

**RAIL COACH FACTORY, KAPURTHALA**

**MD46111**

**Date: 24.10.2019**

**Sub:** Specification no. MDTS-24324 Rev-0 for schedule of technical requirements for manufacturing and testing of Dustbin Compactor.

Please find a copy of spec. no MDTS-24324 Rev-0 for schedule of technical requirements for manufacturing and testing of Dustbin Compactor enclosed herewith.

*M. J. S.* 24/10/19  
**Dy. CME/D-2**




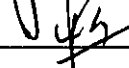
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## 1 FORWARD:

- 1.1 This specification covers general and technical requirements of dustbin with compaction arrangement for LHB design coaches running over Indian Railways.
- 1.2 This specification draws reference to some of the relevant of C-K201, RDSO/PE/SPEC/AC/0184-2015, ELRS/SPEC/ELC/0019, IEC 61373, IEC 60529, IEC 60068, EN45545 and IEC 60571. For dated references, only the edition cited applies. For undated references, the latest edition of the reference document (including any amendments) applies.

## 2 SCOPE

This specification covers general and technical requirements of dustbin with compaction arrangement for LHB design coaches to provide more space for collection of garbage in coaches by electro-mechanical compacting arrangement.

## 3 SCOPE OF WORK

- 3.1 The scope of work shall include design, manufacture, supply, installation, commissioning, performance testing and after sale service support of dustbin with compaction arrangement.
- 3.2 Suitable design of dustbin with compaction arrangement for LHB design passenger coaches for trial to Indian Railways.

## 4 DESIGN REQUIREMENTS

- 4.1 The Dustbin should generally be lightweight, portable, robust, easy to operate and maintenance free. All the equipment's and structural members of dustbin with compaction arrangement shall be made of non-corrosive material preferably stainless steel of grade 304 to RDSO specification no. C-K201 (with latest revision and amendments) or AISI 304 or Grade 304 to IS :6911.

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- 4.2 The design of dustbin with compaction arrangement should be compact in size and it should not require large space for its installation its overall length, width and depth shall not exceed 1240 mm, 410 mm and 250 mm respectively. For location and space envelope, drawing no. MI007362 may be referred. It should also be simple in design for easy handling by Railway staff at maintenance depots/workshops. The installation of the dustbin with compaction arrangement should be easy and should not require any special skills and tools & plants.
- 4.3 Total capacity of Dust Bin compactor shall be 50 Liters. Dust Bin compactor shall have provision for collection of liquid/semisolid waste separately.
- 4.4 The dustbin with compaction arrangement should work satisfactorily under the following operating conditions of IR coaches and should not affect functional requirements of dustbin with compaction arrangement.

#### A. Coach Dynamics:

Equipment shall withstand satisfactorily the vibrations and shocks normally encountered in service as indicated below:

- Maximum vertical acceleration. 1.0g
- Maximum longitudinal acceleration 3.0g
- Maximum transverse acceleration 2.0g
- The vibrations are of sine wave form and the frequency vibration is between 10Hz to 50 Hz.
- The amplitude 'a' expressed in millimeters is given as a function 'f', by equations:
- $a = 25/f$  for values of f from 1 Hz to 10Hz.
- $a=250/f^2$  for values of f exceeding 10Hz and up to 50 Hz.
- In the direction corresponding to the longitudinal movement of the vehicle, the dustbin

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with compaction arrangement should be capable of withstanding for 30 min. at 50 Hz vibrations of such a value that the maximum acceleration is equal to 3g.

**B. Coach-body displacement encountered under dynamic conditions:**

- i. Vertically- ±100 mm
- ii. Laterally - ±55 mm
- iii. Longitudinally- ±10 mm
- iv. Bogie rotation about center pivot-±4°

**C. Ambient conditions for a coach fitted with dustbin with compaction arrangement:**

- i. Ambient temperature: -4° C to 50° C  
Altitude: Sea level to 2500m  
Relative humidity: 40% to 95%
- ii. The rainfall is fairly heavy.
- iii. During dry weather, the atmosphere is likely to be dusty.
- iv. Temperature variations can be quite high in the same journey or short period of time.
- (v) Coaches operate in coastal region with continued exposure to salt laden air.

**4.5 Following Compaction mechanism and Electric mover to be used :**


- 4.5.1 Telescopic ram type  

OR
- 4.5.2 Ball screw with ram  

OR
- 4.5.3 Better mechanism than above.

  
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4.5.4 BLDC type electrical motor of reputed make .

4.5.5 Option to provide motor other than BLDC may be given provided adequate justification is given by the firm.

4.6 Noise during operation shall not exceed 60 db.

4.7 All electronic equipment, PLC, Switchgears, junction boxes shall be IP 67 protection.

4.8 It should not bulge due to compaction force applied by the compaction arrangement of garbage.

4.9 The design of dustbin with compaction arrangement should be injury free. Sharp edges and corner should be avoided.

4.10 The body of the unit shall be constructed with sufficient degree of resistance against safety hazards. The enclosure shall be secure and stable and should provide adequate protection against moving and electrically energized parts. Switches and controls should be protected against penetration of fluids and should have level of protection equivalent to IP67. The controls (i.e. switches, knobs, etc.) should be visible and clearly identified. Device design should prevent misinterpretation of displays and controls settings.

4.11 The design of literbin of dustbin with compaction arrangement shall be portable, robust, easily detachable from dustbin compaction 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 not interfere the free movement of passengers.

**4.12 POWER SUPPLY:**

4.13 110V DC supply is available in LHB AC and Non-AC EOG coach circuits. This supply varies from 90V to 140V with 15% ripple in AC & Non-AC EOG LHB type coaches. 24V DC supply level with tolerance of +25% & -30% is also available in LHB AC & Non-AC, SG and EOG coaches. Moreover, 750V/415V, 3-phase AC 50Hz is also

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available in Rajdhani/Shatabdi Express type coaches only.

4.14 If any power is required, the equipments are to be so designed to withstand 30% voltage fluctuation.

4.14.1 Max current required shall be 12 A.

4.14.2 DC-DC converter of reputed and established brand should be used or made in-house and be able to withstand  $\pm 30\%$  voltage fluctuations, 2KVA surge,  $\pm 10\%$  ripple and complying with IEC 60571 or any equivalent international standards. Industrial Grade Components to be used in all electronic items.

OR

DC-DC convertor of make as approved at S. N. 68 of BOM (Bill of Material) of specification no. RDSO/PE/SPEC/AC/0184-2015 (Rev.0) for Switch Board Cabinet for LHB type AC EOG Coaches should be used.

4.14.3 Requirements of electrical power per dustbin with compaction arrangement shall be not be more than 750 watts.

4.14.4 In case of power failure, inlet of compactor should be openable(manually) and it should act as a normal dustbin.

4.14.5 Control Panel of dustbin with compaction arrangement should have necessary ventilation to avoid over heating of electrical components.

4.14.6 Safety arrangement such as detection of earth leakage and shock prevention should be provided.


4.14.7 Suitable indication on dustbin with compaction arrangement in the form of indicator lights should be provided for following purpose.

4.14.7.1 Litter Bin Full

4.14.7.2 Ready to use

  
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4.14.7.3 Compaction

4.14.7.4 Service

- 4.15 The compacting plate should travel till more than one third depth of total height of litter bin for proper compaction. The stroke should vary with the amount of waste in litter bin and stroke should reduce when waste will increase. A minimum load should be 600 kg for compaction process.
- 4.16 The entire compaction cycle should not exceed 45 seconds of dust bin with compaction arrangement.
- 4.17 The litter bin should accommodate waste minimum ten times of the actual capacity of litter bin after compacting.
- 4.18 Bought out items from a reputed and established brand should be used or made in-house for dust bin with compaction arrangement.
- 4.19 The inlet opening of dustbin should remain close when not in use & should open automatically with the help of electronic sensors whenever waste is required to put inside. Proximity sensors and IR (Infrared sensors) to be used.
- 4.20 The opening & closing mechanism of inlet opening of dustbin should have sufficient safety features to avoid any injuries. (Electrical)
- 4.21 The dustbin should have electronic indications for guidance in Hindi and English.
- 4.22 During compaction the inlet opening/closing flap of dustbin always close for safety reasons.
- 4.23 The dustbin should preferably in two parts (the electronic & bin collector) in separate enclosure to ensure durability and long life.
- 4.24 The inlet opening should be of size minimum 250mmX125mm so as to easily accommodate standard disposable water bottle, food plates and sweet boxes etc.
- 4.25 The outside of the dustbin housing should be plain and free from any hardware

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fitment and should be finished properly.

**5 TESTS :**

All the test shall be carried out at BIS/NABL/MOEF approved laboratory.

(a) The vendor/supplier shall also repeat the type of tests in following cases at their cost.

**5.1 TESTS REQUIRED**

5.1.1 Vibration and Shock Test to IEC-61373 for BLDC Motor, Drive & Power Supply.

5.1.2 Degree of Protection provided by enclosures (IP Code) to IEC60529.

5.1.3 Environment Testing to IEC 60068.

5.1.4 Fire safety to EN45545

5.1.5 Wires required as per RDSO Specification No. ELRS/SPEC/ELC/0019 Rev.3.

- 1C X 0.75SQMM (polyolefin insulated & unsheathed single core 750v)
- 1C X 2.5SQMM (polyolefin insulated & unsheathed single core 750v).


5.1.6 Electronic Equipment's used on Rail Vehicles Test- IEC60571 (for BLDC Motor with Drive).

Following-tests should be as per IEC-60571:

1. Visual inspection
2. Performance check
3. Cooling test
4. Dry heat test
5. Damp heat test (only motor)
6. Voltage surge test

  
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7. Insulation measurement test (before voltage withstand test)
8. Voltage withstand test
9. Insulation measurement test (after voltage withstand test)
10. Below temperature storage test.

6. Prototype approval :

For the first time supplier the prototype approval will be required from the consignee. In case of any design change prior approval shall be obtained from the consignee. Prototype shall be checked as per following :

1. Dimensional check as per drawings.
2. Proper working of system.
3. The supplier must also submit the following documents along with prototype for approval:
  - System description and installation drawings in sufficient detail to evaluate the system design.
  - Certificates of the material used in the various components of the system.
  - Test reports as mentioned in Clause 5.0.
  - Complete maintenance manual including troubleshooting and dismantling instructions in paper and electronic form.
  - List and likely sources for procurement of spare parts/consumables required for maintenance.

7. **SPARE PARTS/CONSUMABLES :**

7.1 The vendor/supplier shall recommend a list of spare parts/consumables required for day to day maintenance of Dustbin with compaction arrangement and spares/consumables in the form of kit for the various sub-assemblies for the maintenance. The list shall give the estimated maintenance frequency, batch no./part number, quantity and price of each

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component or as per kit.

7.2 The vendor/supplier shall ensure availability of all spares/consumables of the Dustbin with compaction arrangement for a period of 5 years. This shall be irrespective of the fact whether the vendor/supplier or his sub vendor/(s) have stopped manufacturing of the equipment/(s) to the design supplied to Indian Railway.

## 8. GUARANTEE/WARRANTY AND REPLACEMENT

The supplier/vendor of Dustbin with compaction arrangement shall be fully responsible for satisfactory functioning. The warranty period for Dustbin shall be 36 months from the date commissioning. The supplier/vendor shall replace the items/equipments rejected due to their non-compliance with the requirements of this specification and/or the products those are failing or providing unsatisfactory service due to defective design, material or workmanship within warranty period by product/(s) complying with the requirements, free of cost within a period of 15 days.

## 9. MARKING :

Each unit of Dustbin with compaction arrangement shall be legibly marked to indicate the followings:

1. Name and code of the manufacturer.
2. Month and year of manufacture.
3. Identification marks, i.e. Part Number, Batch Number, etc.
4. Rated capacity.

## 10. TRAINING:

The supplier/vendor shall arrange free of cost training to Indian Railways. Personnel in operation, maintenance and trouble shooting of the Dustbin with compaction arrangement. The venue and period of training should be mutually agreed between supplier/vendor and purchaser/consignee/Indian Railways.

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**11. INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS (IPR)**

Indian Railway shall not be responsible for infringement of IPR arising due to similarity in design of Dustbin with compaction arrangement, manufacturing process, components used in design, development and manufacturing equipment and any other factor, which may cause such dispute. The entire responsibility to settle any such disputes/matters lies with the manufacturer/ supplier.

**12. PACKING**

The supplier/vendor shall be responsible for proper and adequate packing of Dustbin with compaction arrangement in assembled condition before dispatch to prevent damage in transportation, handling and storage.

**13. INSTALLATION AND COMMISSIONING**

- a. The vendor/supplier shall consult coach manufacturing unit or a unit nominated by the consignee/purchaser/Indian Railways with respect to relevant coach detailed drawings. It would be better on the part of the vendor/supplier to visit and physically assess the existing LHB Coaches for better appreciation of the work contents.
- b. Mounting & Installation of Dustbin with compaction arrangement on the designated coach/coaches shall be carried out by the vendor/supplier at consignee's premises or the place decided by the consignee/purchaser/Indian Railway. The space envelop for fitment of Dustbin with compaction arrangement has been given at Annexure-I of this specification.
- c. The Dustbin with compactor system installed and commissioned shall be checked by the vendor/supplier for proper functionality and performance.

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d. The vendor/supplier shall follow all the safety measures and precautions at the time of installation & commissioning of Dustbin with compaction arrangement at the site.

e. The installed and commissioned Dustbin with compaction arrangement shall be subjected to a field trial of 12 months from the date of commissioning on LHB Coaches.

#### 14. MAINTANANCE

14.1 The vendor/supplier shall be liable for all scheduled and un-scheduled repairs of dustbin with compactor system installed by them for the satisfactory performance for the entire trail period.

14.2 The fault noticed or complaints received during trial period shall be rectified by the vendor/supplier free of cost by next trip or at first availability of the coach at maintenance depot or within 48 hours of the receipt of the complaint. For scheduled replacement of spares/consumables of Dustbin with compactor system, the arrangement of spares/consumables shall be done by mutual agreement between purchaser/consignee/Indian railway and manufacturer.

14.3 The vendor/supplier will be also liable to depute his staff to investigate and attend specific problems arises in operation of dustbin with compactor system during trial period, if requested by the consignee/Indian Railways.

14.4 The vendor/supplier shall supply operation and maintenance manual with each Dustbin with compactor system free of cost in hard and soft copies to consignee for proper maintenance of dustbin with compactor system. The manuals shall be self-illustrated, having principle of operation, maintenance schedule of all the proprietary items of the dustbin with compactor system being supplied by them. The Manual shall also contain information on the following:

• Details of attention required during maintenance schedules of LHB Coach/

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(es).

- Typical defects and their remedial measures.
- List of spares kit for day-to-day maintenance and for maintenance schedule in the form of periodic overhaul kit.
- The vendor/supplier shall also submit the frequency and detailed work content of various inspection/maintenance schedule necessary for maintenance of the dustbin with compactor system.
- Whether these requirements are time based or otherwise shall be indicated for each schedule.
- The vendor/supplier shall also supply Wall Charts (pictorial view showing all components name along with their part Nos.) of all equipments of the dustbin with compactor system along with the equipments being supplied by them for display in maintenance depots.

  
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