection

The fire protection on Seats & Berths, Partitions and Chair Pillars shall be designed and constructed in accordance with EN 45545. The applicable Hazard level will be HL3 for Trains with sleeper Cars. The supplier shall furnish the relevant data, fire load calculations, test reports, certifications etc. of the items considered in fire load calculations separately for the scope of supply.

### 2. Service Conditions:

The mechanical strength of the seat has to meet the requirements of UIC 566. According to this, the design and fastening of the seat is to be made such that the mounted seat can withstand specified static loads. The equipment shall be sturdy and suitable for the following service conditions normally to be met in service.

#### Ambient Environmental conditions:

**Table- 1**

Relative humidity	Up to 100% during rainy season
Altitude	Max. 1200 mtrs. above sea level
Ambient temperature	-50 <sup>0</sup> C to 55 <sup>0</sup> C

#### Working conditions:

**Table- 2**

Maximum operational speed during service	160 Kmph
Maximum operational speed during testing	180 kmph
Vibration and shocks:	
Max. Acceleration (vertical)	3.0 g
Max. Acceleration (Lateral)	2.0 g
Max. Acceleration (Longitudinal)	5.0 g
Frequency and Amplitude:	
Sinusoidal form of vibration, the frequency (f) lies between 1 HZ and 50 HZ and their amplitude (a), expressed in mm, is given as function f by the equation: a = 25/f for the values of ( f between 1 HZ and 1 HZ ) a = 250 f <sup>2</sup> for the values of ( f between 1 HZ and 1 HZ )	

**SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES****Dynamic effects:**

Berths, Seats, Partitions and Chair Pillars shall be designed to withstand the dynamic conditions of the running train.

- (a) Tolerance of Vehicle dimensions
- (b) Surging and lurch (including the effect of wheel and undergear wear)
- (c) Tilting due to cant
- (d) Vehicle roll
- (e) Vehicle bounce
- (f) Pantograph profile, dynamic effect like oscillation & sway of pantograph and electrical clearance
- (g) Any other change having implication of additional movement of Rolling Stock
- (h) Deviation due to wind loading
- (i) Unequal loading of Vehicles.

**3. Standards:**

The design, testing and manufacturing of the Seats & Berths, Partitions and Chair Pillars shall conform to the latest editions of internationally recognized Standards viz., Indian, American, European, Japanese, ISO, etc.

**Design of Seats and Berths:**

- (i) Seats & Berths shall be provided as per layout drawing. It is the responsibility of the supplier to study the human ergonomics and propose the design of Seats & Berths to ensure maximum seating / sleeping comfort based on Indian Anthropometry data. Design of Seats & Berths shall conform to UIC 566 or equivalent standard. Seats and Berths shall be ergonomically designed to accommodate range users covering 95 percentile of Indian adult male / female population.
- (ii) The supplier shall propose the design, meeting the overall dimensions as per the concept design.
- (iii) Berths should be of international standard in line with the berths being provided in European high-speed trains. Design of Berths shall be stylish and aesthetically pleasing with superior touch and feel. The aesthetics of the berths shall blend with the interior panels.
- (iv) The design of Seats and Berths shall be safe under all conditions of passenger impact, during emergency braking and buffing under fully loaded condition. It shall not develop cracks or get damaged when the vehicle is running at the designed speed of 160 kmph.
- (v) All Seats and Berths surfaces must be finished with good blending and good slow ageing properties to provide a pleasant, high-quality finish and for ease of cleaning and maintenance. No material shall degrade or stain when exposed to food, drink, graffiti, or any cleaners used by the Maintenance Personnel. No material shall produce any odour that would be noticeable or irritating to passengers

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- (vi) Mounting frame structure of Berths, Seats and back rest shall be Aluminium and should be sturdy. Proven mounting techniques to be carried out for berth mounting onto pillar structure brackets / partitions to prevent sagging of berths. Frame shall be powder coated or painted to suit the colour scheme of coach. Fasteners shall be of stainless steel only. All fasteners and metal parts shall be suitably concealed or aesthetically flushed. All bearing points shall be provided with bushes made out of good nylon having self-lubricating quality. Seats and Berths shall have no sharp edges or corners anywhere. No rattle or vibration shall be emitted by Seats and Berths or any component of Seats and Berths.
- (vii) Concept of mounting berths and seats on the floor, sidewall, backwall / partitions shall be identical for all the berths to ensure interchangeability. Mounting holes should be drilled with help of Template / Jig to ensure consistency of manufacture.
- (viii) Seats and Berths cushion material should be Moulded PU foam cushion conforming to RDSO standards / any internationally accepted standards meeting FST (Fire smoke and Toxicity) properties to EN45545 HL3 R21 and the integrated frame should be manufactured with Aluminium and base frame / sheet shall be Aluminium sandwich panels / suitable light weight material.
- (ix) Seats and Berths should be modular in design having upholstery material selection as per internationally accepted standard and FST properties conforming to EN45545 HL3 R21 fire standards. During maintenance, only Berth's cushion with upholstery normally required to be replaced on unit exchange basis while matching with colour shade of upholstery.
- (x) A fire barrier cloth of suitable light weight material of internationally accepted standards, if required, may be used between PU foam cushion and Upholstery to meet EN45545 HL3 fire standard.
- (xi) Berth and fold down back rest cum bed (middle berth) shall be connected to upper berth frame by a suitable belt suiting the colour of the berths. Belt shall be of retrieving type which can be pulled out when required. Belt assembly shall be concealed within the berth envelope as per the concept design. Any alternate design and mounting mechanism can be recommended and used by the firm on approval by RCF.
- (xii) Upholstery stitching should be automatic / machine stitching in such a manner, that no folds are visible at the corners. Hand stitching not allowed. Overall look of seats and berths should match to interior décor and it should be aesthetically pleasing.
- (xiii) Suitable traceability provision having name of manufacturer and the date of manufacture, batch number etc. shall be provided on each Berths and other related components for traceability at suitable location which should not be easily visible to the passengers.
- (xiv) Longitudinal and Transverse Upper Berths shall have integrated provision of stopper (Safety Rails), made of Stainless-steel material or FRP panels running through the edge of Upper berths within the berth envelope to restrict the longitudinal movement of passengers during acceleration and braking. Safety rails / FRP walls shall be sturdy enough to withstand high strength of passengers while climbing up and down from upper berth.

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- (xv) Fold down back rest cum bed of seats and berths shall be easily detachable. Fold down back rest cum bed shall have mounting and catch arrangement of appropriate design for holding back rest.

**Design of Partitions:**

- (i) The dimensions of partition frames shall confirm to coach layout & its boundary condition. The reference drawing for Partition frames is LS10011.
- (ii) Both end partition frames shall be made from square tubes of size 20x20 using material RDSO/SPEC.CK201, Gr.X2CrNi12 or better. Panelling of these end partitions shall be done with 3mm AL FR HPL sheet as per MDTs 26337.
- (iii) All other partitions required for Berth fixing and compartmentalization shall be made of 20 mm thick aluminium honeycomb sandwich panels encased in Aluminium extrusions as per technical specification no. MDTs-097 rev.01 which consist of AL FR HPL sheet as per MDTs 26337 on both sides, Aluminium honeycomb core and fire-retardant adhesive.
- (iv) Necessary arrangements / provisions shall be provided in partitions for mounting Berths and passenger amenities. Back plates shall be provided in partitions wherever required as per the concept design. All the necessary arrangements to be provided on end partition frames for CCTV, Papis and VESDA as per layout. Supplier shall also submit FEA analysis report for mounting berths on partition frames. Load testing shall be as per UIC 566 standards or equivalent.
- (v) To manufacture the Aluminium honeycomb sandwich panels, the process adopted shall be a proven technology and the supplier should have manufactured and supplied panels adopting this technology to similar semi- high speed train projects. The Supplier shall furnish the details of the proposed technology / process to be adopted for Amrit Bharat Sleeper train project along with details of such supplies to similar semi-high speed train projects, along with the technical offer.
- (vi) Partitions will be fixed to pillar structure, floor and sidewalls as per the final concept design. Design and construction of Partitions shall be aesthetically pleasant and shall be in line with European high-speed trains. Both transverse and longitudinal partitions shall be provided up to ceiling height for all coaches.
- (vii) All Partition walls to be painted or decals to be used for surface finish and texture as per the concept design.
- (viii) Surface of partitions shall be free from undulation, warpage, twist, cracks, bow, dents, scratches and any other defects that would impair usability of the partitions.
- (ix) Fabrication of partitions shall be carried out using dedicated Jigs and fixtures.
- (x) Corner Edges and joints shall be covered.
- (xi) Aluminium sandwich panels shall not get delaminated for the entire design life.
- (xii) The gap between the extrusion joints at the corners shall be less than 0.5mm

**Design of Pillar structure:**

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- (i) All Berths and partitions (Transverse and Longitudinal) shall be mounted to pillar structure as per the concept design and hence shall be designed to withstand the dynamic loads.
- (ii) Design and construction of pillar structures shall be aesthetically pleasant with material SS-304 and shall be in line with European high-speed trains.
- (iii) Both transverse and longitudinal pillar structures shall be provided up to ceiling height for all coaches.
- (iv) Pillar structure shall be bolt mounted to Floor and ceiling as per the above referred drg. No. LS10011. Brackets will be provided by RCF for mounting of pillar structure in the floor and ceiling. Supplier to provide details of mounting and accordingly brackets will be provided by RCF.

**Design of Handholds and Ladder Assembly:**

Handholds / Grab rails and Ladder shall be of Stainless-steel material and sturdy construction as per the concept design. The design of Handholds and Ladder shall enhance the interior aesthetic appeal and comfortable use by passengers. The design of any joints in the handholds and ladder shall resist the effect of vibration or of passenger moving or twisting them. The handholds and ladders shall suffer no permanent deformation when subject to loading conditions arising in service, in accordance with UIC 566. Ladder shall be provided in all coaches for stepping on Upper / Middle berth. The design of Handholds and Ladder shall be injury free.

**Passenger Amenities:**

- (i) All passenger amenities shall be designed as per the concept design.
- (ii) All the passenger amenities mounted in Partition Walls / Chair Pillars / Seats / Berths as per the concept design will be in scope of the supplier.
- (iii) Supplier shall provide following passenger amenities as a minimum for each berth.
  - a. Bottle Holder (Min. 1 litre, 270 mm large & 85 mm diameter)
  - b. Mobile holder,
  - c. Coat Hook
  - d. Mirror
  - e. Snack Table
- (iv) Drawings of all such items shall be taken prior approval by the manufacturer before bulk supply. Mobile Holder of sturdy construction and suitable size to be provided.
- (v) Water Bottle holder of minimum 1 litre capacity to be provided. Bottle holder shall be compact and shall not project outside partition wall when not in use.
- (vi) Snack Table should have the load bearing capacity of minimum 75 Kgs.

**Design Interface:**

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At design stage, RCF 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 Berths, Seats, Partitions and Chair Pillars shall be defined by the Supplier and approved by RCF in order to avoid any mechanical interference with other equipment for the vehicle. The Supplier shall be responsible for mounting methods and providing all requisite materials for mounting of Berths, Seats, Partitions and Chair Pillars on the car body.

Any changes of the components comprising of Berths, Seats, Partitions and Chair Pillars shall be defined by the Supplier and approved by RCF in order to avoid the mechanical interference with other equipment for the vehicle.

In order to implement interface requirements, the Supplier shall provide the information required by RCF and shall provide the interface data voluntarily for ensuring the performance of Berths, Seats, Partitions and Chair Pillars which need to be used for the mechanical and functional interface. The Supplier 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.

Even if technical information or drawings are approved by RCF, the Supplier shall have responsibility to change/ solve/ modify design failure of production, quality problems and safety issues on its own cost.

The Supplier shall keep in mind that any Berths, Seats, Partitions and Chair Pillars initially proposed by him should be customized to meet a situation of this project or the need of RCF. So, the Supplier shall implement it to Berths, Seats, Partitions and Chair Pillars without any additional cost. Supplier shall solve all issues for proper operation of Berths, Seats, Partitions and Chair Pillars at Supplier's own cost.

Alternate design for Seats, Berths, Partitions and Chair Pillars fixing arrangement can be recommended by the firm. However, RCF will be the final authority to approve the design.

**Design Life:**

Amrit Bharat sleeper trains running on Indian railways are designed for a service life of 35 years and hence berths, seats, partitions and chair pillars to be designed and developed accordingly. Berths, Seats, Partitions and Chair Pillars shall be designed so as to minimize the risks posed by obsolescence. Throughout the design life of 35 years, the materials of Berths, Seats, Partitions and Chair Pillars and its accessories shall not degrade or be etched by the environmental conditions that exist in India, to the extent that the original appearance of the saloon does not deteriorate to the extent that it cannot be restored by normal cleaning. Supplier shall decide cleaning process and cleaning agent accordingly.

**Environmental Protection:**

The materials likely to cause environmental damage during the manufacture, maintenance, operation and disposal of Train shall be avoided. The material listed in this Clause are a minimum list of restricted material and the supplier shall provide adequate evidence to the Government that all materials used shall not cause environmental damage. The material viz. asbestos; chlorofluorocarbons; polychlorinated biphenyls (PCBs); Exposed lead and paints containing lead; chromates; cadmium, except in nickel cadmium batteries; and cyanide shall

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not be used. Use & disposal of all material should be governed by norms set by Government of India (Pollution Control Board).

**Appearance and Finish:**

Berth's base plate & frame, Partitions and Chair Pillar structure shall be paint finish or decal finish. The paint / decal system as per the concept shall be compliant to EN 45545 HL3 with respect to Fire standards. The paint / decals coating shall be tested in accordance with relevant latest international standards. In case of decals, tests shall also include peel adhesion and tensile lap-shear strength tests as per applicable ISO standards. Anti-graffiti clear coating shall be provided on exterior finished surface of passenger Cars.

The surface finish of the Berths, Seats, Partitions and Chair Pillars visible to Passengers shall present a high-quality finish that delivers a smooth and continuous surface free from protuberances, sharp edges, weld spatter or manufacturing marks; a ripple-free appearance when painted or covered in high gloss materials; panel joints on the interior that are not visually misaligned to an observer with normal eyesight standing 1m from the joint and no undulations on any interior surfaces.

Texture pattern design to be implemented in Seats, Berths and Partitions, etc. shall be as per the concept approved by RCF.

**4. Technical Requirements:****General**

The Supplier shall meet the Seats & Berths, Partitions and Chair Pillars requirements for the design, development, manufacture, supply, testing, delivery, commissioning and integrated testing, including the training of operation and maintenance staff of the RCF.

The Supplier shall support in all aspects in obtaining customer clearance of the proto type Berths, Seats, Partitions and Chair Pillars after successful completion of tests. The Supplier shall carry out any modification / alteration based on results of the tests on the prototype if required. The Supplier shall carry out necessary modifications at no additional charge on all trains and shall support in delivering the prototype train.

**Proven Design**

The proposed type of Seats & Berths, Partitions and Chair Pillars should have been proven design i.e. the design of equipment components etc., shall be based on sound, proven and reliable engineering practices. The proposed type of Seats & Berths, Partitions and Chair Pillars shall have proven credentials in train sets of 160 kmph & above operational speed in at least one project. The Supplier may conduct such tests and trials as may be necessary to establish the reliability and efficiency of such technology and designs in accordance with the good industry practice.

The Supplier shall manufacture and supply the Seats & Berths, Partitions and Chair Pillars only from such manufacturing units that have supplied the Seats & Berths, Partitions and Chair Pillars that fulfil the proven design requirements as above.

The supplier shall be fully responsible, for the suitability, adequacy, integrity, durability and practicality of the proposed Seats & Berths, Partitions and Chair Pillars. The supplier shall

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warrant that the supplier's proposals meet the requirements and is fit for the purpose thereof. Where there is any inadequacy, insufficiency, impracticality or unsuitability in or of the specification requirements or any part thereof, the supplier's proposal shall take into account, address or rectify such inadequacy, insufficiency, impracticality or unsuitability at supplier's own cost.

The supplier shall warrant that the works have been or will be designed, manufactured, installed and otherwise constructed and to the highest standards available using proven up-to-date good practice.

**Technical information of Berths and Seats**

- a) Supplier shall submit details of processes and raw materials proposed to be used in manufacturing of Seats and Berths for approval during design stage.
- b) Integrated frame design of Seats and Berths should be modular, aesthetically pleasing, injury free, matching to interior décor and made of Aluminium material. Berth shall be provided with Aluminium honey comb base plate. Berths shall have no sharp edges or corners anywhere.
- c) Cushioning material shall be Polyurethane (PU Foam) confirming to internationally accepted standards / RDSO specification no. RDSO/2007/CG-04(Rev-01), meeting FST properties to EN45545 HL3. PU Foam should be smooth and uniform without any cracks or joints. Cushioning cover to be integrally covered with Upholstery duly stitched. Any Internationally accepted standard with better physical properties of PU foam for better human comfort shall be recommended by the Supplier with due approval.
- d) Fire barrier cloth between foam and upholstery shall be provided as a fire preventive measure confirming to EN45545 HL3 R21 as per specification no. MMDTS-19021. Any Internationally accepted standard with better physical properties for fire barrier cloth shall be recommended by the Supplier with due approval.
- e) Upholstery shall be provided confirming to EN45545 HL3 R21 as per RDSO specification no. RDSO/2008/CG-07 (Rev-01). The material shall have uniform surface finish without any bubbles, blisters. Any Internationally accepted standard with better physical properties for upholstery shall be recommended by the Supplier with due approval.

**Technical information of Aluminium Honeycomb partitions****Aluminium Honey comb core**

The Partitions shall be of Aluminium honeycomb sandwich panel of not less than 20 mm total thickness with Aluminium skin of not less than 1.0 mm thick on either side.

Aluminium honeycomb sandwich panel shall be produced by means of the process which bonds aluminium sheet and aluminium honeycomb core with Adhesive.

The foils of the aluminium honeycomb core shall be suitably treated to improve anti-corrosion properties.

The Adhesive used for bonding Aluminium sheet with Aluminium Honeycomb core shall exhibit excellent adhesive strength, high shear stress and shall comply with Fire safety requirements as per EN 45545-2 HL-3 R1.

**Metal Back Plates**

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The metal back plates shall be Stainless-steel material. All metal brackets or back plates shall be strongly bonded to partitions, preferably in molding stage only.

The adhesive used for fixing metal backplates shall be a toughened structural adhesive suitable for bonding between metals. The adhesive shall offer extremely durable bonds in harsh environments with excellent weathering properties.

The Supplier shall submit the technical data sheet metal back plates and adhesive along with the technical offer.

### Mechanical Properties

Test requirement for Aluminium honeycomb partitions shall be as per below table. (**Table- 3**)

PROPERTIES		TEST REQUIREMENT (Minimum Value)	TEST METHODS
Sandwich	DRUM PEEL STRENGTH N.cm/cm	$\geq 65$	ASTM D 1781
	BENDING LOAD (N)	$\geq 4,300$	ASTM C 393
	FLATWISE COMPRESSION STRENGTH (MPa)	$\geq 4.5$	ASTM C 365

### Aluminium Profile

Aluminium profile to be provided for mounting the partitions on the floor as per the concept design.

### Fittings

- (i) All the fittings including hinges, locks, rubber profiles, brackets, sealants, fasteners etc. required to mount the partitions to car body / pillar structure and Berths shall be suitably designed by the firm.
- (ii) The Firm shall submit the technical data sheet of hinges, locks, rubber profiles, brackets, sealants, fasteners along with the offer.
- (iii) Due care shall be taken to avoid bi-metallic corrosion between metal components including fasteners. Proposal shall be submitted during design stage for approval by RCF.
- (iv) Proven standard parts shall be taken from the reputed sub-contractors namely Dirak / Southco / Sugatsune / Cohama. Approval shall be taken before the procurement.

### Rubber components

All the rubber items supplied in conjunction with Seats, Berths, Partitions and Chair Pillars shall be either silicon or EPDM. The Rubbers supplied shall be to the highest quality and shall conform to the fire requirements of EN 45545-2 HL3 R22. The physical and mechanical properties shall generally conform to table below, as minimum:

**Table- 4**

Material Physical Properties	Silicone	EPDM	Test methods
Hardness, Shore "A"	70±5	85±5	ASTM D2240

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Tensile Strength (Min), MPa	6	8	ASTM D412 Type A dumb-bell test
% Elongation (Min),%	200	100	ASTM D412 Type A dumb-bell test
Tensile Set (Max),%	20	15	ASTM D412 Type A (A strain of 50% shall be applied. The straining period shall be 10 min, followed by relaxation for 10 min, prior to measurement)
Compression Set(Max), %	9	14	ASTM D395 (Type A the temperature of the test shall be 70°C for 22 hrs. The recovery time after compression shall be 60 min)
Tear Strength (min),kN/m	20	25	ASTM D624 Type-C
Density, kg/m <sup>3</sup>	1500 Max.		ASTM D1817
Accelerated ageing	Max. Hardness change $\pm 5$ BS		ASTM D573 (Method B 100 $\pm$ 1°C for 3 days)
Outdoor exposure resistance	Shall not show cracks		ASTM D1171
Low temperature resistance	Shall not crack at -40°C		ASTM D2137
Staining test (where applicable)	No staining		ASTM D925
Ozone resistance (50 pphm, 40°C, 20%, 72 hrs)	Shall not show cracks with a rating greater than I		ASTM D 1149 Method B

### Sealants

In the interior of the car, the gaps between pillar mounting and floor cover, pillar mounting and ceiling panel, gap between partitions and car body shall be sealed. Details of sealant application shall be provided during detailed design. All the sealant shall meet EN 45545 HL3 R22 requirement.

The sealant shall be suitable for internal and external use. The life of the sealant shall not be less than 7 years. The supplier shall provide the data sheet of the product along with the details of the projects where the item is in use.

Test report of the product shall be submitted during the design stage.

### Repair procedure

The Supplier shall submit detailed repair procedures for Seats & Berths, Partitions and Chair Pillars along with the technical offer.

### Workmanship and Finish

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The Supplier shall ensure that the GFRP Panels shall be free from undulation, twist, pinholes, blisters, porosity, blow holes, tear, wrinkles and other visual defects. The visible surface of GFRP Panels shall be made smooth and suitable for application of paints.

### Quality Assurance Program

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

The Supplier shall submit Quality Assurance Plan (QAP) based on ISO 9001 / IRIS guidelines.

## 5. Scope of Supply

### Design & Development activity

The firm will be provided with the concept models in 3D surface file for Seats & Berths, Partitions and Chair Pillars. The firm shall be responsible for following activities:

- (i) The complete scope of Seats & Berths, Partitions and Chair Pillars shall be designed by Supplier in line with concept design. The design includes 3D model and 2D drawings.
- (ii) Supplier shall develop full 3D model and 2D manufacturing drawings of all aggregates including mounting details, interface with car body, passenger amenities etc.
- (iii) Rendering images shall be developed during design stage and shall be submitted to RCF.
- (iv) Firm shall submit 3D model and 2D manufacturing drawings to RCF for approval before taking up for manufacture.
- (v) The quantity of the Seats & Berths, Partitions and Chair Pillars, accessories and miscellaneous items shall be arrived as per the layout drawings and concept design.
- (vi) Develop required tooling for manufacturing of Seats & Berths, Partitions and Chair Pillars.
- (vii) Shall carryout Type tests at any NABL approved laboratory & routine tests and submit the reports.
- (viii) Manufacture and supply Seats & Berths, Partitions and Chair Pillars.
- (ix) Installation of all the items supplied by the firm including Seats & Berths, Partitions and Chair Pillars RCF.

***NOTE – Firm have to submit all the 3D model, DOT(.)Prt files & 2D drawings on NX platform. Drawing & model submitted on any other platform will not be acceptable.***

### Scope of Supply for LWSCN coach

Following items shall be the scope of Seats & Berths, Partitions and Chair Pillars for LWSCN coach, as a minimum.

**Table- 5**

S.No.	Description of the item	Remarks
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## SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES

1	Complete Berths which include the following items: <ul style="list-style-type: none"> <li>Berth frame</li> <li>PU Foam</li> <li>Fire Barrier cloth</li> <li>Upholstery</li> </ul>	<ul style="list-style-type: none"> <li>Berth design shall be as per concept design</li> <li>Berth frame shall be made from Aluminium with proven design</li> <li>Upholstery material shall be as per final design</li> </ul>
2	Transverse side – Lower berth, Middle berth, Upper berth on either side with ladders Longitudinal side – Lower seats/Foldable Back rest cum berths, Upper Berths with ladders	As per the concept design.
3	Safety provisions for upper berth passengers made of FRP / Stainless steel	As per concept design
4	Hinge or Bracket provision for folding mechanism of middle berths	As per concept design
5	Mounting provision for fixing belt in respective berths used for suspension of middle berth	As per concept design
6	Mounting provision and catch arrangement for the back rest	As per concept design
7	Back flap to be provided for all foldable berths to close the gap	As per concept design
8	Luggage locking provision under lower berths	As per concept design
9	Partitions includes the following <ul style="list-style-type: none"> <li>Aluminium Honey comb core</li> <li>Aluminium skin on both sides with texture and paint / decal finish as per final design</li> <li>Metal Brackets for berth mounting as well as passenger amenities</li> <li>Aluminium extrusions at sides and bottom edges</li> <li>Painting or Decals</li> </ul>	As per concept design
10	Pillar structure includes the following <ul style="list-style-type: none"> <li>SS pillar between floor and ceiling</li> <li>Grab handles</li> <li>SS Ladder as per final design</li> <li>Brackets for Berth mounting</li> <li>Painting of SS pillar</li> </ul>	As per concept design
11	Complete set of Hardware, rubbers, sealants, or any other item required for assembly & installation of Berths, Pillar and Partitions shall be provided by the supplier	As per concept design
12	Passenger Amenities – Bottle Holder, Mobile Holder, Snack Table, Coat Hook and Mirror for all types of berths etc. as per layout	As per concept design for each berth

## SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES

13	Seat number indicator	As per concept design for each berth
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Note: All the interfacing activities for interior layout / arrangement / equipment's to be done by supplier.

### Scope of passenger Amenities

The following are the scope of Supplier for supply of passenger amenities as minimum

**Table- 6**

Amrit Bharat LWSCN: Passenger amenities			
S. No.	Systems	QTY	Reference Drg. No.
1	Mobile holder	1 per seat	LSCN/PP2-6-4-003
2	Bottle Holder	1 per seat	ED64013
3	Coat Hooks	1 per seat	LSCN/EOG-6-4-016
4	Mirrors	1 per cabin	LSCN/PP-6-4-003
5	Snack Table	1 per cabin	LSCN/PP2-6-4-002
6	Seat Number Indicator	1 per seat	LS64007

### Supply of spares

Supplier shall supply the following items as spares. Each rake is required to be supplied with 5% BOM quantity of each rake for the following critical items.

**Table- 7**

Sl. No	Description
1	Passenger amenities: 1. Bottle holders 2. Mobile Holders 3. Coat Hooks 4. Snack Table 5. Mirror
2	LWSCN Berths

### Process and Raw material

Supplier shall submit details of process and raw materials and its technical data sheets & test reports, proposed to be used in manufacturing Seats & Berths, Partitions and Chair Pillars for approval.

### Weight

The Supplier shall submit estimated weights of each Seats & Berths, Partitions and Chair Pillars along with the technical offer. Maximum weight permitted for Berth is 25~30 kgs.

**SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES****Painting**

The Supplier shall submit details of painting for Stainless steel and Aluminium materials.

The supplier shall submit the details of the Proven Paint system he proposes to adopt and obtain RCF approval. The details of the Railway project in which the proposed system is used and its satisfactory performance in revenue service shall be submitted. The supporting mechanical and fire performance test reports for adopted painting system shall be submitted in detail design phase.

The paint system shall be suitable for climatic conditions specified at Clause-2.

The paint systems shall have excellent substrate and inter-coat adhesion, outstanding long term corrosion protection, good resistance to oils and cleaning agents, very high order of abrasion, chip, impact and scratch resistance.

The paint system shall meet Fire safety requirement of EN45545-Part 2, HL3

The paint system shall display a uniformity of colour throughout its service and shall therefore withstand frequent use of various cleaning products (alkaline or acid detergents, petroleum solvents, mechanical action of brushes) without losing their colour or noticeable deterioration of their surface aspect.

**Training**

The Supplier shall provide comprehensive training to RCF for fitment and removal of Seats & Berths, Partitions and Chair Pillars for maintenance activity and repair. The aim of training is to enable the RCF personnel to effectively carry all aspects of the operation and maintenance activity during normal, failure and emergency situation.

Train sets will be commissioned at various maintenance depots over Indian Railways. Supplier shall depute personnel to impart training to operation and maintenance staff of the various maintenance depots.

**Submission of Documents**

The Supplier shall submit the following documents, as a minimum preferably in English language

- QAP of Seats & Berths, Partitions and Chair Pillars including all the rubber components, locks, hinges, hardware etc.
- Complete 3D Models of Seats & Berths, Partitions and Chair Pillars including all the rubber components, locks, hinges, hardware etc.
- (.) prt File ,2D manufacturing drawings of all Seats & Berths, Partitions and Chair Pillars assemblies, sub-assemblies and part level components.
- Bill of material (BOM) of complete Seats & Berths, Partitions and Chair Pillars to obtain RCF approval. Bill of materials of all bought out items shall be submitted with make and part number.
- Technical Description document including detail description of all the parts in the scope of supply.
- Type test & FAI reports

**SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES**

- Fire safety test reports for Seats & Berths, Partitions and Chair Pillars produced for this project
- Weighment document with Actual weights of each of the items viz Seats & Berths, Partitions and Chair Pillars
- Test certificates and technical data sheets for proposed raw materials for the all items.
- Dimensional check sheets for each of the items viz Seats & Berths, Partitions and Chair Pillars
- FEA analysis report for Seats & Berths, Partitions and Chair Pillars.
- Actual load test certificate for Seats & Berths as per UIC-566 or other International standards
- Operation & Maintenance manual - Maintenance manual shall include maintenance schedule, tools, grease or any other items required during maintenance.

**Submission of samples**

Supplier shall submit representative samples of proposed Partitions & Chair Pillars for compartments. Supplier shall submit samples of Upholstery & complete seats & berths for approval before mass production.

**Packing**

The Supplier shall pack properly in order that in transit and after supply of proposed items to the place allocated by RCF, no damage to the items shall occur.

**First Article Inspection (FAI)**

The Supplier shall offer the Seats & Berths, Partitions and Chair Pillars for First Article Inspection by RCF in accordance RCF 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.

The Supplier shall ensure that the produced Seats & Berths, Partitions and Chair Pillars is in 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 RCF witness.

At the FAI, the Supplier shall make available all pertinent design and manufacturing process documentation, test records, material certifications, etc.

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 Supplier 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.

If FAI has to be repeated due to non-compliances/ deficiencies noticed, the cost towards the same and the cost towards RCF visit to Supplier's place for witness of re-FAI shall be to Supplier's responsibility.

## SCHEDULE OF TECHNICAL REQUIREMENTS FOR PROCUREMENT OF SEAT & BERTH, PARTITION AND CHAIR PILLAR FOR AMRIT BHARAT LWSCN COACHES

Upon acceptance of the FAI by RCF, the Supplier 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 RCF at the FAI.

Supplier shall note that RCF FAI clearance will not relieve the Supplier's responsibility towards design, development, testing, manufacture and supply during the revenue service.

At any point of time, during the execution of the contract, if RCF has any concerns about the quality of the product supplied, RCF 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 reports.

### 6. Inspection

#### Visual And Dimension Inspection

- The colour and surface finish shall be visually inspected on 100 % of the lot. The surface should be free of tears, hard skin and voids. All the samples must pass the test for the lot to be accepted.
- The dimensions shall be checked on 5% of the lot cleared or 10 sample whichever is more for each type of Seats & Berths, Partitions and Chair Pillars. All the samples checked for dimensions shall pass the test.

#### Acceptance test and Type test

- Supplier shall perform type and routine test for Seats & Berths, Partitions and Chair Pillars as per the technical specifications.
- All such tests shall be carried out at the supplier's cost, wherever performed in the presence of and to the satisfaction of RCF, who reserves the right to witness any or all of the tests and to require submission of any or all test specifications and reports.
- RCF reserves the right to reasonably call for additional tests, if necessary.

The Supplier shall carryout the following type tests and routine tests, as a minimum.

**Table- 8**

S.No	PROPERTIES	TYPE TEST	ROUTINE TEST
1	Visual Inspection	•	• (100 % supplies)
2	Dimensional Inspection	•	• (100 % supplies)
3	Functional test as per PTS	•	• (100 % supplies)

#### Marking

The manufacturer's logo shall be stamped on the Seats & Berths, Partitions and Chair Pillars supplies. The batch number, identification number for traceability and month / year of manufacture shall be marked on each item suitably such that it will not easily visible for passengers.