RAIL COACH FACRTORY, KAPURTHALA

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Sub: Issue of MDTS 25293 Rev 04 MECHANICAL DESIGN TECHNICAL SPECIFICATION FOR SUPPLY, INSTALLATION AND COMMISSIONING OF AUTOMATIC SLIDING DOORS FOR ENTRANCE TO AC AREA IN LHB AC COACHES.

Please find enclosed copy of following specification for information and necessary action at your end.

S. No.	Description	Specification No.
1.	MECHANICAL DESIGN TECHNICAL SPECIFICATION FOR SUPPLY, INSTALLATION AND COMMISSIONING OF AUTOMATIC SLIDING DOORS FOR ENTRANCE TO AC AREA IN LHB AC COACHES.	MDTS 25293 Rev 04

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ADE/Design

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स्थापित: १९८६

RCF
KAPURTHALA

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Technical specification for Supply, Installation and Commissioning of Automatic Sliding Doors for entrance to AC Area in LHB AC Coaches



Specification Number	MDTS 25293	
Revision Number	4	Date Issued: 8 November 2023

BRIEF DESCRIPTION:

This specification covers the general, Functional Requirements and Technical Requirements of automatic sliding doors for entrance to AC area in LHB coaches.

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FOREWORD:

This technical specification is prepared forSupply, installation and commissioning of automatic sliding doors for entrance to AC area in LHB AC coaches.

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Technical specification for Supply, Installation and Commissioning of Automatic Sliding Doors for entrance to AC Area in LHB AC Coaches

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Issue/Rev	Details of Changes	Date
1.	Clause No. 3.1 Ambient conditions a. -4°C to 55°C with 95°/Humidity and dust 4.1 The tenderer / their principals should be an OEM for the offered design of eclectically operated door mechanism arrangement and associated control units. 5.13 Door is opened manually with 8.0Kg/80N force (Max.) 6.7 deleted.	21.04.2017
2.	Clause No. 5.1 Opening operation can be achieved via push button and it should close automatically. 5.6 It should have provision to allow the delay up to 60 sec before closing. 5.10 OR On continued presence of the obstruction, even after three successive closing attempts, the door should move up to the location of obstruction (i.e. Partial close/open) and remain there for a minimum period of 30 sec before repeating the completely opening and closing cycle.	07/12/18
3.	Clause No. 4.4 The tenderer / their principals should have a full fledged design office and shall have designed and manufactured electrically operated automatic door systems or electrically operated door mechanism arrangement and associated control units for at least 200 rail vehicle cars, and these supplied systems should have been working satisfactorily in railway rolling stock vehicles for more than 5 years. 12.1 The supplier shall give warranty for the complete system including individual parts against failing or proving unsatisfactory	28/03/2019

	in service due to defective design, material or workmanship within 84 months from the date of supply or 72 months from the date of commissioning of coach, whichever is earlier and shall replace the same at his own cost and risk. 12.2 Items used in the system will have an onsite warranty of ten years against corrosion.	
4.	1. Clause 1.0 & 2.0 modified. 2. Clause 3.2 modified. 3. Clause 4.0 & 6.6 deleted and remaining clauses rearranged. 4. Clause 4.13 modified. 5. Clause 4.14 added. 6. Clause 8.0 modified. 7. Clause 16.0 &17.0 added.	08/11/2023

1.0 Scope:

This specification covers the general, Functional Requirements and technical requirements of automatic sliding doors for entrance to AC area in LHB coaches. Notwithstanding whatever mentioned in this specification, it is the responsibility of the supplier to successfully install and commission the door system on the coach.

2.0 Scope of supply:

Supply, installation and commissioning of automatic sliding doors for entrance to AC area as per applicable drawings of the coach along with followings:

2.1 Door Leaf Complete with operating mechanism for smooth operation of automatic sliding door.

2.2 Electronic Control unit with software.

2.3 Emergency disconnecting switches with notices/operating instruction stickers for uses of these devices.

2.4 A Software monitoring tool for any data uploading /downloading and retrieval of data log for failure investigation. It shall be compatible with commonly available latest available Operating system. This software shall allow user to alter the door operating parameters with user lock provision.

2.5 Adequate number of Double sealing brushes on door leaf and Door Pocket to be provided.

2.6 Maintenance free Lower guides.

2.7 Any additional item considered necessary for operation of the door but not included in this specification.

2.8 Visual indication sticker in traffic reflective White colour describing the steps for initiating opening/closing of the doors should be supplied 2 nos. per door.

3.0 Service/ operating conditions:

The automatic sliding door should function with full efficiency under the following operating conditions:

3.1 Ambient conditions:

3.1.1 Altitude: Sea level to 2500 metre.

3.1.2 Operating temperature: - 10◦C to 55 ◦C.
3.1.3 Max. Temperature under Sun: 70°.
3.1.4 Relative humidity: up to 95%.
3.1.5 The rainfall is heavy.
3.1.6 During dry weather, the atmosphere is likely to be dusty.
3.1.7 Temperature variations can be quite high with-in range specified in the same journey or short period of time.
3.1.8 Coaches operate in coastal areas with continued exposure to salt laden air.
3.1.9 Coaches may be subjected to frequent external washing with detergents and cleaning of toilets by cleaning agents.

3.2 **Car-body dynamics:**
Equipment shall withstand satisfactorily the Vibrations and Shocks as per IEC/EN 61373 normal encountered in Service as indicated below:
a. Maximum Vertical acceleration 3.0g
b. Maximum longitudinal acceleration 5.0g
c. Maximum transverse acceleration 2.0g

3.3 **The vibrations are of sine wave form and the frequency vibration is between 1 Hz to 50 Hz.**
The amplitude 'a' expressed in millimetres is given as a function of 'f', by equations
a= 25/f for values of 'f' from 1 Hz to 10 Hz.
$a= 250/f^2$ for values of 'f' exceeding 10Hz and up to 50 Hz.
In the direction corresponding to the longitudinal movement of the vehicle, the equipment is subjected for 2 min. to 50 Hz. Vibrations of such a value that the maximum acceleration is equal to 3g.

3.4 **LHB type coach length over coupler is approximately 24 meters.**

3.5 **Coach-body displacement encountered under dynamic conditions.**
i) Vertically- ±100 mm
ii) Laterally - ±55 mm
iii) Longitudinally- ±10 mm
iv) Bogie rotation about centre pivot- ±4°
v) Maximum Speed of train: 160 KMPH.

3.6 **Power Supply:**

a. 110V AC/DC supply is available in the coach with variations as per EN 50155 standard. If the system is to operate at input voltage of 110V/24V DC, converter of

reputed make only should be used: i.e. M/s Siemens, M/s Cosel, Japan, M/s Astec Power or M/s ABB shall be provided along with the system by the firm.

b. Power up to 700 watts total shall be made available per coach for operation of two doors.

4.0 **Functional Requirements:**

4.1 Door should be opened through human sensor/proximity sensors automatically. Alternatively the opening operation can be achieved via push button and it should close automatically. The push button operation shall override the sensors inputs when used. Push buttons shall meet IP67 requirement. The sensor operating range to be decided during design approval / Prototype validation by CDE/RCF.

4.2 Once the opening of the door is initiated, it should complete the opening stroke.

4.3 After completing the opening stroke, closing shall start automatically after a pause of 5-7 seconds.

4.4 Once closing starts, it should complete its closing stroke in normal operation. After the closing stroke is completed, door should remain in the closed position, unless opening action is initiated through the push button/sensor.

4.5 Opening and closing of doors shall be automatic and time for each opening and closing stroke should be between 3 to 4 sec or as approved by CDE/RCF.

4.6 Door operating mechanism should have adjustable time delay device to increase the closing stroke with in electronic control device. It should a provision to allow the delay up to 60 sec before closing. Movement of the door shall be slower. (Approx 0.05 m/sec) at the end of closing stroke for last 200 mm.

4.7 When the door leaf meets an obstruction in the passage, the door should open fully immediately and pause for 5-7sec and then start its closing operation as done normally.

4.8 For the force on obstacle, the system shall meet EN 14752 clause 5.2.1.4.

4.9 If the obstruction continues to be present, the door should make three successive closing attempts.

4.10 On continued presence of the obstruction, even after three successive closing attempts, the door should move to fully open position for a period of 30 seconds. After that, the door should close again automatically, OR On continued presence of the obstruction,

even after three successive closing attempts, the door should move up to the location of obstruction (i.e. Partial close/open) and remain there for a minimum period of 30 sec before repeating the completely opening and closing cycle.

4.11 If obstruction is still present, the cycle described in para 4.7 to 4.10 should be continued.

4.12 If the door is required to remain open for a longer duration, especially at en route stations where large nos. of passengers board or get down, it should be possible to keep the door open by keeping the push button pressed in the opening direction (as done for opening the door).

4.13 In case of failure of electrical supply, the door should work as manual opening manual closing door. This means that in such case if the door is opened manually with 8.0kg /80N force (max), and closed by applying 8.0kg /80N force (max). In such a case, functional feature as explained in para 4.7 to 4.10 may not work.

4.14 Provisions of two emergency push button (red colour) disconnecting switches located near the door are part of a system. After pressing the emergency control the door is disconnected from the power supply and is freely movable. In order to return the door back to the initial stage, the emergency switch has to be unlocked by turning. The door is then fully closed and operates normally.

4.15 There should be provision for interlinking door control unit with fire & smoke detection system. In the event of any fire detection alarm, the door should come into open position automatically until reset of fire & smoke detection system.

4.16 During closing stroke, it should be possible to open the door manually in case system of obstacle detection or there is no power supply.

4.17 Door should remain in closed condition during normal train running and should not move/ open up owing to centrifugal force experienced on curvatures or under normal vibrations.

5.0 **Technical Requirements:**

5.1 Operating mechanism may be electro-mechanical.

5.2 Automatic sliding doors shall have smooth running, without jerks and low noise operation.

5.3 Sealing shall be provided to stop ingress of dust/ dirt/ moisture in all gaps (both in closed and open position).

5.4 Stainless Steel to RDSO/spec. C-K: 201, X5CrNi1810 or AISI: 304 shall be used for construction of stainless steel parts where material grade of stainless steel has not specified. Alternatively, the firm may offer other material for door leaf and other components with technical justification.

5.5 Suitable hand safe rubber gasket/beadings with adequate softness and durability shall be provided at the end of the door leaves to ensure that the passengers are not hurt during closing of the doors. All rubber components shall meet the fire & smoke requirements R1, HL3 grade of EN 45545-2.

5.6 The electronic equipments used in the system shall meet EMC requirements as per EN 50121-3-2.

5.7 Move mechanism shall be tested for endurance simulating actual working strokes on coach for 500,000 continuous cycles. At the end of endurance test, there should not be any deterioration in performance of any component. The supplier shall get the doors tested from a reputed firm/ laboratory for endurance testing and shall submit a certificate to RCF in this regard. Alternatively supplier should have their own automatic test stand with digital counter for above mentioned endurance test.

5.8 All sharp edges and corners shall be rounded off.

5.9 Weight of complete door assembly as per above scope of supply must not exceed 75 kgs.

5.10 Only qualified welders as per EN 287 shall be used for welding. It is preferred that the manufacturer is certified as EN 15085.

6.0 Construction:

6.1 General arrangement:

General arrangement of the doors shall be as per reference/ applicable drawing of sliding door for entrance to AC area of the coach 1 10113.0.22.135.001 (Saloon sliding door mounting).

6.2 Door Assembly:

A self contained module consisting of a single leaf sliding door, an automatic operating mechanism for automatic opening and closing, the upper and lower guides for sliding door leaf and the mounting frame into which the integral unit is assembled.

6.3 Module characteristic and mounting details:

The max, size and mounting details of modular unit shall be as per reference/ applicable drawing of sliding door entrance to AC area of the coach 1 10113.0.22.135.001. Approx Height & width of shell opening are 800 mm, 1920 mm respectively.

6.4 Door leaf:

Door leaf shall be made up of sandwich construction of stainless steel frame with stainless steel sheet of AISI 304 of 1 mm thick on both sides filled with rigid phenolic foam to IS: 13204-1991 density 32 kg/m3 inside the door leaf. The firm may offer alternate material for door leaf with adequate technical justification. Thickness of door leaf should be 25 to 30 mm.

6.5 Glass:

8 mm thick laminated safety transparent glass as per IS: 2553(part1)-1990, Type-c and quality-AA of reputed make like: M/s Saint Gobain, M/s Modiguard, M/s AIS Tata or M/s Siescam shall be fitted with EPDM rubber profile similar to drawing no. LD56145(in black colour, shore hardness 65±5) on the door. Length & width of window glass to be 1000 X 600 mm respectively.

6.6 Door handle:

A door handle shall be provided for manual operation of doors in case of no electric power is available.

6.7 Locking:

Lock shall be operated by square key from both outside and inside (both in opened and closed position).

6.8 Lower Guidance:

There shall be a lower guide for door leaf covered with a plastic / any non metallic cap for noiseless operation of doors. The life of plastic cover / cap shall be at least 500,000 operations.

7.0 Training:

The supplier shall provide training to RCF and Zonal Railway maintenance personnel (against each P.O.) in installation, operation trouble shooting, repairs and preventive maintenance of the semi-automatic door system at his own cost. Min. 3 days training may be imparted at base depot to at least two technicians of each primary depot where coaches fitted with these doors are being maintained.

8.0 Marking:

The supplier shall fix engraved or punched metallic name plate with the help of rivet on each door mentioning the following details:

- Manufacturing Date
- P.O. No. of item
- Specification No. with Revision
- Manufacturer's complete address like name of contact person, e-mail, Mob No., Land Line No., Place of Works etc
- Name of item and its Sr. No
- Supplier's Name, (if the items have been supplied through approved manufacturer). *Notices for users and maintenance personnel shall also be supplied for fixing in each coach, as decided between supplier and consignee. These stickers shall not be visible to the passengers easily.*

9.0 Interface Requirements:

General arrangement of the doors shall be as per reference/ applicable drawing of sliding door for entrance to AC area of the coach.

10.0 Mechanical strength requirements:

10.1 Door shall meet the mechanical strength requirements as per UIC 566 appendix-9. The firm/ supplier shall supply a certificate from a reputed laboratory in this regard.

10.2 The passenger coaches running on Indian Railways are designed for a service life of 30 years. The doors are to be developed and assembled accordingly.

10.3 Resistance to vermin:

10.4 Selection of the materials (insulation, sealant, rubber etc.) should be done with due consideration to their resistance to vermin (e.g. termites).There should be no replaceable

parts needed to be changed up to at least 10 years or till 5,00,000 cycles in the proposed door system.

10.5 No maintenance shall be required for at least 1year, not even greasing. However, safety function checks are permitted as per supplier recommendation. The duration for safety check requirement shall not be less than 3 months. It is preferred that, the safety check requirements once in six months.

11.0 Warranty:

11.1 The supplier shall give warranty for the complete system including individual parts against failing or proving unsatisfactory in service due to defective design, material or workmanship within 84 months from the date of supply or 72 months from the date of commissioning of coach, whichever is earlier and shall replace the same at his own cost and risk.

11.2 However items used in the system will have an on-site warranty of ten years against corrosion.

11.3 In the event of 'non-satisfactory performance' of any of the items as indicated above, supplier will have to replace the same at his own expense and also bear the cost involved in transportation, handling and replacement of each items.

12.0 Annual Maintenance and Operation Contract (AMOC):

12.1 The supplier must express his willingness to enter into an annual maintenance and operation contract with railways for a 3 year period after expiry of guarantee period. Indian Railways and the firm will separately or mutually decide terms of this AMOC.

12.2 RCF reserves the right to reject the offers received without separate quote for AMOC.

12.3 The firm shall ensure availability of all spares for a period of minimum 10 years from the date of commissioning. This shall be irrespective of the fact whether the firm has stopped manufacture of the doors to the design supplied to IR.

13.0 Recommended spare parts detail required for 5 years:

The offer shall include recommended list of spare parts required for day to day maintenance of the automatic sliding door equipments and spares in the form of kit for various sub-assemblies for the maintenance at the time of POH. The list shall give the batch number/ part number, quantity and price of each component.

14.0 **Documents to be submitted by supplier for prototype approval:**

The following documentation for the assemblies of the doors is to be prepared by the supplier for submission along with the prototype assembly:

14.1 A set of drawings along with major dimensional details / accessories with drawing nos. / Specification no. and make name.

14.2 Clearly organized instructions for mounting and adjusting the door, changing the door and wearing parts.

14.3 Complete maintenance manual including trouble shooting and dismantling instructions in paper and electronic form with:

a. Recommended maintenance schedule

b. Any special tool required

15.0 **Testing of prototype and regular production assemblies:**

15.1 The supplier shall supply one prototype of door along with the documents indicated in this specification for approval before commencing bulk supply. The prototype and drawings shall be examined from all view points and this shall be fitted on the coach/ mock –up for checking the smooth running and proper fitment/ functioning of the doors. Supplier shall incorporate changes suggested by RCF in the prototype as well as bulk supply. The bulk manufacture shall be undertaken only after the approval of prototype sample by CDE/ RCF.

15.2 This clause is applicable for first supply of a supplier. However, RCF shall have the right to repeat prototype approval process in subsequent order also. In this regard, RCF decision shall be final.

16.0 **Compliance with various Standards/test methods:**

S.No.	Parameter	Standards/Test method	Remarks
1.	Vibrations and Shocks	IEC/EN 61373	• These tests are considered as Type test and shall be valid for 36 months from the date of issue or as specified. However, if the consignee or inspecting agency desires to do the type tests, before 36 months, the
2.	Electronic equipment that is being installed onto rolling stock (or rail vehicle).	EN 50155	
3.	Doors obstacle detection(force on obstacle)	EN 14752 clause 5.2.1.4	
4.	Fire protection on railway vehicles	EN 45545-2. R1, HL3	

5.	Electromagnetic compatibility	EN 50121-3-2.	supplier should not deny the same.
6.	Loadings of coach bodies and their components (Mechanical strength requirements)	UIC 566 appendix-9	
7.	Endurance test	500,000 cycles	• Firm/OEM shall have in house test facility. Firm/OEM shall submit valid test certificate against Endurance test during prototype approval.

16.1 All the testing shall be conducted by NABL accredited Lab for that particular test. The fire & smoke requirements tests as per EN 45545-2 shall be conducted by either NABL accredited Lab for these tests or testing lab accredited as per ISO/IEC-17025 to perform/conduct fire test as per EN 45545-2 (Proof of same shall be submitted).

17.0 **Up gradation of design:**

17.1 Supplier may offer alternate design of doors for all the above or any of the above clauses with a view to upgrade the design. The supplier in such case shall give clause wise justification. Doors 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.