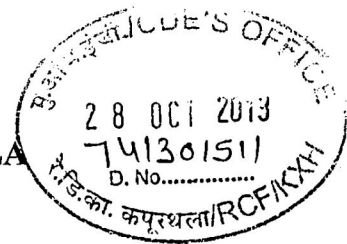


RAIL COACH FACTORY KAPURTHALA



MD35131

DATE: 28.10.2013

Sub: Issue of specification no. MDTs 219 Rev-02.

Please find enclosed a copy of specification no. MDTs 219 Rev-02 for information and necessary action at your end.

Specification no. **MDTS 219**Rev. **02**Dated: **22.10.2013****SCHEDULE OF TECHNICAL REQUIREMENTS FOR SEATS FOR CHAIR CAR**

This specification supersedes the following specifications.

1. **MDTS 073 Rev-05**
2. **MDTS 104 Rev-04**
3. **MDTS 219 Rev-01**

Signature
28/10/13
SME/D1

CQM, CPLE, CWE (FUR), CMM, CMT, DY.CME/MP

SSE / LIB. DESIGN

✓ SSE / RECORD (With original specification)

SSE / DESIGN / RCF / TKJ




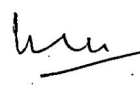
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DY.CME/D1, DY.CME/D3

CDE

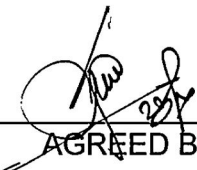
81 Kulwinder Singh
Mr. Mehta, and update
accordingly, on
28/11/13
(SSE/Rec)

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NAME	DESIGNATION	SIGNATURE	DATE	LEVEL
Dharmendra Kumar	SSE/Design		22/10/13	Prepared
B K Goyal	SME/Dev-I		22.10.13	Reviewed
Suraj Prakash	DY CME/D1		23.10.13	Agreed
Parmanand Singh	CDE		23.10.13	Approved

Issue/Rev	Detail of Changes	Date
Rev-02	Specification revised and made common for all type of chair car coaches.	22.10.2013


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1. Preamble:

This specification covers the general & technical requirements for supply and testing of seats along with accessories for Chair Car coaches.

2. General arrangement & mounting:

The general arrangement and mounting of the seats shall be as per following general arrangement drawings:

S.No.	Coach Type	General Arrangement Drg. No.
1	AC Chair Car	2 10113.0.25.100.001
2	Executive AC Chair Car	2 10112.0.25.100.001
3	Double Decker AC Chair car	LD61110
4	Non AC Chair Car	LJ61104

(Latest alteration/revision of above drawings should be referred)

3. Dimensional requirements:

3.1 The seat dimensions for various type coaches shall be as per following tabulated RCF drawings.

S.No.	Type	Dimension Requirements
1	AC Chair Car	MI004722 , MI004723
2	Executive AC Chair Car	MI004724
3	Double Decker AC Chair car	LD61107 , LD61108 , LD61109 Folding table assembly (Item-1) and Knob (item-3) to drawing no. LD61128
4	Non AC Chair Car	LJ61104

(Latest alteration/revision of above drawings should be referred)

3.2 Additional requirements of the folding seat for conductor should have overall dimension of the 375x375 mm. A spring loaded mechanism should ensure to keep the folding seat in closed vertical position while not in use and shall come in the horizontal positions only when forced down for sitting. The folding seat should not produce rattling noise while coach is in motion. The weight of the folding seat shall not be more than 10 kgs.

3.3 Firm should submit drawings of bottle holder, snack table, footrest / foot protection frame, armrest, holding latch etc. indicating mounting arrangements, manufacturing details and overall dimensions to CDE/RCF for approval before bulk supply.


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4. 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 static loads as per para-10 of this specification. The equipment shall be sturdy and suitable for the following service conditions normally to be met in service.

4.1 Ambient Environmental conditions:

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

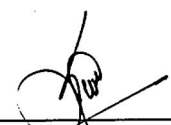
4.2 Working conditions:

Train speed	160 Kmph Max.
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) $a = 250 f^2$ for the values of (f between 1 HZ and 1 HZ)	

5. Functional and Technical Requirements:

- 5.1 Seat manufacture should display very good styling in design of chairs to have aesthetics of international standards. Seat & backrest contours and other components like armrests, snack table etc. shall be designed on the basis of following anthropometric data of Indian population. The average of North India and South India data against 95 percentile is to be taken as reference.


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Measurement table for the region 'North India'

Measurement	Percentile (Men)			Percentile (Women)			Min.	Max.
	5	50	95	5	50	95		
Body height	1580	1670	1770	1450	1540	1630	1450	1770
Sitting height	820	870	920	770	820	870	770	920
Eye level of a sitting person	710	750	800	650	690	730	650	800
Reach (fingertips)	760	800	850	700	740	780	700	850
Width of the shoulders (bideltoid)	360	380	430	320	340	370	320	430
Width of the shoulders (acromion)	350	370	390	285	310	340	285	390
Width of the hip(of a standing person)	280	295	320	285	310	340	280	340
Knee height	500	530	560	460	490	515	460	580
Length of the lower leg with foot	390	415	440	360	380	410	360	440
Distance between elbow and grip axle	310	340	370	280	310	340	280	370
Length buttocks-knee	550	580	620	500	530	570	500	620
Length of the legs with buttocks	940	1000	1060	880	940	1000	880	1060
Sitting width	280	300	340	290	315	360	280	340
Hand length	180	190	200	150	160	170	150	200
Hand width	80	85	90	70	75	80	70	90
Foot length	230	250	270	205	220	235	205	270
Head circumference	515	550	580	495	525	555	495	580
Head length (depth)	180	190	200	170	180	190	170	200
Head width	135	145	155	125	135	145	125	155

Measurement table for the region 'South India'

Measurement	Percentile (Men)			Percentile (Women)			Min.	Max.
	5	50	95	5	50	95		
Body height	1530	1620	1720	1390	1500	1600	1390	1720
Sitting height	770	820	880	740	800	850	740	880
Eye level of a sitting person	660	700	740	620	670	720	620	740
Reach (fingertips)	730	780	840	670	720	770	670	840
Width of the shoulders (bideltoid)	370	400	440	330	360	390	330	440
Width of the shoulders (acromion)	355	375	395	310	330	350	310	395
Width of the hip(of a standing person)	270	285	300	280	300	320	270	320
Knee height	470	510	550	440	470	505	440	550
Length of the lower leg with foot	380	405	430	345	375	400	345	430
Distance between elbow and grip axle	300	325	350	275	300	325	275	350
Length buttocks-knee	530	560	600	480	515	550	480	600
Length of the legs with buttocks	920	980	1030	850	920	980	850	1030
Sitting width	275	290	320	280	310	350	275	350
Hand length	180	190	200	145	155	165	145	200
Hand width	75	85	90	65	70	75	65	90
Foot length	225	245	265	200	215	230	200	265
Head circumference	530	550	580	475	510	540	475	580
Head length (depth)	170	180	195	165	175	185	165	195
Head width	135	145	150	120	130	140	120	150



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5.2 Contours of the moulded cushions should be ergonomically perfect to provide adequate comfort even in any reclined position and generally as per the dimensions indicated in the respective drawings.

5.3 Frames:

5.3.1 The frame of seats should be made of stainless steel Grade-AISI 202 or J4 grade of M/s Jindal Steel (as per chemical composition as tabulated in table -1) or equivalent offered in the tender & approved by CDE/RCF.

Table -1
Chemical Composition(%) SS for J4 grade of M/s Jindal Steel

C	S	P	Si	Mn	Cr	Ni	Cu
0.1 (Max.)	0.01 (Max.)	0.08 (Max.)	0.75 (Max.)	8.5-10.0	15.0- 16.0	1.00- 2.00	1.5-2.0

5.3.2 Frames of seat and back rest should be sturdy enough to withstand normal misuse by Railway passengers.

5.3.3 The frame should have a good finish at weld joints. There should be no sharp edges.

5.3.4 Structural supports should be suitably concealed.

5.4 Mounting arrangements :

5.4.1 Mounting of seats should have easy access for tightening of fasteners.

5.4.2 The concept of mounting the seats on the floor and side wall shall be identical for similar seats to ensure inter-changeability.

5.4.3 Mounting holes should be drilled with the help of template/jig to ensure consistency of manufacture.

5.4.4 On side wall mounting bracket, three mounting holes should be provided vertically, one above and one below of the mean dimension for adjustment of level of the seat. Mounting brackets should be designed in a manner to conceal the mounting bolts.

5.5 Seats

5.5.1 The seats dimensions shall confirm to the respective RCF drawings.

5.5.2 Chairs shall have all provisions of accessories such as bottle holder, snack table, holding latch, arm rest, magazine bag & leg protecting frame/foot rest etc. as mentioned in the relevant drawings.

5.5.3 Stainless steel sheet of Grade-AISI 202 or J 4 grade (chemical composition as tabulated in Clause 5.3) of M/s Jindal Steel or equivalent offered in the tender & approved by CDE/RCF to be used as a support/base for cushion in seat & backrest. Alternatively, 6 mm. thick compreg for seat cushion and 4 mm. thick compreg for backrest cushion to RDSO/Spec. C-9407 to be used.

5.5.4 The seats shall have no sharp edges or corners anywhere.

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5.6 Back Rest:

- 5.6.1 The rear side of the backrest shall be covered with Vinyl Coated Upholstery Fabric (Artificial Leather) to RDSO specification no. RDSO/2008/CG-07. Vinyl coated fabric for backrest, if procured, from RDSO approved sources; same shall be acceptable on basis of WTC from OEM. In case, the vinyl coated fabric is procured from other sources, same shall be got tested for conformance to RDSO specification.
- 5.6.2 Backrest of chairs shall be easily dismountable.

5.7 Head Rest:

- 5.7.1 Adjustable head rest shall be provided on backrest of the executive chair car for the comfort of neck portion.
- 5.7.2 Total vertical movement of the headrest should be min. 50 mm.


5.8 Fasteners:

- 5.8.1 All fasteners and metal parts shall be suitably concealed.
- 5.8.2 Only stainless steel cross recessed (star Philips head) screws shall be used. Stainless steel hex. Socket head screws (Allen head) with spring washer shall be used at load bearing locations.
- 5.8.3 All bearing points shall be provided with bushes made out of suitable nylon grade having self lubricating properties.

5.9 Snack Table:

- 5.9.1 Design of snack table shall generally confirm to RCF drawing no. LD61130. Size of snack table should be sufficient to facilitate the placement of snack tray provided in the Shatabdi Coaches.
- 5.9.2 Over all rim height (at edges) of snack table should be 10-15 mm.
- 5.9.3 Stainless steel pipe of Grade-AISI 202 or J-4 grade of M/s Jindal steel (Chemical composition as per Table-1) of size $\varnothing 21 \pm 0.5$ mm & 2 mm thick shall be used for snack table supporting frame.
- 5.9.4 Snack table shall be made up of aluminium die casting and shall be powder coated.
- 5.9.5 Snack table shall have a smooth dirt resistant top surface with a depression to place tumbler. It shall be easily cleanable. The snack table should be sturdy.
- 5.9.6 Mounting bracket of snack table should not project above its surface at all, while in open position. Movement of snack table should be smooth without any noise. It should not open up automatically even after disengaging the holding latch, rather it should open up with slight effort.


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5.10 Cushioning Material:

- 5.10.1 Cushion for seat and back rest shall be directly moulded from polyurethane foam to RDSO spec. no. RDSO/2007/CG-04.
- 5.10.2 Moulded cushion shall have integral PU skin.
- 5.10.3 A sample of P.U. foam of size 570x570x50(thick) shall be submitted along with prototype seat to RCF for approval before start of the bulk manufacture of chairs.

5.11 Fire Barrier:

Fibre-glass woven cloth as per IS:11273-75 having minimum density of 250 gm/sqm or alternate approved by CDE/RCF shall be provided all around PU foam including between upholstery and cushion as fire protection measure.

5.12 Upholstery:

5.12.1 AC Chair car

Fire retardant upholstery having properties as per Table-2 shall be used. Colour and pattern of upholstery should match with “Aunde Jacquard Moquette ‘Ampurias’ quality & design name ‘Circuite Verde’” of M/s Aunde, Spain. A sample of upholstery shall be got approved from RCF for colour shade and pattern before submission of pilot sample. Supplier shall submit WTC from OEM for conformance to properties indicated in Table-2 for reference to inspection agency. Inspection agency may carry out the tests under Table -2 for which tests facilities are readily available.

Table-2

S.N.	Property	Specified value	Spec. Referred
1	Composition:	Overall: 58% WO, 10% PA, 27% CO, 5% PES, 2% PAC backing	-
2	Width	157 ± 2 Cm.	EN 1773
3	Weight:	Overall: 825 g/m ² ± 5% Backing: 25 g/m ²	ISO 3801-1977/ EN12127
4	Thickness:	4.4 mm ± 0.5 mm.	ISO 5084
5	Strength: (Breaking load)	Warp >400 N Weft >600 N	ISO 13934-1
6	Seam strength:	Warp >40 Kg. Weft >50 Kg.	ASTM D1683
7	Abrasion resistance:	>60000 Rubs	ASTM D4966/ ISO 12943
8	Fire resistance	Comply Annexure IV & V	DIRECTIVE 95/28/EC OF THE EUROPEAN PARLIAMENT

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9	Colour Fastness:	Light: 6 Dry cleaning: Change in shade 4/5 Staining 4/5 Rubbing resistance to Perchloroethylene: Change in shade 4/5 Resistance to acid Perspiration: Change in shade 4/5 Staining 4/5 Resistance to alkali Perspiration: Change in shade 4/5 Staining 4/5 Resistance to Dry Rubbing: Change in shade 4/5 Staining 4/5 Resistance to Wet Rubbing: Change in shade 4/5 Staining 4/5	ISO 105 B02 ISO 150-C06 ISO 105 D02 ISO 105 E04 ISO 105 E04 ISO 105 X12 ISO 105 X12
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5.12.2 Non AC Chair Car

- 5.12.2.1 For Non AC coach Vinyl Coated Upholstery Fabric (Artificial Leather) to RDSO specification no. RDSO/2008/CG-07 shall be used for covering of seats and back rest.
- 5.12.2.2 Vinyl coated upholstery fabric is to be procured from RDSO approved sources only. Manufacturer's name shall be duly embossed at the rear side of the artificial leather at regular intervals.
- 5.12.2.3 A sample of artificial leather shall be approved from CDE/RCF for colour shade, texture and finish before bulk manufacture of chairs. Supplier should also submit WTC from the OEM as per RDSO specification along with supply.

5.13 Reclining mechanism:

Reclining mechanism should cater for continuous movement or with stops at any desirable position within the overall sliding dimensions as shown in the respective RCF drawings. The backrest of the chair shall have reclining arrangement as tabulated in Table-3 below:

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Table-3

S.No.	Type of coach	Reclining angle
1	AC Chair Car	19 ⁰ to 37 ⁰
2	Executive AC Chair Car	20 ⁰ to 40 ⁰
3	Double Decker AC Chair car	10 ⁰ to 21 ⁰
4	Non AC Chair Car	19 ⁰ to 37 ⁰

5.13.2 The mechanism for reclining shall be sturdy enough to meet the operating requirements in a railway coach and shall be a gas spring based device. Gas spring of M/s Stabilus, Germany or equivalent to be approved by CDE/RCF, is to be used. The supplier shall submit the details of gas spring used i.e. the OEM, Part number and data sheet, along with supply.

5.14 Armrests:

- 5.14.1 Bracket/arm of the armrest shall be made up of aluminium die casting.
- 5.14.2 Armrest top shall have integral PU skin with minimum PU thickness of 5mm in self pigmented colour matching with colour scheme.
- 5.14.3 All armrests except on the aisle side of seats shall be foldable. Foldable armrests should flush with back rests when folded up.

5.15 Bottle Holder

- 5.15.1 A suitable bottle holder for one litre standard mineral water bottle having 270 mm height & 85 mm diameter shall be provided for each seat at an appropriate location (on the arm of the snack table). Shortest dimension (height of side) of bottle holder should be minimum of 160 mm.
- 5.15.2 Stainless steel wire of thickness 6 mm of Grade-AISI 202 or J 4 grade (chemical composition as tabulated in clause-5.3) of M/s Jindal Steel or equivalent offered in the tender & approved by CDE/RCF to be used for manufacture of bottle holder.

5.16 Foot rest/ Leg protecting frame

Each seat is to be provided with foot rest/leg protection frame. All seats except for double decker coaches shall be provided with adjustable foot rest. The seats for double decker coaches shall be provided with leg protection frame.

5.16.1 Foot rest:

- 5.16.1.1 Foldable footrest must allow adjustment in three positions- top, middle and folded. First step (lower) of footrest should be at 150 mm from the floor level. Further 50 mm distance should be in between the other two steps.
- 5.16.1.2 Movement of foot pedals should be smooth and its movement in any position should be possible with foot.

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- ### 5.16.2 Leg protecting frame:

5.17 Holding Latch

- ### 5.18 Magazine bag:

- ### 5.19 Aisle side cover:

5.20 Edge Protection:

5.21 No disturbing noises or vibration shall be emitted by the seat or any component in service.

- 5.22** Hard wood or wood based materials not to be used anywhere in manufacturing of the chair.

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6. Color Scheme:

6.1 Colour Scheme for the seats of AC Chair Car:

S.N.	Component	Colour Shade/pattern
1.	Frame, mounting legs, side cover/frame of the arm rest, snack table holding frame, bottle holder, foot rest & leg protecting frame	Powder coating (Thickness-50 to 80 Microns and Gloss-80 to 90 at 600) to colour shade RAL9006
2.	Snack Table	Powder coating (Thickness-50 to 80 Microns and Gloss-80 to 90 at 600) to colour shade RAL DS 170 60 10
3.	Arm rest top (hard PU skin)	RAL DS 170 60 10
4.	Stoppers (catch) for snack table and back rest reclining lever knob	RAL7016
5.	Upholstery for seats & backrests	Aunde Jacquard Moquette 'Ampurias' quality & design name 'Circuite Verde' of M/s Aunde, Spain
6.	Vinyl coated upholstery fabric for back of the Backrest	RAL DS 170 60 10

6.2 Colour Scheme for the seats of Non-AC Chair Car:

S.N.	Component	Colour Shade/pattern
1	Frame, mounting legs, side cover/frame of the arm rest, snack table holding frame, bottle holder, foot rest & leg protecting frame	Powder coating (Thickness-50 to 80 Microns and Gloss-80 to 90 at 600) to colour shade RAL9006
2	Snack Table	Powder coating (Thickness-50 to 80 Microns and Gloss-80 to 90 at 600) to colour shade RAL DS 170 60 10
3	Arm rest top (hard PU skin)	RAL DS 000 15 00
4	Stoppers (catch) for snack table and back seat releasing lever knob	RAL7016
5	Upholstery for seats & backrest	ALNAC-03

6.3 Colour scheme for prototype sample will be approved by RCF at the time of approval of the prototype along with drawings submitted by the supplier.

6.4 RCF reserves the right to change colour shade considering the aesthetics of seats in coach during prototype approval.


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7. Weight:

Weight of seats shall be approx. as given below:

For double decker coaches-

Single seater module	:	21 Kgs. \pm 2 Kgs.
2-seater module	:	42 Kgs. \pm 2 Kgs.
3-seater module	:	63 Kgs. \pm 2 Kgs.

For Executive AC chair coaches-

2-seater module	:	62 Kgs. \pm 2 Kgs.
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For AC chair car coaches-

2-seater module	:	44 Kgs. \pm 2 Kgs.
3-seater module	:	66 Kgs. \pm 2 Kgs.

For Non AC Chair car coaches-

2-seater module	:	42 Kgs. \pm 2 Kgs.
3-seater module	:	63 Kgs. \pm 2 Kgs.

8. Warranty:

The supplier shall give warranty for the complete seat including individual parts against failing or proving unsatisfactory in service due to defective design, material or workmanship within 36 months from the date of supply or 30 months from the date of commissioning of coach, whichever is earlier and shall replace the same at his own cost and risk. Name of manufacturer with month & year of manufacture along with manufacturing details on metallic plate should be displayed at some suitable location not visible to passengers, ordinarily.

9. Documents to be submitted by supplier for prototype approval

The following documentation for the assembly of the seats is to be prepared by the supplier for submission along with the prototype assembly.

1. A set of documents consisting of drawings and part lists. It should also consist of the drgs. of subassemblies of frame, seat, backrest, cushion, snack table, snack table latch, arm rest, gas spring, foot rest/leg protecting frame and bottle holder with mounting arrangement with material & manufacturing details.
2. Clearly organised instructions for mounting and adjusting the seats, changing the seat and other parts.
3. Maintenance and repair instructions.
4. WTC from OEM for all parts procured from sub-vendors.
5. Test certificates of all the tests mentioned in this spec. from a reputed test laboratory.

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10. Testing of prototype & regular production assemblies

The supplier shall supply one prototype of seat along with the documents indicated above for approval before commencing bulk supply. General dimensions of the seat shall be as per Para 2 & 3 of this specification. The prototype and drawings shall be examined from all view points and supplier shall incorporate changes suggested by RCF on the basis of this review in the prototype and drawings. The bulk manufacture shall be undertaken only after the approval of prototype and drawings.

Testing of the seat shall be done in the same condition as fixed in the coaches. The following static load test shall be applied to prototype samples:

- i) 150 kgf vertical load to be applied per person to the seat cushion by using press board of hard board of circular area 615 sq. cm in the location of sitting area.
- ii) 50 kgf of horizontal load to be applied to the frame at the top aisle side corner of back rest of seat sets.
- iii) 50 kgf of horizontal load to be applied at the centre of back rest by using press board of hard board of circular area 615 sq. cm normal to the surface.
- iv) 75 kgf vertical load applied in the centre of the snack table.
- v) 75 kgf vertically load shall be applied on each arm rest near the outer most edge of arm rest. 75kgf horizontal load shall be applied on the outer arm directing inside the seat.

The above tests shall not give rise to any deformation in any component. The requirement of prototype is applicable for first supply of a supplier for approval of proto type. However, RCF shall have the right to repeat prototype approval process in subsequent order also. In this regard RCF decision shall be final.

11. Upgradation of design

Supplier may offer alternate design of seats for all the above or any of the above clauses with a view to upgrade the design. Clause-wise justification shall be given by the supplier in such case. Seats having lower weight shall be preferred. Specification details may be deviated from those specified above, if sufficient technical justification is available. However, RCF's decision on all such matters shall be final.


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12. Drawings/Spec. to be referred in this specification:

12.1 Drawing/Spec. attached with this specification:

S.No.	Drg. No. / Spec. No.	Description	Remarks
1.	2 10113.0.25.100.001	Seat Arrangement and Mounting	1. Drawings are to be supplied with their component drgs. & latest alterations. 2. Specifications are to be supplied with latest version.
2.	2 10112.0.25.100.001	Seat 1-Class Arrangement and Mounting	
3.	LD61110	Location of Seating Arrgt. in 2nd Class LHB Double Decker Chair Car	
4.	LJ61104	Seating Arrgt. for EOG Non-AC Chair Car	
5.	MI004722	2-Place Seats for 2nd Class AC Chair Car	
6.	MI004723	3-Place Seats for 2nd Class AC Chair Car	
7.	MI004724	Seats for Executive Class AC Chair Car	
8.	MI005145	Magazine Bag	
9.	RDSO/Spec. C-9407	Spec. for wood based impregnated compressed laminates	
10.	RDSO/2008/CG-07	S.T.R. for vinyl coated upholstery fabric (artificial leather)	
11.	RDSO/2007/CG-04	S.T.R. for flexible load bearing polyurethane foam cushions	

12.2 Other Specs. referred in this specification:

S.No.	Spec. No.	S.No.	Spec. No.
1.	EN 1773	8.	UIC 566
2.	ISO 3801-1977/ EN12127	9.	RAL9006
3.	ISO 5084	10.	RAL7016
4.	ISO 13934-1	11.	RAL DS 170 60 10
5.	ISO 105	12.	RAL DS 000 15 00
6.	ASTM D1683	13.	ALNAC-03
7.	ASTM D4966/ ISO 12943	14.	DIRECTIVE 95/28/EC OF THE EUROPEAN PARLIAMENT

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