



भारत सरकार
रेलवे विभाग
नई दिल्ली-110001
फोन: 230011
फैक्स: 230010
टेलीफोन: 230010

Government of India Ministry of Railways
Research Designs & Standards Organisation
Lucknow - 226 011
DID (0522) 2480115
DID (0522) 2480310



No. MC/CB/LF/WLI

Dated. 18-07-2025

प्रमुख मुख्य यंत्रिक अभियन्ता

- 1- मध्य रेलवे, छत्रपति शिवाजी टर्मिनस, मुम्बई- 400 001.
- 2- पूर्वरेलवे, फोयरली प्लेस, कोलकाता- 700 001.
- 3- उत्तर रेलवे, बड़ीदा हाउस, नई दिल्ली- 110 001.
- 4- दक्षिण रेलवे, पार्क टाउन, चेन्नई- 600 003.
- 5- दक्षिण मध्य रेलवे, रेलनिलयम, सिकन्दराबाद- 500 071.
- 6- दक्षिण पूर्व रेलवे, गार्डन रीच, कोलकाता- 700 043.
- 7- पूर्वोत्तर रेलवे, गोरखपुर- 273 012.
- 8- पूर्वोत्तर सीमान्त रेलवे, मालीगौंव, गुवाहाटी- 781 011.
- 9- पश्चिम रेलवे, चर्चगेट, मुम्बई- 400 020.
- 10- पूर्व मध्य रेलवे, हाजीपुर- 844 101.
- 11- पूर्व तटीय रेलवे, बीडीए रेंटल कालोनी, रेलवे काम्प्लेक्स, चन्द्रशेखरपुरा, भुवनेश्वर, उड़ीसा- 751 016.
- 12- उत्तर मध्य रेलवे, हास्टिंग रोड, इलाहाबाद- 211 001.
- 13- उत्तर पश्चिम रेलवे, जयपुर- 302 006.
- 14- दक्षिण पश्चिम रेलवे, हुबली- 580 023.
- 15- पश्चिम मध्य रेलवे, जबलपुर- 482 001.
- 16- दक्षिण पूर्व मध्य रेलवे, आर ई आफिस काम्प्लेक्स, बिलासपुर- 495 004.

Sub:- Issue of corrigendum no. 1 of the specification no. IS/RDSO-CG/0002:2025 Revision Nil for "specification for IoT based water level indicator system for Indian Railway passenger coaches".

Ref:- (i) Railway Board letter no.96/M(C)/141/77-I dated 29-11-2024.
(ii) This office letter No. MC/CB/LF/WLI dated 24.06.2025

Vide this office letter at Ref (ii) RDSO specification no. IS/RDSO-CG/0002:2025 for IOT based water level indicator system for Indian Railway passenger coaches was issued. In continuation to above corrigendum no. 1 of the specification no. IS/RDSO-CG/0002:2025 Revision Nil for "specification for IoT based water level indicator system for Indian Railway passenger coaches" is being issued for necessary action please.

DA: As above

Anurag
(Anurag Malik)
Director / SS / Carriage

प्रतिलिपि :-

1. कार्यकारी निदेशक यंत्रिक (कोचिंग), रेलवे बोर्ड, रेल भवन, नई दिल्ली -110001
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Ref: CG-WI-4.2.1-1 Ver. 1.0	Page 1 of 16	Date of issue: July 2025	IS/RDSO-CG/0002:2025
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INDIAN RAILWAYS



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Document content	Technical Specification	Yes
	Schedule of Technical Requirement	No
Description of item	SPECIFICATION FOR IOT BASED WATER LEVEL INDICATOR SYSTEM FOR INDIAN RAILWAY PASSENGER COACHES	
Remarks	Nil	

S.No.	Month /Year of issue	Revision / Amendment	Page No.	Reason for Amendment
1.	May 2025	Nil	N. A.	First Issue
2	July 2025	Corrigendum 1	N.A.	Inclusion of omitted correction.
3				

Issued By:

Carriage Directorate

Research Designs and Standards Organisation
Manak Nagar, Lucknow - 226011.

Signature	<i>Ashish</i>	<i>Agarwal</i>	<i>Anurag</i>
Name & Designation	JE Design/ Carriage Prepared By	SSE Design/ Carriage Checked By	Director/ Carriage Approved By

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
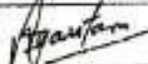
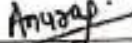
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CORRIGENDUM -1 of IS/RDSO-CG/0002:2025 Revision Nil for specification for IoT based water level indicator system for Indian Railway passenger coaches.

Correction in clause no. 9.1 of the final draft specification was left over by mistake; same has been included in clause no. 9.1 of the specification IS/RDSO-CG/0002:2025 Revision Nil and now shall be read as below.

"9.1 After successful prototype approval of the complete system, 20 coach set shall be installed & commissioned by the vendor / supplier for field trials of at least 03 months before bulk supply, shortfall in trial period due to stabling of coaches or any other unforeseen reasons shall get extended. However field trial shall not be required for those vendors who had already supplied WLI and their communication protocol is established with CRIS."

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WEST CENTRAL RAILWAY



Office of the
General Manager
Mechanical Branch
Jabalpur

Date: 25-06-2025

WCR/M/C/02/251

**Sr. DME(Chg.)
JBP/ BPL/ KOTA**

Sub:- Issue of Specification no. IS/RDSO-CG/0002:2025 for "Specification for IOT based water level indicator system for Indian Railway Passenger Coaches."

Ref:- RDSO letter No. MC/CB/LF/WLI, Dated- 24-06-2025

Vide letter under ref the RDSO has issued the specification no. IS/RDSO-CG/0002:2025 for "Specification for IOT based water level indicator system for Indian Railway passenger coaches."

This is for your information and necessary action please.

Encl: Letter under ref with RDSO spec.


(Manish Kumar Patel)
Dy. CME/CHG/WCR

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No. MC/CB/LF/WLI

Dated, 24-06-2025

प्रमुख मुख्य यंत्रिक अभियन्ता

- 1- मध्य रेलवे, छत्रपति शिवाजी टर्मिनस, मुम्बई- 400 001.
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3. उत्तर रेलवे, बड़ौदा हाउस, नईदिल्ली- 110 001.
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Sub:- Issue of specification no. IS/RDSO-CG/0002:2025 for "Specification for IOT based water level indicator system for Indian Railway passenger coaches".

Ref: (i) Railway Board letter no.96/M(C)/141/77-I dated 29-11-2024.

In reference to Railway Board letter at ref (i), RDSO has finalised the specification no. IS/RDSO-CG/0002:2025 for IOT based water level indicator system for Indian Railway passenger coaches; same is being issued for necessary action please.

DA: As above

Anurag 24/06/25
(Anurag Malik)
Director / SS / Carriage

प्रतिलिपि :-

1. कार्यकारी निदेशक यंत्रिक (कोचिंग), रेलवे बोर्ड, रेल भवन, नई दिल्ली -110001
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Document content	Technical Specification	Yes
	Schedule of Technical Requirement	No
Description of item	SPECIFICATION FOR IOT BASED WATER LEVEL INDICATOR SYSTEM FOR INDIAN RAILWAY PASSENGER COACHES	
Remarks	Nil	

S.No.	Month /Year of issue	Revision / Amendment	Page No.	Reason for Amendment
1.	June 2025	Nil	N. A.	First Issue
2				
3				

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Carriage Directorate

Research Designs and Standards Organisation

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Signature	<i>Ashish</i> 23/06/2025	<i>Agarwal</i> 23/06/25	<i>Amrarp</i> 23-6/25
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INDEX

S.No.	Description	Page No.
1	PREAMBLE	3
2	PARTICULAR REQUIREMENTS	3
3	DEFINITION OF TERMS USED	4
4	SCOPE OF WORK	5
5	COACH OPERATING CONDITIONS	5
6	DESIGN REQUIREMENTS	6
7	TECHNICAL REQUIREMENTS	9
8	TESTING AND APPROVAL	11
9	FIELD TRIALS	12
10	INSPECTION	12
11	MARKING	13
12	DOCUMENTATION AND TRAINING	13
13	WARRANTY AND SPARES	13
14	INFRINGEMENT OF PATENT RIGHTS	14
15	ANNEXURE-I	15

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Ref: CG-WI-4.2.1-1 Ver. 1.0	Page 3 of 16	Date of issue: JUNE 2025	IS/RDSO-CG/0002:2025
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SPECIFICATION FOR IOT BASED WATER LEVEL INDICATOR SYSTEM FOR INDIAN RAILWAY PASSENGER COACHES.

1. PREAMBLE :

- 1.1. This technical specification covers general conditions, technical & operational requirements, design, supply, installation & commissioning, inspection, testing procedure of **IOT based water level indicator system for water tanks in passenger coaches.**
- 1.2. This specification also covers the preventive maintenance by supplier/vendor during warranty and AMC for post warranty period.
- 1.3. Real time water level indicator system for water tank of passenger coaches shall be designed primarily for monitoring of water level of water tank in real time and generating alerts / report of low water to the monitoring officials for refilling of water tanks at the nearest watering stations.

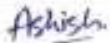
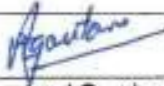

List of normative standards for reference

Sl. No.	Standard	Description
1	EN50155	Railway applications — Rolling stock — Electronic equipment.
2	IS/IEC 60529	Degrees of protection provided by enclosure (IP code)
3	EN 61373	Shock & vibration tests of rolling stock equipments.
4	ELRS/SPEC/ELC/0019	Technical specification for electron beam irradiated/chemically cured cross linked thin walled flexible elastomeric cables with copper conductors.
5	IS:17050-2023	Degrees of protection provided by enclosures for electrical equipments against mechanical Impact (IK code)

2. PARTICULAR REQUIREMENTS

- 2.1. Make in India policy of Govt. of India will apply
- 2.2. Water level indicator system for passenger coaches requires higher reliability of various components especially the critical components and reliable internet connectivity during entire journey for real time water level monitoring and syncing data with existing railway network (CRIS server).

Note: During tendering the firms shall comply the eligibility criteria specified by the purchaser.

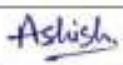


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- 2.3. Supplier / vendor should have design capability in the field of electronic instrumentation and IoT based networked devices for customized application. Documentation and credential for successful completion of design, installation and after sales service for at least one such application.
- 2.4. Firm should possess ISO: 9001 certificate issued by NABCB accredited certification body / International Accreditation forum (IAF) under multilateral Recognition arrangement (MLA) for its works address covering the items under manufacture, supply and installation etc. Firm should have established quality control system and organization to ensure quality of the product.
- 2.5. Firm should have well-established design facilities with qualified & competent design personnel and well established manufacturing facilities required for real time water level indicator system.
- 2.6. Firm should have in-house testing facilities to test the performance of all critical components of the complete system.

3. DEFINITION OF TERMS USED:

- 3.1. " **WLI system** " means IOT based water level indicator system for water tanks in passenger coaches.
- 3.2. " **Supplier** " means the firm/company on whom the order for the manufacture, supply, installation and commissioning and maintenance of the WLI System is placed or will be placed.
- 3.3. " **Purchaser** " means the Indian Railways on behalf of the President of the Republic of India who is purchasing the WLI system.
- 3.4. " **Inspecting Authority** " means the Organisation or its representative nominated by the Purchaser to inspect the WLI system on his behalf.
- 3.5. The Research Designs and Standards Organization, Manak Nagar, Lucknow-226011 is here after referred to as **RDSO**.
- 3.6. Indian Railways is hereafter referred to as **I.R.**
- 3.7. In case of any clarification in respect of any clause of this specification or drawings, the same shall be obtained from purchaser / ED Standard (Carriage), RDSO.
- 3.8. " **MPU** " Means main processing unit.
- 3.9. " **Web Server** " intended web server of Indian Railway /CRIS
- 3.10. " **IOT Device** " Internet of thing Device.
- 3.11. " **M2M** " means Machine to Machine communication.
- 3.12. " **CMS** " Portal means "Coach maintenance management portal of CRIS".
- 3.13. " **ICMS** " means "Integrated Coaching Management System " of CRIS.
- 3.14. CRIS means "Center for Railway Information System" an organization under Ministry of Railways.

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4. SCOPE OF WORK

The scope of supply includes the following subsystems:

- 4.1. Each Coach shall be equipped with following separate units along with required connectors and wiring for communication & power supply etc.

Sl. No.	Description of unit	Quantity per coach
1	Main Processing Unit along with enclosure unit. Description of Main Processing Unit shall be as per clause no. 7.1, 7.2, 7.5 of this specification.	01 per coach
2	Water level Sensor along with connector and wiring. Description of water level sensors shall be as per clause no. 7.4 of this specification.	01 per coach (for AC and SCN with under slung water tank pack) 02 per coach (for Non AC coaches fitted with Roof water tanks)
3	Supply and maintenance of e-SIM for M2M data connection for MPU main processing unit. Description and other requirement for maintenance shall be as per clause no. 7.3 of this specification.	01 per coach
4	In addition to above all items, hardware, pipe fittings etc required for installation and commissioning of WLI system shall be supplied by vendor.	As per requirement

5. COACH OPERATING CONDITIONS

Water level indicator system should function with full efficiency under following coach operating conditions.

5.1. Car-body dynamics:

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

- i) Maximum vertical acceleration 1.0g
- ii) Maximum longitudinal acceleration 3.0g
- iii) Maximum transverse acceleration 2.0g

The vibrations are of sine wave form and the frequency vibration is between 1 Hz to 50 Hz. The amplitude 'a' expressed in millimeters is given as a function of f, by equations

Signature	<i>Ashish</i>	<i>Agarwal</i>	<i>Amey</i>
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$a = 25/f$ 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 min. 2Hz to 50 Hz Vibrations of such a value that the maximum acceleration is equal to 3.0g. Maximum value for vibration level of the equipment shall be tested as per IEC 61373.

5.2. Coach-body displacement encountered under dynamic conditions.

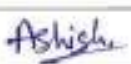
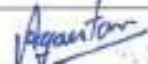
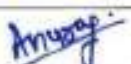
- | | | |
|------|------------------------------------|---------------|
| i) | Vertically- | ± 100 mm |
| ii) | laterally - | ± 80 mm |
| iii) | longitudinally- | ± 10 mm |
| iv) | bogie rotation about center pivot- | $\pm 4^\circ$ |
| v) | Maximum Speed of train - | 160 KMPH |

5.3. Ambient Condition:

- | | | | |
|--------|---|---|---|
| (i) | Altitude | : | Sea level to 2500m |
| (ii) | Operating temperature | : | -10°C to 55°C |
| (iii) | Max. Temperature under Sun | : | 70°C |
| (iv) | Relative humidity | : | 40% to 95% |
| (v) | The rainfall is fairly heavy. | | |
| (vi) | During dry weather, the atmosphere is likely to be dusty. | | |
| (vii) | Temperature variations can be quite high in the same journey or short period of time. | | |
| (viii) | Coaches operate in coastal areas with continued exposure to salt laden air. | | |
| (ix) | Airborne contaminants like smoke, chemical vapours, conducting particals etc. | | |
| (x) | Coaches may be subjected to frequent external washing with detergents and cleaning of toilets by cleaning agents. | | |
| (xi) | LHB type coach length over coupler is approximately 24 meters. | | |

6. DESIGN REQUIREMENTS:

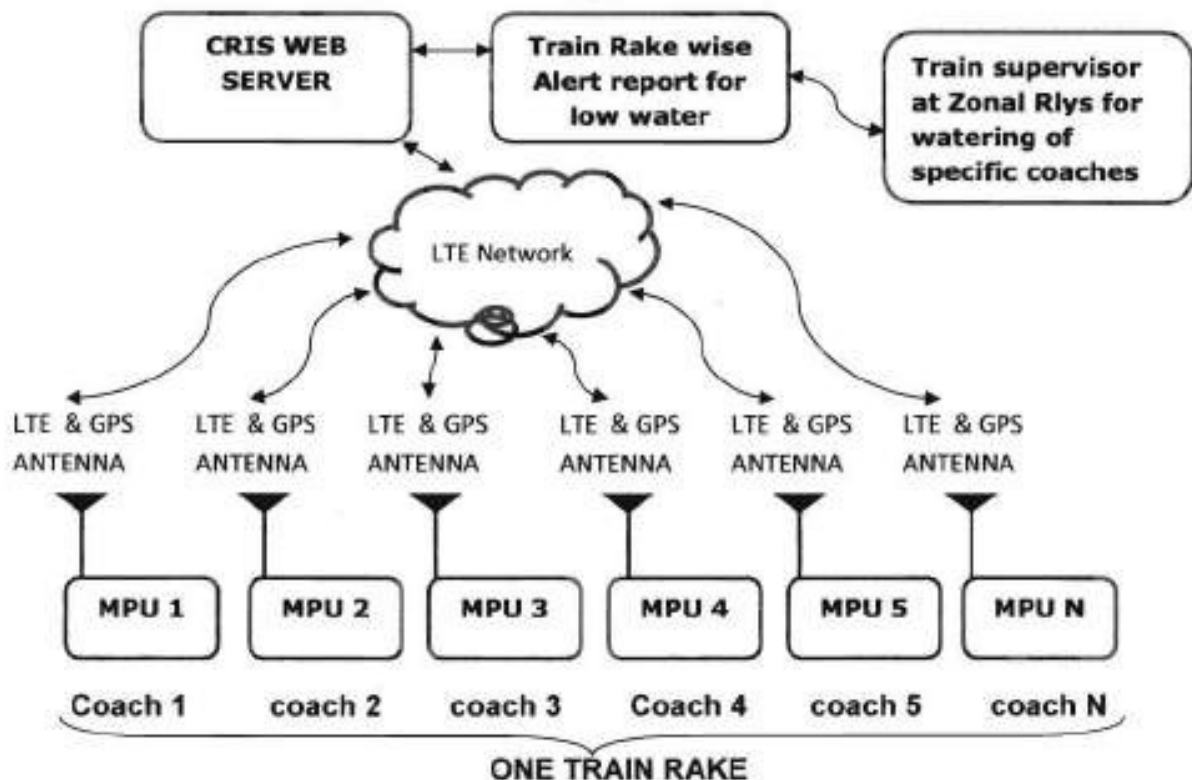
- 6.1. System shall be designed with hydrostatic water level sensor & IoT based MPU having connectivity of internet using 5G or 4G/LTE (M2M) through e-SIM of GSM network. In case of non availability of network automatic switching to available 4G or 3G/2G network.
- 6.2. Water tank shall be fitted with wired hydrostatic water level sensor and output signal shall be mapped / calibrated in main processing unit for water tank capacity in % available water out of installed capacity water tanks. Non AC coaches fitted roof water tanks shall have separate sensor for both end of coach.
- 6.3. The MPU shall monitor the corresponding signal of each water level sensor for conditioning & converting into digital form for uploading on cloud platform (preferably on CRIS sever). Frequency of polling water level data along with location, battery health, date and time stamp etc.

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- 6.4. The sensor data mapping program (program to convert the output signal of the sensor to a percentage of available water out of total volume installed) should be stored in the non volatile memory of MPU unit to facilitate conversion from raw data to water level percentage of installed capacity. Software should be able to compensate the atmospheric pressure variation of different geographic location of pan India rail network.
- 6.5. All MPU must have a unique ID (MAC ID of the microprocessor unit / microcontroller) registered along with the corresponding coach numbers in CMM portal (CRIS server). CRIS will map the all unique IDs of the coaches with trains using direct integration with ICMS portal of CRIS to facilitate the running train status and upcoming stations accordingly. CRIS shall use HTTPS GET or any other protocol to push data from CMM to MPU and update the unique ID of the coach if required.
- 6.6. MPU shall have appropriate low power modes and watchdog timer to ensure that the sensor keeps running continuously and system restarts automatically in case of a software fault. For power saving of battery, MPU shall be designed to go in sleep mode, if GPS location is same for more than 6 hour and wake up every hour to check the GPS location to return the MPU in Normal mode.



BLOCK DIAGRAM OF SYSTEM ARCHITECTURE FOR WATER LEVEL INDICATOR

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Ref: CG-WI-4.2.1-1 Ver. 1.0	Page 8 of 16	Date of issue: JUNE 2025	IS/RDSO-CG/0002:2025
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- 6.7. The MPU should send data only once per cycle (i.e.15 minutes) and there should not be any repetition of data. In case of no network data shall not be queued for sending to CRIS server, however real time water level data shall be sent to CRIS server as soon as network restores after elapsing of 15 minutes of last data polled to CRIS server.
- 6.8. The data communication between the transmitter (MPU) and the receiver (CRIS server) shall be on HTTPS protocol with token based security wherein token is required to be sent to server in form of the header for each communication. All the data will be shared in Json format or MQTT protocol as defined and accepted by CRIS.
- 6.9. Communication protocol for transmitting and receiving between MPU and CMM server shall be as per cloud service provider (preferably CRIS). Details of communication protocol shall be shared by CRIS during design stage / installation & commissioning.
- 6.10. CRIS server shall be designed for sending broadcast / RCS messages to all predefined numbers of concerned watering supervisors at next watering stations enroute. A web interface shall be provided to zonal / division railways authorities to update the predefined numbers of concerned watering supervisors of the concerned Zonal Railways /division.
- 6.11. The server displays the water level of the all coaches in a rakes / trains to the user depots as well as sends alert messages to the supervisors of upcoming watering points in case it detects any coach is running with low water level (predefined water level of 40%) or out of water (Empty water tank).
- 6.12. CRIS shall update the database of each coach by using the link between the Unique ID of the coach number and creation of train rake of such coaches by concerned authority in ICMS portal for updating the current status of the water level of each coach of the train rake .
- 6.13. A WEB interface shall be developed by CRIS for monitoring the water level, viewing on PC/Mobile apps train rake wise, depot wise, zone wise of all coaches by all concerned users at watering station, depot, zone etc and automatic alert messaging to the concerned train supervisor of next upcoming watering station.
- 6.13.1. All data generated by the WLI system shall be the exclusive property of Indian Railways. it shall retain full rights to use, manage, and distribute this data at its discretion.
- 6.13.2. The Vendor /Supplier shall not store, publish, or transmit any data generated by the system to any server, cloud service or external storage, solution unless explicitly authorised by Indian Railways.
- 6.14. System design should be modular to ensure the interchangeability of sensor, MPU, battery etc. Devices / modules interface should be interoperable for hardware / software level.
- 6.15. Power consumption of the complete system Per /Hour /Day shall be worked out and clearly defined.

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Ref: CG-WI-4.2.1-1 Ver. 1.0	Page 9 of 16	Date of issue: JUNE 2025	IS/RDSO-CG/0002:2025
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7. TECHNICAL REQUIREMENT

7.1. MAIN PROCESSING UNIT

Main processing unit (MPU) shall be designed with 32 bit Microprocessor / microcontroller based system with inbuilt e-SIM for 5G or 4G LTE (M2M) module, Wi-Fi 4 or better module, Bluetooth Low Energy module version 5 (BLE 5), GPS module for real time location & USB, RS485 ports etc. along with system software and application program for easy configuration of the system.

WLI System shall be capable to communicate using Wifi / Bluetooth and RS-485 with other auxiliary railway systems to be installed in the coach to receive their data and transmit to CRIS and other cloud server and vice versa according to mutually agreed protocol.

7.2. ENCLOSURE UNIT OF MPU

7.2.1. Main processing unit, battery pack and other electronic circuit shall be enclosed in a Stainless steel (AISI 304) or fire retardant polycarbonate enclosure unit (preferable size 300mm x 300mm x 150 mm) with protection channel around the door opening & shall have IP65 ingress protection against water, dust and access to hazardous parts as per IS/IEC 60529 - 2001 for full service life. Enclosure unit and system shall have IK-10 rating as per IS:17050 - 2023 for impact resistance to withstand ballast hit etc. Enclosure unit should sustain the surrounding temperatures in the range of -15°C to 120°C. & mounting of enclosure unit shall be done on AISI304 at least 3mm thick back piece. Reference drawing no. RDSO/CG/DRG/25007 for location is attached as annexure-1.

7.2.2. Enclosure unit shall be mounted under slung with suitable brackets on cross member of under frame with the help of prevailing torque type nut bolt. Provision of connection of level sensor shall be done through IP65 protected M12, 4 pole, A-coded, male connector as per IEC 61076-2-101 provided on Enclosure unit. Pin no. 1 & 3 shall be used for connection of water level sensor to the MPU for interchangeability of sensor.

Antenna and other connections shall be suitably sealed to prevent ingress of dust and water. Drawing for mounting of enclosure unit and water level sensor shall be as per annexure-I

7.2.3. Enclosure unit along with MPU and all electronic items should withstand the coach operating conditions of clause no.5 of this specification and it shall be ensured the compliance of EN50155 specification for electronic equipment on rolling stock application.

7.2.4. Necessary test certification for compliance of EN50155 specification shall be done on one system for design validation by NABL accredited labs for this purpose.

7.3. 5G or 4G/LTE MODULE

The SIM module shall have 5G or 4G network support with 3G/2G fallback using M2M e-SIM with URL white listing. It should be from reputed vendors like Telit,

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Ref: CG-WI-4.2.1-1 Ver. 1.0	Page 10 of 16	Date of issue: JUNE 2025	IS/RDSO-CG/0002:2025
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Sierra wireless etc. It should be provided with a good internal antenna tuned for 5G or 4G / 3G/2G having a minimum gain of 3dBi.

E-SIM module provided in IOT Device shall have active data and SMS through leading GSM service provider with national roaming for pan-India connectivity for full warranty period.


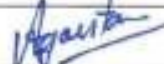
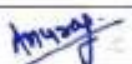
7.4. LEVEL SENSOR

7.4.1. Level sensor type shall be hydrostatic pressure transducer of Reputed make of RS Pro / Siemens / TE connectivity, Huba Control, Encardio Rite, Honeywell, Rockwell, Schneider or any other make with prior approval of RDSO, suitable for fitment on 1/4" BSP threaded socket of water tank piping and shall be capable to measure absolute pressure. Following common specification shall be followed for the water level Sensor

- i. Level sensor body - stainless steel 316L
- ii. IP rating of sensor - Minimum IP-65 & above
- iii. Diaphragm - Piezo-Resistive Ceramic
- iv. Operating voltage - 5V to 30 V D.C.
- v. Load /impedance - ~ 500 Ohm
- vi. Measurement type - Absolute pressure sensor with barometric correction in MPU.
- vii. Measuring range - 0 to 1 Meter water column.
- viii. Response time - ~ 500 ms
- ix. Accuracy - 99 %
- x. Interface connection - 1/4" BSP male Thread
- xi. Cable length - To suit the requirement with M12 socket 4 pole A coded connector at MPU end (pin no. 1, 3 shall be used for sensor connectivity with MPU).

7.4.2. Level sensor shall be fitted with lowest portion of water tank with suitable compatible pipe fitting or water column provided for this purpose as per sketch attached at Annexure-I. Level sensor shall be fitted on the socket as per modification provided in the RDSO drawing no. RDSO/CG/DRG/25007 & RDSO/CG/DRG/25008 for under slung water tanks and roof water tanks respectively, drawings are attached as annexure-1 for ready reference. Pipe Fittings, clamp, hose etc required for above modifications shall be in the scope of supplier.

7.4.3. Connection between level sensor and signal processing unit shall be made with shielded wire and shall be routed through protective conduits to prevent accidental damages in transit /service of the coaches.

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7.4.4. All wing and cabling shall be fire retardant and as per RDSO specification ELRS/SPEC/ELC/0019 latest revision.

7.5. BATTERY

Power requirements for power supply of MPU shall be met with Lithium Iron Phosphate (Li-FePO₄) / Lithium Thionyl Chloride (LiSOCl₂) Batteries only, which should last for at least 6 months without recharge / exchange.

Specification of Lithium Iron Phosphate (Li-FePO₄) Batteries shall be as below:

Battery Type	Lithium Iron Phosphate (Li-FePO ₄) / Lithium Thionyl Chloride (LiSOCl ₂)
Capacity of Battery Pack	Minimum 48AH of suitable voltage to suite 6 months operational life without charging.

Note: Battery certification shall be required for safety against fire.

8. TESTING AND APPROVAL

8.1. The supplier / vendor shall submit the design details of the WLI system complying the technical, design requirements of this specification including layout drawings, coach interfaces requirements, integration requirement, operation and maintenance manual, including the requirement of spares and consumables for the approval by Vendor approving authority. Quality assurance plan covering all stages of manufacturing, quality control and testing at various stages of the sub-assemblies and final system shall be submitted for approval by vendor approving authority.

8.2. Supplier/vendors who have already met the requirements of para 8 of this specification by vendor approving authority shall be exempted to clause no. 8.3. However in case of any design change / sub vendor change by supplier fresh prototype approval shall be required.

8.3. PROTOTYPE APPROVAL:

8.3.1. Prototype approval of the WLI system will be done by Vendor approving authority. Prototype approval shall be done as per approved QAP of the firm on test bench at firm's premises for verification of the technical, design requirements and testing of the system followed by actual fitment on a coach and successful functional test as per this specification.

8.3.2. Following parameters and system functionality will be checked during prototype approval :

A. DIMENSIONAL CHECK AND VISUAL INSPECTION:

- I. Dimensional check as per design / interface drawing.
- II. Working of system controls & indications.
- III. Functional check of the complete system including web interface.
- IV. Demonstration / calibration of level sensors.
- V. Any other tests considered necessary.

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Note: Actual working conditions shall be simulated in a depot and live reporting shall be checked for water level indicator system.

B. TYPE TESTING:

Type testing of water level indicator system including battery shall be done from any Govt. Lab or NABL accredited testing lab and test report shall be submitted to the vendor approving authority.

Type testing shall be done for all test (Mandatory & optional) as specified in clause 13.3.1 of EN50155 specification (latest revision). In addition to above impact resistance test shall also be carried out as per IS: 17050 : 2023.

9. FIELD TRIALS:

- 9.1. After successful prototype approval of the complete system, 20 coach set shall be installed & commissioned by the vendor / supplier for field trials of at least 03 months before bulk supply, shortfall in trial period due to stabling of coaches or any other unforeseen reasons shall get extended.
- 9.2. Field trials shall be jointly monitored by concerned Zonal Railways /PUs and supplier/vendor as per trial scheme finalized by vendor approving authority for this purpose. Criteria for successful completion of field trial shall be elaborated in trial scheme.
- 9.3. Performance monitoring of the coaches fitted with water level indicator will be done in actual train service for the trial period with an objective to monitor the following:
 - a) Low water alerts issued in real time basis at 15 minutes intervals.
 - b) Battery life span (last change date) and residual battery capacity
 - c) Proper Working of level sensors without error.
 - d) Intactness of Enclosure unit & mounting arrangement of enclosure unit.
 - e) Proper functioning of the complete system.
 - f) Details of attention /maintenance requirement with coach number, date and time.

10. INSPECTION:

- 10.1. The inspection will be carried out generally as per firm's approved drawings, RDSO drawing, firms approved QAP and any other specification given in water level indicator specification.
- 10.2. The inspection of material will be carried out at contractor's premises by authorized representatives of nominated Inspecting agency as per manufacturers drawing, physical & chemical properties, various critical dimensions as per approved Quality Assurance Program (QAP) as by vendor developing authority.
- 10.3. Contractor shall provide free of charge labour, material, tools, gauge and appliance etc. required by the inspecting authority for inspection at manufacturing location.

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11. MARKING

Manufacturer's name plate with Purchase order no. & date, serial/batch number along with month and year of manufacture shall be fitted at a visible location for identification on major assemblies of the system supplied.

12. DOCUMENTATION AND TRAINING




- 12.1. Following the acceptance of the prototype, contractor shall provide technical manuals as given below about the system in English. The information should be both printed and in electronic format and shall be provided to IR.

- I. Operating and maintenance instructions
- II. Periodic Maintenance Schedule (Daily / Trip/ Monthly) in line with maintenance schedule of LHB & Train-set coaches.
- III. Schematic diagrams of Installation & commissioning and their instructions
- IV. Schedule of operating principles.

- 12.2. The contractor shall provide theoretical and practical training to the staff of workshops and zonal railways for a period of 05 days free of cost.

13. WARRANTY AND SPARES.

- 13.1. Supplier / vendor shall be liable for warranty of 72 months from the date of fitment. warranty of the supplied WLI system including the cost of active e-SIM service, Checking / Replacement of Battery on six monthly basis and its maintenance for 6 years shall be part of supply order and the supplier / vendor shall make arrangements for scheduled maintenance of WLI System to make it operational at all times. Payment shall be made on half yearly basis on satisfactory service of battery and e-SIM services.
- 13.2. Spares & consumables required shall be all inclusive part of warranty. Strict provisions of imposing penalty on vendors for unreasonable downtime and repeated failures of the components / sub-assemblies shall be ensured by purchaser.
- 13.3. The warranty period would get extended on a pro-rata basis if warranty repairs / replacement are not provided within 5 days of notice. If supplier/vendor fails to provide warranty services within 5 days of notice, Railway reserves the right to take action as per extant rules.
- 13.4. Minimum 02 (two) Preventive maintenance visit(s) per year has to be undertaken by the supplier / Vendor during the warranty period. During these preventive maintenance visit(s), the supplier / vendor should attend the scheduled maintenance, as specified in OEM's technical manual and supplier / Vendor should also change the parts which are required to be changed as per OEM's technical manuals to achieve 72 months warranty.
- 13.5. Supplier /vendor shall ensure the availability of spare parts of the supplied system for a period of at least 10 years.

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Ref: CG-WI-4.2.1-1 Ver. 1.0	Page 14 of 16	Date of issue: JUNE 2025	IS/RDSO-CG/0002:2025
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14. INFRINGEMENT OF PATENT RIGHTS:

The supplier /Vendor are required to give undertaking on "INFRINGEMENT OF PATENT RIGHTS". The undertaking shall be as under:

Indian Railway shall not be responsible for infringement of patent rights arising due to similarity in design, manufacturing process, use of similar components in the design and development of this item and any other factor not mentioned herein which may cause such dispute. The entire responsibility to settle any such disputes/ matter lies with the supplier / Vendor.

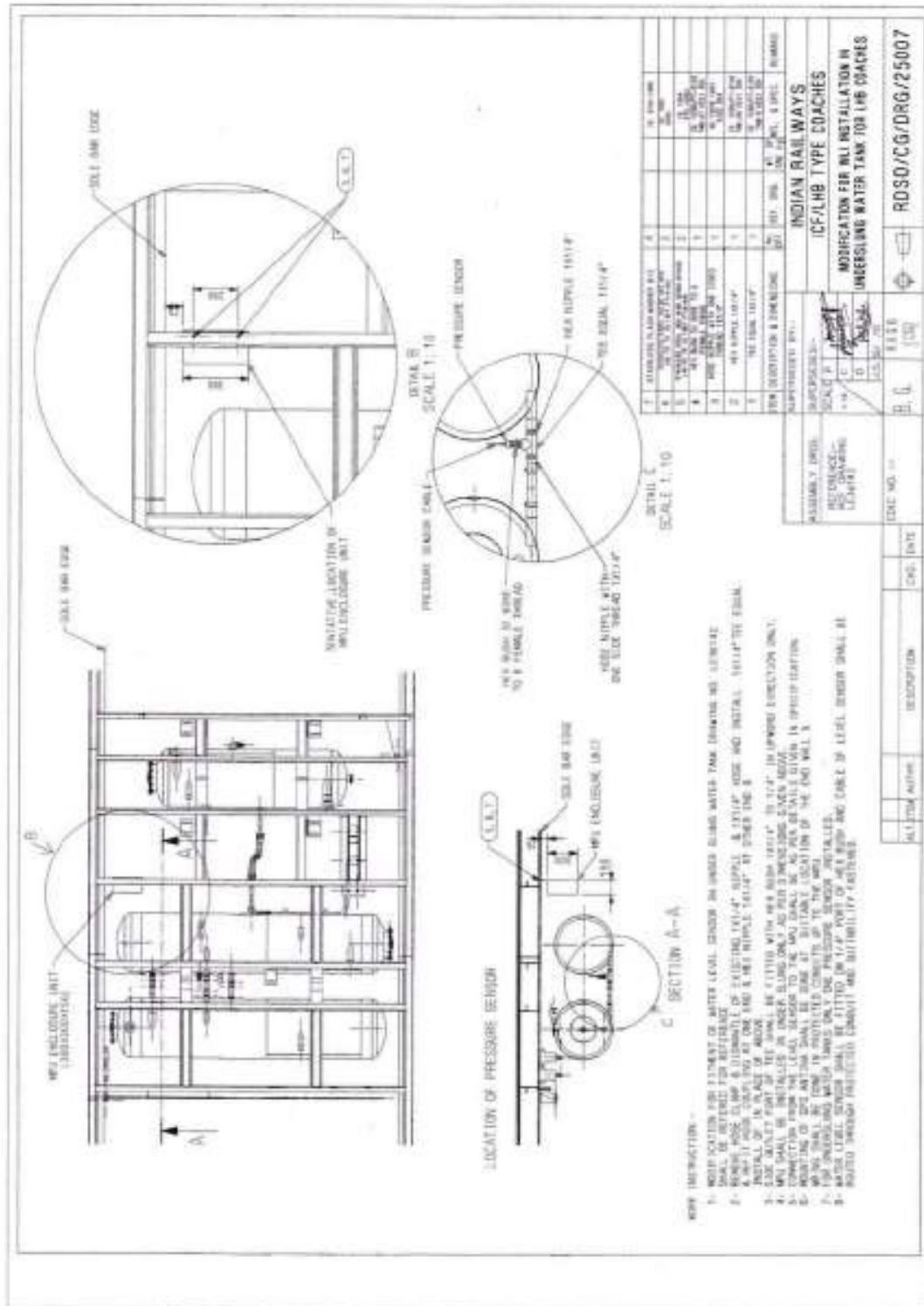
Details / design / documents given by them are not infringing any IPR and they are responsible in absolute and full measure instead of Railways for any such violation. Data, specification and other IP as generated out of interaction with Railways shall not be unilaterally used without the consent of RDSO and rights of Railway / RDSO on such IP as acceptable to them.

Signature	<i>Ashish</i>	<i>Agartan</i>	<i>Anurag</i>
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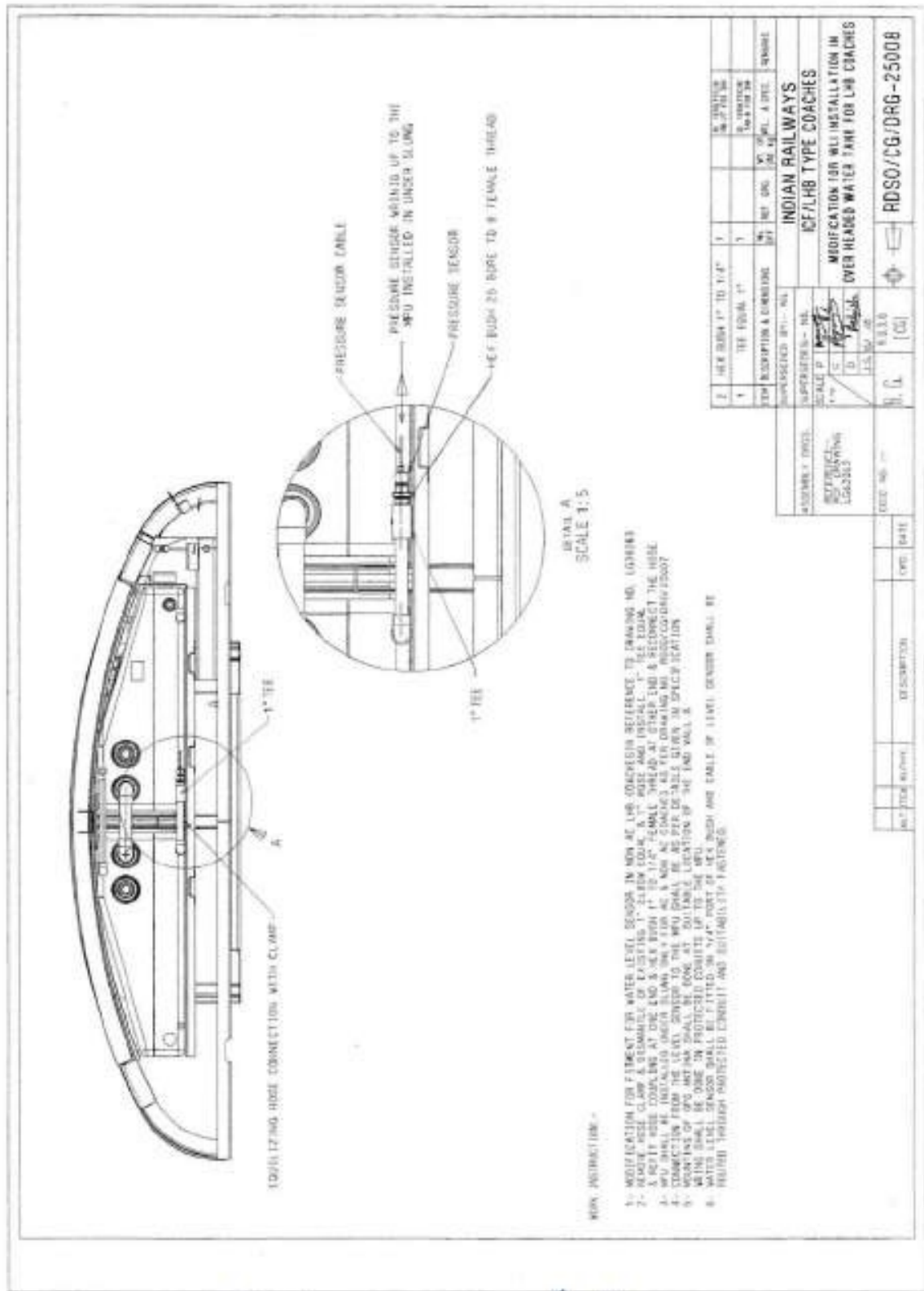
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Annexure-I



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Signature	<i>Ashish</i>	<i>Agarwal</i>	<i>Amruth</i>
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