

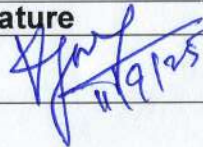


GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

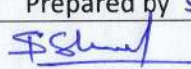

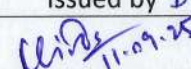
Functional Requirement Specification (FRS) of Water-Less Urinal for Electric
Locomotives

FRS No.: RDSO/2023/EL/FRS/0034 (Rev. 02)

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Approved by	Signature
PED/ PS & EMU	 11/9/25

RESEARCH DESIGNS AND STANDARDS ORGANISATION
LUCKNOW-226011

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		 11.09.25

Functional Requirement Specification (FRS) of Water-Less Urinal for Electric Locomotive

1. OBJECT:

This FRS covers construction features and technical requirements of Water-Less Urinal module suitable for men & women for Electric Locomotive application.

2. GENERAL

- 3.1. IR has always endeavour to provide best in class facilities to the passengers. Provision of superior toilets in trains has been one of the key focus areas of IR. In the same pursuit, it becomes imminent for IR to provide safe and hygienic urinal facility to its LOCO pilots who are the fountain head of the exemplary services offered by IR to its passengers.
- 3.2. Considering the riding shocks and vibrations sustained by the locomotive on run, the robustness of the system with respect to its capability to endure higher vibrations and shocks becomes all the more important.

3. Technical requirement:-

- 3.3. Maximum envelope size of water-less urinal module should not be more than 1050 (L) X 600 (W) X1830 (H) mm.
- 3.4. The sheets used for construction of the waterless urinal unit which will be of stainless steel have a minimum thickness of 1.0 mm. The panel shall be sandwich puff filled.
- 3.5. It should be provided with single WC type bowl which is suitable for use by both man and woman. The spring loaded commode seat shall be used to keep commode cover normally in upright position.
- 3.6. Material of bowl should be Stainless steel.
- 3.7. Coating such as high grade epoxy coating, nano coating (minimum thickness 2 mm) etc. should be there on bowl so that urine should not stick to bowl.
- 3.8. Any proven technology to prevent odour such as membrane traps, liquid sealant cartridges etc. should be there. Naphthalene balls chamber can also be fitted in the bowl.
- 3.9. Discharge of urine should be directly gravitational to the ground through suitable drain pipe arrangement. To drain excess water during washing, an additional hole will be required on the floor of the urinal, which will drain from the main hole i.e. the outlet of the additional hole will have to be connected to the main hole. The location of the main discharge should be such that it does not adversely affect nearby equipment. The slope of the floor should be drain hole side.
- 3.10. There should be UV LED light based sanitization system for sanitizing the bowl. The arrangement of UV light inside the bowl should be such that the entire bowl should be sanitized. The UV Light arrangement should be protected from urine during use and from water or cleaning agent during cleaning. The calculation for

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the number of UV LED required for sanitization of the entire bowl shall be submitted. Bowl should be easy to clean whenever needed with toilet cleaner agents.

- 3.11. Complete system should be work 110 V DC. Operating voltage range is Maximum-138 V Minimum-72 V.
- 3.12. A computerized processing unit should be there to interface with an external micro-processor i.e. locomotive microprocessor for interlocking the permission for usage of toilet only at zero speed. Interlock of Waterless Urinal unit with the locomotive will be done.
- 3.13. The urinal should be fitted with an occupancy sensor that will turn on the exhaust fan and light during use and turn off the light after 02 minutes and exhaust fan after 30 minutes after use. Apart from this, UV light and perfume dispenser should work after using the urinal. The UV light shall be turned on for 02 minutes. The frequency of operation shall be optimized with use of Water Less Urinal.
- 3.14. Auto door closer should be provided in Water Less Urinal.
- 3.15. Indication should be given in case the Water Less Urinal door is left open and also red indication lamp for occupied and green indication lamp for vacant should be provided on the front side above the door.
- 3.16. Emergency push button should be provided inside near the door for exit in case of emergency.
- 3.17. Waterless urinal unit should be provision for isolate (electrically/electronically) and integrated with the locomotive by Switch / Push button. The door should be remained closed in the isolated condition.
- 3.18. Complete design of urinal cabin should be such that it can with stand the vibration being generated during running and it should be easy to install and dismantle from locomotives. Shock and Vibration test shall be carried out as per IEC-61373 or (latest) on complete unit.
- 3.19. It should be fitted with urinal mat as well as automatic and power supply-based perfume dispenser to reduce the odour and the quantity of perfume should not be less than 300 ml.
- 3.20. It should be fitted with a sensor and power supply-based hand sanitizer dispenser, the quantity of which should not be less than 900 ml.
- 3.21. There should be a provision to keep the door closed from inside while using the urinal.
- 3.22. For convenience of crew following items should also incorporated in product i.e Door Handle (inside & outside), handrail, Door latch, Led Light, exhaust fan for proper ventilation etc.
- 3.23. Instructions for use of the waterless urinal and other instructions should be given in radium/reflector/self-illumination on the inside of the unit (on the side the person face while urinating) and on the outside of the door. Instructions should be

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written in English (**Only for Urination**) and Hindi (केवल पेशाब/मूत्र के लिए) and letter / word font size should be between 80-100.

3.24. Marking:

- (i) Name of Manufacturer
- (ii) Month & Year of Manufacture e.g. XX/20XX
- (iii) Serial Number

- 3.25. The firm shall have the following machinery & Testing equipment which will be verified at the time of prototype testing:

SN	Equipment	Range
1.	Hydraulic press	Min. 25 ton
2.	Rolling machine	Min. 1 mm thick plate
3.	TIG welding machine	---
4.	Shearing machine/ Laser cut machine	Min. 1 mm thick Bed length 2000 mm
5.	Drilling machine.	---
6.	Grinding machine.	---
7.	Spray painting machine.	---
8.	Punching machine.	---
9.	Buffing machine.	---
10.	Bending machine.	---
11.	Rivet Gun.	---
12.	variable D C power supply	Range 0 -150 V DC
13.	Measuring tape	0-3000 mm
14.	Vanier Calliper	0-200 mm
15.	Digital multimeter	---
16.	Lux meter	---
17.	Micrometre	0-25mm
18.	Coating thickness gauge.	---

- 3.26. The firm should possess valid ISO certification.

4. Approval of Design:

The design shall be developed as per requirement given above. The detailed design shall be submitted for scrutiny and approval before commencing the manufacturing. The supplier's shall be responsible for performance of complete system.

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