Rail Coach Factory, Kapurthala

MD22301

Date: 19.09.16

Sub: Issue of revised specification MDTS-49281, Rev-04 for Vacuum Evacuation System for IR-DRDO Bio-toilets for LHB coaches.

Please find enclosed the revised specification MDTS-49281, Rev-04.In order to clarify the limits of available pneumatic and power supply in the coach, amendment in clause 4.10 has been made.

All concerned are requested to take necessary action.

19/9/16
(Lalit Kishore)
Dy CME/D-I

Encls: MDTS-49281, Rev-04 (05 pages)

Dy CPLE-II
Dy CMM/LHB/Fur/HSQ

SSE/Lib/Design
SSE/Record (With Original Specification)

Copy for kind information to:

Dy CPLE-III
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CPLE
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Specification	Specification For Vacuum Evacuation System for IR-DRDO Bio-Toilets of LHB Coaches	MDTS 49281 REV-04 PAGE 1 OF 5 DATE: 19.09.16

Name	Designation	Signature	Date	Level
Ashwani Kumar	SSE/Design		19.9.16	Prepared
Lalit Kishore	Dy CME/D-1		19.9.16	Reviewed/Agreed
A.K.Kathpal	CDE		19.9.16	Approved

Rev. No.	Details of Changes	Date
01	1. In clause 4.6 the word "toilet" replaced with "Vacuum evacuation". 2. In clause 4.12 the " mentioned in para-5" added. 3. In clause 4.28 the word "tank" replaced with "Vacuum evacuation system". 4. Clause 4.31 added.	04.11.15
02	1. Option for alternate design of valve and pump mentioned in clause 4.7 and 4.14. 2. bio-tank is full, Signal indicating the level of use and Stepwise reverse cycle deleted from clause 4.15, 4.26 and 4.8.	28.11.15
03	Clause 4.2, 4.6 and 4.9 amended. Clause 4.4, 4.7, 4.8, 4.10, 4.13 to 4.16, 4.20, 4.25, 4.26, 4.28, 4.30 and 4.31 deleted and renumbering done.	17.06.16
04	In order to clarify the limits of available pneumatic and power supply in the coach amendment in clause 4.10 has been made.	19.09.16

Prepared By	Agreed By

1. **PREAMBLE:**

1.1. This technical specification covers the general conditions, technical requirements, inspection, testing procedures, repair and maintenance services to be provided during the warranty period for Vacuum evacuation system.

1.2. Vacuum evacuation system for IR-DRDO bio-tanks will transfer the feacal matter from the bowl/pan to the bio-tank by positive suction and also clean the lavatory bowl/pan with pressurised jet automatically.

2. **ELIGIBILITY CRITERIA:**

2.1. The tenderer must submit detailed clause-wise comments on the specification. In absence of above, offers shall be deemed as incomplete and may not be considered.

2.2. Firm should be a proven supplier of vacuum evacuation system and should have supplied atleast 500 vacuum evacuation systems or vacuum toilets either by them or by their principles. They should have well-established manufacturing and testing facilities. They should submit M&P and records of previous supplies along-with the offer. In absence of this information, offers shall be deemed as incomplete and may not be considered.

3. **SCOPE OF SUPPLY:**

3.1. Vacuum evacuation system including pressurised bowl/pan cleaning arrangement. The connection between lavatory bowl/pan and bio-tank, all plumbing and electrical wiring will be in the scope of tenderer.(Bio-tank, mounted below lavatory, will be in the scope of IR).

3.2. Lavatory pan (Oriental or Western style depending upon the type of lavatory).

3.3. Supply, Installation and commissioning will be in the scope of tenderer.

4. TECHNICAL REQUIREMENTS

4.1. The tenderer shall use the existing space of lavatory module of LHB coaches and lavatory pan size to install Vacuum evacuation system along with the bowl of Oriental and Western style. Drawing nos: 1.10113.0.30.000.013 alt-DR7 and 1.10113.0.30.000.015 alt DR6 of lavatory modules indicating size are enclosed.

4.2. The vacuum evacuation system shall be designed such that it vacuums out the waste in both toilet systems with minimum use of water to bio-digester tank installed under the carriage.

4.3. The Vacuum evacuation system shall be compact , made of mainly stainless steel, clean, free of odor, hygienic and aesthetical.

4.4. The main controller shall have indications to show different operations and faults.

4.5. The Vacuum evacuation system shall be strong, reliable and shall require minimal maintenance, and the work to be carried out at interim stations shall be minimal. In case of a malfunction of the Vacuum evacuation system, the evacuation system should be replaced in a short time.

4.6. The amount of water consumption needed for effective cleaning of the Western/Oriental bowl shall be about 0.5 liters.

4.7. All parts of the vacuum toilet system installed under the carriage shall be at least 225 mm above the head of rail level and it shall not restrict the free movement of bogies or the periodical repair-maintenance work.

4.8. All mechanical, pneumatic, hydraulic, electrical and electronic components of the vacuum evacuation system shall operate under the conditions mentioned in para-5 without any problems.

4.9. The weight and locations of the components of the vacuum toilet systems shall not disturb the static and dynamic safety of the coach. Relevant and necessary measures must be taken for this.

4.10. The required energy for the vacuum evacuation system shall be provided from the pneumatic and electrical circuits of the coach. A limited quantity of air supply of 15 lit/min./Coach can be made available at 6 Kg/cm2 for the system. For electrical supply, 110 Volt AC power supply only can be made available. Total peak power requirement per toilet shall not exceed 800 Watts. Any other voltage rating required for operation shall be derived by the firm from 110 Volt AC available limiting the maximum power requirement to 800 Watts per toilet".

4.11. The vacuum toilet shall be designed for a usage of 150 times within 24 hours.

4.12. The system must be designed in a way that the service crew does not get in physical contact with the waste water during the daily cleaning process. Before the maintenance-repair work, it shall be possible to empty the system completely and to give pressurized water. In the event of blockage, all the lines shall be closed and the blocked toilet shall be easily cleaned up by increasing the vacuum in the tank.

4.13. There will be a bio-digester tank under each toilet. Each vacuum evacuation system unit shall evacuate the waste into the same.

4.14. All pipes in the toilet systems shall be fitted with effective sealing systems.

4.15. The air shall be supplied at 6 bars.

4.16. All components and sub-assemblies will be manufactured to a standard for high level of ruggedness, corrosion resistance, reliability and long-life. There should be no maintenance requirement like painting, lubrication, oiling, periodic tightening of fasteners etc. All fasteners should be of locking type and should not get loose due to coach vibration. If due to any technical/commercial reason, a component/part or sub-assembly does not meet these requirements, it should be clearly spelt out in the offer and the maintenance requirements shall be furnished. However if any choking or malfunction occurs due to any unforeseen reason,

tenderer will rectify it under warranty with proper tools and equipments to ensure cleanliness and hygiene in the depot.

4.17. The tenderer should have established quality control system and organization to ensure quality of the product and should be an ISO 9000 certified company or should have an internationally certified quality control system.

5. OPERATING CONDITIONS

5.1. Ambient Conditions:

- -4^0C to 55^0C with 100% humidity and dust, high-humidity air with salt content. System and its components should not get damaged in these conditions. Temperature variations can be quite high in the same journey or short period of time. Most coaches are based in coastal cities, with continued exposure to salt laden air.
- Air supply pressure: min 6 bar

5.2. **Car-body dynamics and forces on retention tank system:**

±100 mm vertically
±55 mm laterally
±10 mm longitudinally
$\pm 4^0$ bogie rotation about centre pivot
Fitment installation and commissioning with two safety ropes of SS should be done to ensure safety along with positive mounting.

6. MARKING

6.1. Manufacturer's name with the serial/batch number along with month and year of manufacture shall be marked at a visible location for identification.

7. TESTING AND APPROVAL OF PROTOTYPE

7.1. Tenderer must submit and get approval of Quality Assurance Plan from CDE/RCF before taking up prototype manufacture.
7.2. One prototype of each variant shall be fitted on coach at RCF by CDE/RCF. After approval of prototype firm will do the bulk supply. Supplier has to incorporate any changes noticed during the inspection without any additional cost.
7.3. Test certificates to be submitted by the manufacturer for raw material and testing of all critical components/assemblies.

8. DOCUMENTATION AND TRAINING:

8.1. Following the acceptance of the prototype, contractors shall provide an information pack about the vacuum toilet systems in English. The information should be both printed and in electronic format and shall be provided to IR.

- Operating and maintenance instructions,
- Installation instructions ,