



सत्यमेव जयते

**Government of India  
Ministry of Railways**

**DRAFT**  
**SPECIFICATION**  
**FOR**  
**ELECTRONIC**  
**IN-MOTION RAILWAY WEIGHBRIDGE**  
**(15 KMPH SPEED)**

**ISSUED BY:**

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## Specification for Electronic In-Motion Rail Weighbridges

### 1.0 Scope

This specification lay down broad technical requirements for Electronic In Motion Rail Weighbridge suitable for weighing speeds up to 15 kmph to be installed on turnkey basis (including all civil & electrical work) on a Railway track anywhere on Indian Railways and where Indian Railway locomotives and /or rolling stock ply for measurement of tare, gross and net weight of goods wagons while in motion both in coupled and uncoupled conditions. These shall be referred as WB 15 in these specifications. These specifications also lay down the maintenance requirements, training and spares for ensuring that the readings remain accurate within the specified tolerances defined in this document and the up time of the weighbridge is maximized.

### 2.0 General:

The technical terms used in this document largely draw reference from the Metrological Rules in vogue in India. Electronic In-Motion Rail Weighbridge shall consist of

- (i) Weigh rails or weighing instrument having a load receptor, inclusive of rails for conveying railway vehicles.
- (ii) Track switches/sensors for speed and wagon/coach type detection.
- (iii) Control console with suitable electronics/electronic cards for implementing track switch logic and receiving signals from weigh rail/load receptor /weighing instrument sensors for further processing.
- (iv) A windows PC with windows 10 OS or above and min. 19” LCD/LED or latest display screen, mouse, keyboard & a suitable heavy duty printer for operation, viewing and printing output. (Printer should also be able to give print out on A-4 size paper.)

### 2.1 Functional requirements & definitions:

- 2.1.1 **Weighing speed:** Weighing speed shall not exceed 15 kmph for WB15 weighbridge. Speed of trains over a weighbridge when not weighing shall also not be more than 30kmph.
- 2.1.2 **Weighbridge capacity:** Transducers/load receptor shall be able to measure a load of up to 35 tons for each axle and software/hardware should be able to compute weights up to 140 tons for an individual wagon/coach.
- 2.1.3 **Advance over speed warning system:** An audio visual warning shall be provided for guiding the driver for controlling the speed before the train approaches the weigh bridge. The advance over speed warning system shall be installed at a suitable height and location to provide visibility from both sides to train crew approaching the weighbridge and during course of weighment of rake.

The color of visual indication will be **purple**, with provision of LED's as the light source & it will have two aspects:

- Steady - When the speed of the train is within specified limits.
- Pulsating – When the train is over-speeding.

**2.1.4 Anti-roll back:** The system shall take care of the effect of roll back, even up to full train, at the time of weighing so that the reverse movement of the stopping train does not have any effect on the orderly recording of weight of each wagon/coach in the train.

**2.1.5 Wagon or Coach Identification:** The measurement technique used may be either axle-by-axle or bogie-by-bogie. However, the machine shall identify four axle wagons & brake vans and locomotives (and eliminate brake vans & locomotives in the weighment).

It shall be possible to weigh all types of approved wagons & coaching stock available on Indian Railways, which include container wagons i.e. BLCA & BLCB and their variants, Parcel Vans, variants of passenger coaches and also VPU, VPH & their variants.

**2.1.6 Bi-directional weighing:** The weighment shall be possible from both directions.

**2.1.7 Mixed rake weighing:** It should be possible to weigh a mixed rake (combination of different type of rolling stock) & rake consisting of empty and loaded wagons and other coaching vehicles.

**2.1.8 Working environment:** The system supplied should be rugged to work satisfactorily in ambient temperatures ranging from -10°C to 50°C, 95% humidity, dusty environment and tropical conditions. The instrumentation shall be designed and manufactured in such a manner that when exposed to ambient conditions beyond what is specified, either:

- i. Significant faults do not occur, or
- ii. Significant faults are detected and acted upon.

**Note:** A fault equal to or less than a significant fault (1xd) is allowed irrespective of the value of error of indication.

**2.1.9 Accidental maladjustment:** Instruments shall be constructed so that maladjustment's likely to disturb metrological performance cannot normally take place without the effect being detected.

**2.1.10 Tamper Proof:** The junction Boxes, Hardware cabin etc. should have the arrangement of bolting/ locking/**password protected** with sealing to prevent it being tampered by unauthorized persons. Moreover, junction boxes, hardware cabins must be moisture and dust proof. The sub-assemblies/ assemblies, alteration of which can lead to erroneous weighments should be made as tamper proof as feasible. Arrangement must be within control console to ensure that logging details at the time of calibration are recorded and can be verified.

2.1.10.1 During calibration, PC must be disconnected. Track logic must not be implemented in PC and weighing electronics must work independently without PC which will avoid weight manipulation in PC.

2.1.10.2 Calibration and adjustment of weight to be through hardware switch, soft key or key board linked with digitizer and the same shall be disabled after calibration.

2.1.10.3 Calibration mode switch must be inside the digitizer which is properly sealed after calibration and should not be accessible after sealing of digitizer.

2.1.10.4 Control console shall have display facility to view calibration value, calibration date & time, which can be verified any time without opening control console.

2.1.10.5 Direct Printing provision of test wagon's weight during calibration shall be available in control console without PC or weighing control console must be capable of saving the calibration data/weight of each test wagon/train for record purpose.

**2.1.11 Track requirement:** A minimum of 100 meter straight rail track length shall be made available with a gradient of not more than 1:400 on either side of Electronic In-Motion Rail Weighbridge. This portion of the track should be on ballast cushion, well maintained and well drained so that there is no water accumulation. The level, twist and alignment shall be maintained to main line track standard of IR.

Tenderer should study type of stock, condition and layout of track and the site in his own interest.

Site earmarked should be as per current RDSO specification and preferably approachable by road.

**3.0 Particular requirement:**

These shall comprise of weigh rails/transducers/load receptor, track switches/sensors, weighing system electronics (control console) and processing and printing equipment and any other equipment required for satisfactory performance of the system.

**3.1 Technical requirements/Software requirements/ Weighing system electronics:**

**3.1.1 Technical requirements:**

**3.1.1.1 Weigh rails/load receptor:** Rails with transducers or **Rails having a load receptor, inclusive of rails for conveying railway vehicles** suitable for the purpose. The length of these rails shall be at least 5.5 meters. The rail section will be the same as the adjoining rail section (52kg/60kg any other as the case may be). Weigh Rail or **weigh zone** must be electronically isolated from approach Rail to prevent signaling voltage as well as to protect from lightning. Jumpers have to be provided at weigh rail/load receptor portion for a length of 5.5 meters to bypass the weigh rail/**weigh zone** and avoid damage to load sensor/**load receptor**.

a) "**IRST-12-Grade 880**" Rails shall be used in the Weighbridges if they are installed on main/loop lines. The provision of EIMWB (15KMPH) should be preferably in loop line. The purchase of the Rails by the Electronic In-Motion Weigh Bridge manufacturer shall be governed by the extant instructions issued by Railway Board. If firm experiences any difficulty to procure the rails as per Board's extant instructions, Firm shall approach Civil Engineering Department of the concerned division, for supply of Rails on payment basis.

b) Industrial use (or IU) rails may be used for private sidings, where there is no movement of passenger trains.

**3.1.1.2 Rail transducers/load receptor:** Rail transducers/ **load receptor** should meet following specifications.

a) Cables and connectors: suitable for Rail transducers/ **load receptor** with proper screening to isolate leakage (Elec.)

b) Type or protection - The IP (Ingress protection) rating for equipment and enclosure should be IP 67 as specified in AS1939 and EN 6052.

- c) Provision of suitable compensating methods for thermal stresses and dis-balance of wheat stone bridge under no load conditions.

**3.1.1.3 Track sensors (Track switches):**

- a) Track sensors shall be non-contact type of proximity sensors.
- b) Track switch combinations used shall be capable of speed measurement, discriminating the type of axle combination and define weighing zone.
- c) The switches shall be rugged enough to work in all weather conditions.
- d) The junction boxes used shall be suitable to work in all weather conditions.

**3.1.1.4 Weighing system electronics:**

- a) It shall consist of control console and a PC. PC shall communicate with the control board through a standard RS 232 C serial port or Ethernet.
- b) System should be free of relay logic. All the control logic should be achieved through semi-conductor devices.
- c) Suitable input device shall be provided for inputting the data from time to time.
- d) Visual display unit as described in para 2.0 (iv) shall be provided for monitoring the contents and results visually.
- e) Suitable heavy duty printer shall be provided for getting a hard copy of the weight of the individual wagons and total train. (Printer should also be able to print on A-4 size paper.)
- f) Suitable fault finding software routines for display of major faults occurring in the system shall be provided. Suitable LED panel/Message display should be provided on the console, each LED/message indicating a specific fault and LED/message should light up indicating the type of fault for diagnostics.
- g) Auto Zero function for eliminating zero error resulting from drift shall be provided after each and every operation. Auto calibration & balance should be possible in case out of balance is within 4% of the capacity of system.
- h) **Automatic zero setting** of the system after each and every weightment cycle shall be provided for error free weightment.
- i) The system shall have facility of standard remote desktop sharing through LAN/WAN/Internet for FOIS (freight operation information system).
- j) All weighbridge equipment required to be placed outside the structure mentioned in para 3.4.1 shall be capable of working in field environment without air conditioning. Any temperature/dust control required for satisfactory and reliable operation of the above mentioned equipment of system shall be considered and provided by the tenderer as part of the turnkey project.

**3.1.1.5 Power equipment and battery backup:**

- a) The system shall work with  $230 \pm 10\%$  volts at 50 Hz mains.
- b) A suitable voltage stabilizer/CVT of minimum 2 KVA capacity shall be provided.
- c) An uninterrupted power supply of 2KVA 'online' UPS unit shall be provided to facilitate uninterrupted working for minimum one hour in case of power failure.
- d) The control panel shall have suitable means for memory protection in case of power failures.

**3.1.1.6 Lightning and Transient Protection:****3.1.1.6.1 Power & Data Lines Protection:**

- i) Adequate protection against electrical surges arising from high voltage traction system, line transients and lightning should be provided to avoid damage/mal-functioning in the equipment, **which includes all the sub-systems like rail transducers/ load receptor, track sensors, weighing system electronics, power equipment & battery backup, etc.**

All the electronic equipment should be tested for disturbances from bursts and Electrostatic discharge in compliance with clause A.9.2 and A.9.3 of OIML R106-1, Edition 1997 (E).

In addition, the IEC standards 61312, 61024, 61643, 62305 and VDE 0100-534 pertaining to protection against lightning and surges shall apply for all electronic equipment to withstand static electricity, electric fast transient and surge voltage.

The power line of electronic equipment shall have Class B & C type 2-stage protection in TT configuration. Stage 3 protection is also required for protection of power/signaling/data lines. Class B & class C type protection devices shall preferably be pluggable type to facilitate easy replacement.

**ii) Stage 1 Protection (Power line protection at Distribution Level)**

The protection of class 'B' type, against Lightning Electromagnetic Pulse (LEMP) & other high surges shall be provided at the power distribution panel. Wherever available, the modules shall have an indication function to indicate the prospective life and failure mode to facilitate the replacement of failed SPDs. The device shall be spark gap type and certified as per the VDE 0675 A1/A2 & IEC 61643. It shall be provided with a 63 Amp fuse in phase line. The protection shall be in compliance of IEC 61312, IEC 61024 & VDE 0100-534 with the following characteristics:

SN	Parameters	Limits	
		Line & Neutral	Neutral & Earth
1	Nominal Voltage ( $U_0$ )	230V	230V
2	Maximum continuous operating voltage ( $U_c$ )	$\geq 255V$	$\geq 255V$
3	Lightning Impulse current 10/350 $\mu$ s ( $I_{mp}$ )	$\geq 25KA$	$\geq 50KA$

4	Response time ( $T_r$ )	$\leq 100 \text{ ns}$	$\leq 100 \text{ ns}$
5	Voltage protection level ( $U_p$ )	$\leq 2.5\text{KV}$	$\leq 2.5\text{KV}$
6	Short circuit withstand and follow up current extinguishing capacity without back up fuse ( $I_{sc}$ & $I_{fi}$ )	$\geq 3\text{KA}$	$\geq 100\text{A}$
7	Operating temperature / RH	$-25^\circ\text{C}$ to $+80^\circ\text{C}/$ $95\%$	$-25^\circ\text{C}$ to $+80^\circ\text{C}/$ $95\%$
8	Mounted on	din rail	din rail

### iii) Stage 2 Protection (Power line protection at Equipment Level)

The protection of class 'C' type against low voltage surges shall be provided at the equipment input level connected between line & neutral. This shall have an indication function to indicate the prospective life and failure mode to facilitate the replacement of failed SPDs. This shall be thermal disconnecting type and equipped with potential free contact for remote monitoring. The device shall be a single compact varistor of proper rating and in no case a number of varistors shall be provided in parallel. This protection shall be in compliance of IEC 61643-12, 61312 & 61024 and VDE 0100-534 with the following characteristics:

SN	Parameters	Limits
1	Nominal Voltage ( $U_0$ )	230V
2	Maximum continuous operating voltage ( $U_c$ )	$\geq 300\text{V}$
3	Nominal discharge current 8/20 $\mu\text{s}$ ( $I_n$ )	$\geq 10\text{KA}$
4	Maximum discharge current 8/20 $\mu\text{s}$ ( $I_{max}$ )	$\geq 40\text{KA}$
5	Response time ( $T_r$ )	$\leq 25 \text{ ns}$
6	Voltage protection level ( $U_p$ )	$\leq 1.5 \text{ KV}$
7	Operating temperature / RH	$-25^\circ\text{C}$ to $+80^\circ\text{C}/ 95\%$
8	Mounted on	din rail

### iv) Stage 3 protection (Protection for Power / data lines)

All external Power/signaling/data lines (AC/DC) shall be protected by using preferably pluggable stage 3 surge protection devices which consists of a combination of varistors/suppressor diodes and GD tube with voltage and current limiting facilities.

#### a) Power line Protection (Class D)

The device for power line protection shall be of Class D type. This shall have an indication function to indicate the prospective life and failure mode to facilitate the replacement of failed SPDs. This shall be thermal disconnecting type and equipped with potential free contact for remote monitoring. This protection shall be in compliance to IEC 61643-1 and VDE -0675 Pt. 6 with following characteristics:

Nominal Voltage ( $U_0$ )	24V	48V	60V	110V	230V
Max. continuous operating voltage ( $U_c$ )	30V	60V	75V	150V	253V
Rated load current ( $I_L$ )	16A	16A	16A	16A	16A
Nominal discharge current	$\geq 700\text{A}$	$\geq 700\text{A}$	$\geq 700\text{A}$	$\geq 2.0\text{KA}$	$\geq 2.5\text{KA}$



(I <sub>n</sub> ) 8/20 μs					
Max discharge current (I <sub>max</sub> ) 8/20 μs	≥2KA	≥2KA	≥2KA	≥5KA	≥5KA
Voltage protection level (U <sub>p</sub> )	≤200V	≤350V	≤500V	≤700V	≤1100V
Response time (T <sub>r</sub> )	≤25 ñs	≤25 ñs	≤25 ñs	≤25 ñs	≤25 ñs

Note: Minor variations from above given parameters shall be acceptable.

#### **b) Data line protection**

These devices shall preferably have an indication function to indicate the prospective life and failure mode to facilitate the replacement of failed SPDs. If the device has any component which comes in series with data/ signaling lines, the module shall have "make before break" feature so that taking out of pluggable module does not disconnect the line. This protection shall be in compliance to IEC 61643-21 & VDE 0845 Pt. 3 with the following characteristics:

Nominal Voltage(U <sub>0</sub> )	5V	12V	24V	48V
Arrester Rated Voltage(U <sub>C</sub> )	6V	13V	28V	50V
Rated load current(I <sub>L</sub> )	≥250mA	≥250mA	≥250mA	≥250mA
Total discharge current, 8/20 μs( I <sub>n</sub> )	≥20KA	≥20KA	≥20KA	≥20KA
Lightning test current 10/350 μs	≥2.5KA	≥2.5KA	≥2.5KA	≥2.5KA
Voltage protection level (U <sub>p</sub> )	≤10V	≤18V	≤30V	≤70V

Note: Minor variations from above given parameters shall be acceptable.

- c) If power supply /data lines (AC/DC) are carried through overhead wires or cables above ground to any nearby building or any location outside the equipment room, additional protection of Stage 2 (Class C) type shall be used at such locations for power supply lines and Stage 3 protection for data lines.

#### **v) Note:**

1. Coordinated type Class B & C arrester shall be provided in a separate enclosure in weighbridge control room adjacent to each other. This enclosure should be wall-mounting type.
2. Length of all cable connection from input supply and earth bus-bar to SPDs shall be minimum possible. This shall be ensured at installation time.
3. Stage 1, Stage 2 & Stage 3 protection should be from the reputed manufacturer/supplier. Weighbridge manufacturer shall provide Stage 1, Stage 2 & Stage 3 protection for the equipment.
4. The cross sectional area of the copper conductor for first stage protection shall not be <16 mm<sup>2</sup> and for second stage shall not be < 10mm<sup>2</sup>.
5. Batch test report or conformance of certificate of OEM should be submitted by the manufacturer /supplier of Lightning & Surge protection devices to the weighbridge manufacturer at the time of supply of these devices. Copy of the same shall be submitted by Weighbridge manufacturer to inspection agency at the time of pre – dispatch inspection of weighbridge system.

6. The procurement & the installation of the SPD's shall be done by the weighbridge manufacturer, only through the reputed OEM's or their authorized representative, to ensure that the equipment of the weighbridge & the SPD is matched.

**3.1.1.6.2 Use of Ground Enhancement material:**

Ground Enhancement material for the weighbridge installation shall be as per RDSO specification no. RDSO/SPN/197/2008 (with latest amendment/revision).

- 3.1.1.6.3 The procurement & the installation of the Lightning and Transient Protection shall be done by the weighbridge manufacturer, only through the reputed OEM's or their authorized representative, to ensure matching with the equipment of the weighbridge.

**3.1.2 Software requirement:**

- 3.1.2.1 Software should be on window platform and should be easily transferable and should not have protections of dongle/ adapter on parallel port. It should be capable of using extended memory. It should be password protected for operation.
- 3.1.2.2 The weighbridge PC and software should be able to receive & transfer text based/other specified files in encrypted/unencrypted mode over a local area network/ wide area network to any remote/local server. The weighbridge PC and software should be able to have FOIS functionality. The weighbridge manufacturer shall, upon direction from Indian Railways, either now or at any future date, enable the weighbridge software to transmit the weighment data in the prescribed syntax, sequence and format with/without the prescribed encryption, against the data transfer protocol specified.
- 3.1.2.3 Operator's interaction should be through a PC or a control console with a VDU.
- 3.1.2.4 Initial screen should be in the form of an indexed block menu or a drop down menu. Selection of items should be possible either by cursor keys or a mouse.
- 3.1.2.5 Menu should include items like weigh mode, printing, diagnostic tests, help etc.
- 3.1.2.6 While in weighing mode, screen should show number of axles in the wagon/coach, its gross weight and its sequence number. Date and time should be taken from system date and time.
- 3.1.2.7 The software should be capable of removing last vehicle in train in addition to brake van/loco at specified wagon sequence no.
- 3.1.2.8 In the weighment software, there should not be any import/export option to any other software and there should not be any options like Delete/Edit/Erase rake weighment data.
- 3.1.2.9 System must be capable of achieving zero balance preferably automatically before start of a new weighing cycle.

- 3.1.2.10 Weighbridge system must be capable of weighing long haul trains of composition 2/3 Locomotive + 59 wagons + 1 Brake vans + 2/3 Locomotive + 59 wagons + 1 Brake vans + 2/3 Locomotive + 59 wagons + 1 Brake vans +.....

### **3.1.3 Print out requirements:**

Print out format should contain the following information.

- (a) Date and time
- (b) Rake number, time in /time out for the train.
- (c) Wagon/coach identification no., tare weight, gross weight, net weight and speed.
- (d) Gross and net weight for the complete rake.
- (e) In case weighing speed of a wagon/coach exceeds the limiting specified speed of the weigh bridge, gross weight of the wagon/coach should not be printed whereas all other parameters should be printed.

### **3.1.4 File retrieval:**

It should be possible to store the information of one rake weighing into a separate file, which can be retrieved and printed at a later date. Such stored information should be complete with original date and time and it should not be possible to edit such file.

- 3.1.5** The operating software should have in-built security so that no unauthorized person can alter/interfere with the system to ensure reliability of weighment. The system should have adequate capacity to store the record of about 200 rakes weighed without having to delete/off load for storage. These records will be normally preserved for about 6 months and the system should not permit any alteration of records after the weighment is completed. There should be provision to record the weighment on DVDs. It should not be feasible to modify these records after off-loading on DVDs. Operating software should have the capability to store at least last 100 nos. of login particulars without facility of editing.

## **3.2 Eligibility criteria**

- 3.2.1 The weighbridge supplier shall be required to necessarily possess all requisite clearances and approvals from the Metrological department, Government of India for the model of the In-motion weighing instruments being offered to the Indian Railways.

- 3.2.2 **Manufacturers shall be required to submit certified version of EIMWB software from the STQC Directorate, Ministry of Electronics and Information Technology, Govt. of India, which should be fully compatible to this specification for record and quality assurance purpose.**

Every time a version change is necessitated, the same should be deployed only after submission of compatible version of software to RDSO along with **above mentioned certificate.**

### **3.3 Acceptance/approval/registration process**

- 3.3.1 Manufacturers shall apply to RDSO, fulfilling requirements for fresh registration as per extant ISO procedures for vendor registration. This shall include requisite fees, compliance of STR/specification and other requirements as covered in relevant applicable latest guidelines/procedures as applicable for fresh registration of any item.
- 3.3.2 On receipt of application and documents submitted by the firm shall be scrutinized by RDSO. If the information submitted by the firm found to be inadequate firm shall be intimated for necessary compliance. In case the manufacturer is considered capable, a team of RDSO officials shall visit the manufacturer's premises to verify the manufacturing, testing and other facilities to manufacture the product conforming to this specification and submit a report.
- 3.3.3 Based on satisfactory report as above, the manufacturer shall be considered for approval as a RDSO vendor for manufacture and supply of In-motion weighbridge.

### **3.4 Structural requirements:**

- 3.4.1 Structures required for installation of the equipment (including electronics) shall be provided by the contractor. Further the room should be made leakage proof and seepage proof to prevent ingress of rain water and moisture in the room which may eventually damage the control panel, computer and its peripherals. A concrete/pre-fab structure of size 3m x 4m (minimum) and 3m high with RCC roof shall be provided/ constructed by the tenderer for installation and operation of control equipment. Details of such requirements shall be indicated in the offer. This room shall be provided with Air conditioner (for dust & temperature control) of at least 1.5 ton capacity and 5 star ratings, light fittings & fans by the contractor. This room should have a bay window for clear view of the track.
- 3.4.2 **Foundation/support** - A slab type of concrete foundation/ support should be provided for laying concrete sleepers throughout the underneath length of weigh rail/ **weigh zone, if required for installation**. Foundation work should be carried out by the tenderer and shall form part of the contract. M30 or higher grade concrete is to be used for the slab. Foundation drawings shall be furnished with the offer. Foundation/support shall be constructed so as to last minimum 8 years from the date of commissioning. Any damages, if any, shall have to be repaired by OEM during currency of Warranty/AMC.
- 3.4.3 Any change of design of the existing weighbridge or introduction of a new design of weighbridge, for any location/s wherein operational /commercial implications exist for Indian Railways, shall require prior approval of RDSO.  
In case of change in weighbridge model, weighbridge manufacturer has to approach Metrological department for its due approval.
- 3.4.4 It shall be mandatory to follow standard IRS track structure & fittings, for the weighbridge installation, which shall be as per RDSO drawing no T - 2496 (latest alt), with the provision of slab-type concrete foundation/apron, as per Indian Railway Standards, provided underneath the weigh rail/**weigh zone**.

### **3.5 Documentation requirements:**

#### **3.5.1 Operator's manual:**

Instructions for operating the system for the purpose of weighing and printing should be clearly laid down in an operator's instruction manual. It should contain complete information on using the software, auto calibration and zero balance, carrying out diagnostic tests and system set up before start of weighing.

#### **3.5.2 Maintenance manual:**

It shall contain detailed description of the system and its functioning. This manual shall contain.

- i. Drawings and circuit diagrams with component layout wherever required.
- ii. Complete wiring diagram with all wires numbered and components/cards labeled.
- iii. List of parts with part number of the assembly and also part number of the original manufacturer and manufacturer's address.
- iv. Details of assembly and installation with dip switch setting and jumper settings on electronic cards if any.
- v. Diagnostics and fault finding with check points and parameters to be measured and their value.

**3.6 Training:** The supplier shall give adequate training to at least two persons of each mechanical & commercial department in the concerned Zonal Railway for operation and maintenance of the system free of charges.

#### **3.7 Delisting:**

Weighbridge manufacturer can be delisted by RDSO as per extant ISO procedure on receipt of complaints of serious nature for epidemic failure, unethical practice and any other serious reasons reported from Zonal Railways.

### **4 Testing:**

#### **4.1 Metrological requirements:**

The Electronic In-Motion Weigh Bridge systems and their installation shall follow the Metrological Rules and norms laid down by the Ministry of Consumer Affairs, Food and Public Distribution, Government of India and as amended time to time.

##### **4.1.1 Accuracy class of weighbridges**

WB-15 weighbridge - It shall meet the requirement of accuracy class-1 for wagon/coach weighing and accuracy class 0.5 for rake/train weighing.

4.1.2 The maximum permissible error for in motion weighbridges shall be as specified in Table-1:

Accuracy class	% of mass of single wagon or total train, as appropriate	
	Initial verification	In-service inspection
0.5 (Train weighing)	±0.25%	±0.50%
1 (Wagon weighing)	±0.50%	±1.00%

For application of maximum permissible errors refer para 4.1.4 and 4.1.5. On initial verification of weighbridge, weighing coupled wagons, the errors of not more than 10% of the weighing results taken from one or more passes of the test train may exceed the appropriate maximum permissible error given in Table-1 but shall not exceed two times that value.

4.1.3 Scale interval (d):

For a particular method of weighing in motion and combination of load receptors, all weight indicating and printing devices on the instrument shall have the same scale interval of 200 kg.

The relationship between the accuracy class, the scale interval and the maximum wagon weight divided by the scale interval shall be as specified in Table-2.

Accuracy Class	d (kg)	(maximum wagon weight) / d	
		Minimum	Maximum
0.5	200	500	2500
1	200	250	1250

The scale intervals of the indicating or printing devices shall be in the form of 1 x 10k, 2 x 10k or 5 x 10k, “k” being a positive or negative whole number of zero.

Weighing increment/ scale interval should be 200 kg maximum uniformly throughout its capacity.

4.1.4 Wagon weighing:

The maximum permissible error for coupled or uncoupled wagon weighing shall be one of the following values, whichever is greater:

- The value calculated according to Table 1, rounded to the nearest scale interval;
- The value calculated according to Table 1, rounded to the nearest scale interval for the weight of a single wagon equal to 35% of the maximum wagon weight (as inscribed on the descriptive markings), or
- 1 d, where ‘d’ is scale interval/ weighing increment.

**4.1.5 Train weighing:**

The maximum permissible error for train weighing shall be one of the following values, whichever is greater:

- The value calculated according to Table 1, rounded to the nearest scale interval;
- The value calculated according to Table 1, for the weight of a single wagon equal to 35% of the maximum wagon weight (as inscribed on the descriptive markings), multiplied by the number of reference wagons in the train ( not exceeding 10 wagons) and rounded to the nearest scale interval or
- 1 d for each wagon in the train but not exceeding 10 d, where 'd' is scale interval/ weighing increment.

**4.2 Test scheme:**

Verification of weighbridge, initial and in service, shall be carried out using a test train of loaded reference wagons. Each test train shall be comprised of not less than 5 and not more than 15 reference wagons and shall be weighed repeatedly and in each direction to yield not less than 60 wagon weights or equivalent in total train weights.

- 4.2.1 Reference wagons are wagons of known weight, which have to be made available by the concerned Railway for verification of weighbridges. The weight of the reference wagon can be known by weighing the same on an accurate, certified, static weighbridge in uncoupled condition.
- 4.2.2 The weighment readings shall be taken in pulling mode.
- 4.2.3 Readings of up and down direction are to be considered separately for calculating accuracy level.
- 4.2.4 For WB-15 weighbridge, for the initial verification, 90% of the wagon weight should be within  $\pm 0.5\%$  of the known weight of the wagon and not more than 10% of the wagon weight shall exceed  $\pm 0.5\%$  and be within  $\pm 1\%$  of known weight of the wagon. However, during in service all the wagon weight should be within  $\pm 1\%$  of the known weight of the wagon.
- 4.2.5 For WB-15 weighbridge, for initial verification, 90% of the total train/ rake weight should be within  $\pm 0.25\%$  of the known weight of the train and not more than 10% of the total train / rake weight shall exceed  $\pm 0.25\%$  and be within  $\pm 0.5\%$  of the known weight of the train/ rake. However, during in service all train/ rake weight should be within  $\pm 0.5\%$  of the known weight of the train/ rake.
- 4.2.6 If roll back takes place at the time of testing, that weighing operation has to be repeated a new.
- 4.2.7 Anti-roll back test

Run 75% of the train over the weighing instrument, then stop the train, reverse 25% of the train and complete the weighing of the total train in the forward direction. Check that no wagon is weighed more than once.

4.2.8 Verification & calibration:

The firm shall arrange for calibration, testing and certification of the weighbridge for the initial commissioning the weighbridge as per terms & conditions of AMC. The reference wagons for verification purposes should be made available by Railways.

**5 Inspection:** The inspection of the Weighbridge system shall be conducted as follows:

**5.1** First pre-dispatch inspection of weighbridge supplied by a fresh registered vendor to either zonal railways or private sidings shall be carried out by RDSO.

**5.2** Pre-dispatch inspection of weighbridge by any registered weighbridge manufacturer, supplied to Zonal Railways shall be carried out by the RITES.

**5.3** Pre-dispatch inspection of weighbridge by any registered weighbridge manufacturer, supplied to private sidings shall be done on WTC basis by the weighbridge manufacturers itself.

**6 Warranty:** The weighbridge is installed on turnkey basis including civil and electrical works. The machine shall be warranted against the defects in design and materials and workmanship for a period of 30 months from the date of dispatch or 24 months from the date of commissioning whichever is earlier. Warranty will be applicable to the all work done by the weighbridge manufacturer. During this period all defective parts i.e. weigh rail and all accessories shall be replaced promptly and free of cost to the customer and such replaced parts shall further carry the same warranty. Warranty will not be applicable for consumables item like printer ribbon, printer cartridge, UPS batteries and fuses.

**6.1 Annual maintenance contract:**

**6.1.1** Tenderers are required to quote for post warranty comprehensive annual maintenance contract for a period of six years of the M&P along with their offers from the date of expiry of warranty period or 8 year from the date of commissioning whichever is later. Foundation work shall also form part of the annual maintenance contract. AMC shall be part of Purchase order as per extant Railway Board instructions.

**6.1.2** Zonal Railway, if required, may have the provision for entering into AMC for whatever the period they decide and follow AMC guidelines issued by Railway Board from time to time.

**6.1.3** Other terms and conditions of Annual maintenance contract shall be as issued/ approved by Railway Board from time to time.

**6.1.4 Spares Part Hubs:**

i. The EIMWB manufacturers shall be required to maintain Spare Part Hubs at strategic locations, from where they can promptly rush spares to service defective EIMWBs. Each Hub shall cater to a cluster of both Railway and non-Railway EIMWBs installed in its geographical vicinity.

ii. The items to be stocked in the spare part hub would include long lead items, which shall be required for ensuring proper uptime of the weighbridge over the



warranty period and subsequent AMC periods. It should also include such items, non-availability of which has resulted in higher downtime in the past. The list of spares to be maintained in each spare part hub will necessarily include but shall not be limited to:

- a) Set of **load receptor**/instrumented weigh rails (LH + RH) – the quantity to be asked shall be equal to 20% of the number of EIMWBs (Railway + non- Railway) serviced by the spare part hub, subject to minimum of 2 sets and maximum of 5 sets.
  - b) Track switches- the quantity shall be equal to 10% of the numbers fitted in the EIMWBs (Railway + non- Railway) serviced by the spare part hub, subject to minimum of 2 weighbridge sets and maximum of 5 weighbridge sets.
  - c) PC, Printer, UPS, CVT/Stabilizer, AD card, CPU card, Power card, Mother Board or **other data processing cards** – minimum 3 sets.
  - d) Any other spare that the firm opines is required to ensure up time of EIMWBs. Weighbridge manufacturer should ensure the availability of minimum required spares all the time.
- iii. Spare parts listed in para 6.1.4. (ii), (a), (b) and (c) when consumed in the course of maintenance shall be replenished by the firm within a maximum period of 45 days from the date of use. Records of usage shall be maintained in the Hub for this purpose.
  - iv. The Hub shall be open to inspection by representatives of Zonal Railways (Zonal/ Divisional) and RDSO at any time.

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**ANNEXURE-1**

**WORKS TEST CERTIFICATE**

**FOR**

**ELECTRONIC IN MOTION RAIL WEIGHBRIDGES**

**Ref: RDSO Specification No. WD-29-Misc-19 (Rev.-1)  
(up to latest current Amendment)**

This document consists of 6 Annexures- A, B, C, D, E & F. The Annexures E & F indicate the load linearity Graphs and copy of the ultrasonic testing of the Weigh Rails/ **Load Receptor**.

**MANUFACTURER NAME  
AND ADDRESS**

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-----  
-----

**WEIGHBRIDGE CONSIGNEE  
NAME AND ADDRESS**

-----  
-----  
-----

**SITE OF INSTALLATION**

-----  
-----  
-----

**Copies to:**

1. Consignee M/s \_\_\_\_\_
2. Sr. DME, \_\_\_\_\_ Division, \_\_\_\_\_ Rly.
3. Weighbridge manufacturer M/s \_\_\_\_\_

**WORKS TEST CERTIFICATE  
OF  
ELECTRONIC IN-MOTION WEIGHBRIDGE**

This is to certify that the Electronic in motion Weighbridge as certified by this WTC is as RDSO Specification No. WD-29-Misc-19 (Rev.-1) with latest amendment and this has been manufactured, processed, inspected and tested accordingly.

The results of the tests conducted on this weighbridge along with their test reports are given with this WTC. All the relevant records included in the process inspection and testing records as well as any other technical information regarding this weighbridge and its components with complete traceability shall be retained and kept with us for the warranty period. Even after warranty period, important data regarding this weighbridge will be kept. The information as above will be made available to Indian Railways, as and when required.

The test results are given for the Electronic In-motion Weighbridge being offered against your purchase order No. .... Dated ..... The Electronic In motion Rail Weighbridge is being shipped with the following dispatch particulars:-

- Mode of Transport: Road/Rail
- Truck No (In case of transport by Road):
- RR No./Lorry Receipt No. :

Date:

Signed:-----

Name:-----

Designation:-----

Name of the manufacturer-----

Address:-----

Seal of Weighbridge Manufacturer -----

**CERTIFICATE OF CONFORMANCE**

We certify that the product has met the requirements of the RDSO Specifications No. WD-29-Misc-19 (Rev.-1) (Specifications of .....)

We further certify that the above mentioned products have been manufactured conforming to the specifications for material and have been subjected to functional tests, as required, to meet performance criteria laid down in RDSO Specifications No. WD-29-Misc-19 (Rev.-1) (with latest/current Amendment). We further certify the following:

1. The Weighbridge has undergone visual and operational checks, as per the requirement laid down in RDSO Specification.
2. We further certify that this works test certificate is in exact conformance with the WTC format circulated by RDSO vide letter No.....dated.....
3. This certificate is only an authority to dispatch the stores. This does not, in any way, authorize the installation, commissioning and usage of the weighbridge for any commercial transaction. For the purpose of the installation and commissioning of the weighbridge and usage for commercial transactions with Indian Railways, the 'site approval' from concerned Zonal Railway as advised below should be taken, which conveys the approval of the specific location of weighbridge on the site plan.

**Description of goods:**

140T capacity Electronic In-Motion Rail Weighbridge to RDSO Specification No. WD-29-Misc-19 (Rev.-1) (with latest current amendment).

**Site Approval Details**

Zonal Railway Site approval letter No.....dated.....

Date

Signed:-----

Name:-----

Designation:-----

Name of the manufacturer-----

Address:-----

Seal of Weighbridge Manufacturer -----

**Annexure-C**

**Status of Calibration of Important IMTEs used for Manufacture Inspection and Testing of Electronic In-Motion Weighbridge.**

S.No.	IMTE Name	Make	S.No. of IMTE	Last Calibration date	Next Calibration date	Calibration Agency

Note :

1. The calibration status of all IMTEs used for the pre-dispatch Inspection of the Electronic In-motion Weighbridge are indicated in this page. These include the details of all Digital Multimeters, UTM/Load Cells amongst all other IMTE's.
2. It is certified that all the IMTEs used for the Manufacture and Testing were within the calibration control range and traceable to National Standards on the date of usage of the IMTEs.

Date:

Signed:-----

Name:-----

Designation:-----

Name of the manufacturer-----

Address:-----

Seal of Weighbridge Manufacturer -----

**Details of Pre dispatch Check of Weighbridge**

S. No	Store Particulars	Make & S. No. of Part (to be filled in by WB manufacturer)	Quantity and Unit of Quantity (to be filled in by WB manufacturer)	Inspection Parameter				Remarks
				Parameter to be checked	Instrument/ Equipment/ Type of Check	Acceptable Value	Value obtained/ Actual Observation (to be filled in by WB manufacturer)	
1	In motion weighing system (console unit)			Capacity	Visual	140 ton		
				Provision of locking Of Control Panel/ Digitizer	Visual Check	Should be lockable		
				Scale Interval Setting.	Visual Check/ Setting in Personal Computer	200Kgs.		
				Provision of standard RS 232 C serial port/Ethernet.	Visual check and Working of Port	Should be provided with RS 232 C Port/Ethernet in working condition		
				Provision of memory protection in case of power failure.	Physical Observation by switching off the Power Supply to the Console	The Data Integrity of earlier Data should be maintained		

Signature and Date

Seal of the Firm

2	Weigh Rails/ load receptor			Quality of Rails/ load receptor	Check of Purchase Order placed by Weighbridge Vendor and Quantity received	IRST-12-Grade 880/ IU Grade from RDSO approved Sources - SAIL and Jindal Steel		
				Ultrasonic Testing of Rails	Check of Certificate of Ultrasonic Testing	UST by NABL approved Laboratory or RITES Certificate for UST		Copy of the UST certificate shall be annexed along with the WTC as Annexure 'F'
				Length of Weigh Rails	Measuring Tape	5.5 Mtr.		
				Ingress protection (IP - 67 Certificate)	Visual Check	The product is in conformance with the IP - 67 Certificate		
				Linearity Test of Weighrail/ Load receptor	UTM or Hydraulic Press with Calibrated Load Cell, Multimeter	Graph between load with an increment of 2.5 tons, up to a max. load of 17.5 tons for each sensor, and mV/V should be linear.		Copy of the Load Linearity Graph shall be annexed along with the WTC as Annexure 'E'.
				Insulation resistance between Rail and Load Cell	Digital Multimeter	$\geq 200 \text{ M}\Omega$		

Signature and Date

Seal of the Firm

3	UPS			Load Test Specified by the Manufacturer of the UPS.	Using Suitable Resistances and voltage source	The UPS should work for specified Time backup as per the Manufacturers stipulation		
				Load Test for the full load of Weighbridge	Complete Weighbridge assembly	The UPS should give a backup of minimum 1 hour		
4	Stabilizer			Functioning of Stabilizer for Variable Input Voltages as per Stabilizer Manufacturer's Test Specifications	Variable Voltage Input, Multimeter for Output	The Stabilizer shall work within the Cut off Range specified by the Stabilizer Manufacturer		The Voltage stabilization range shall be minimum of 230 V + / - 10 %
5	CPU, Monitor, Printer & Weighing Software			Physical condition.	Visual Check	The Monitor and CPU shall be damage free		
				System Booting and Monitor Check	Visual Check	The system should boot up in Normal Mode and Monitor should work normally		
				Software on windows platform.	Visual Check checking of system properties	The Operating system shall be on Microsoft Windows Platform		
				Weighing Software Password Protection	Physical Check	There should be a provision to password protect the weighing software		

Signature and Date

Seal of the Firm



				Simulation Test.	Weighing Simulator	Loco Elimination, Anti Roll Back, Two/ Four Axle Wagon Detection, Bidirectional Weighing, Over speed Indication Checking should be checked		
				Printer Working	Weighing Simulator	Printer shall be able to print the Output of the Simulation		
				Possibility of Gross Load wagon Editing	Weighing Simulator	It should not be possible to change the Gross Weight Wagon Field in any case		
6	Key board			Physical condition.	Visual Check	The Keyboard shall be damage free and shall be able to key in Data on the PC		
7	Track Switches			Type of Track Sensors	Physical Check using suitable voltage source and any metallic object	The Sensors shall be of Non-Contact type and shall get activated upon proximity of a metallic object		

Signature and Date

Seal of the Firm

8	Lightning protection device (SPD's)			Types of Surge Protection Devices used	Physical Check	The Surge protection devices shall be as per RDSO Specifications. Also all three Stages of Surge Protection Devices should be available in the Bill of Material		The Make, Model and S No of <b>all the three stages</b> of Surge Protection Devices shall be indicated in Column 3.
				Make and Model Number of Stage 1 and 2 Surge Protection Devices	Physical check of Purchase Orders and comparison with RDSO Specifications	The Model and Makes of the Surge Protection Devices shall be as specified in RDSO Specifications		
				Characteristics of Stage 3 Surge Protection Devices	Physical Check of Product Data Sheet of the Stage 3 Surge Protection Devices and comparison with RDSO Specifications	The Stage 3 Surge Protection Devices shall be purchased from RDSO approved sources. The Characteristics of the Stage 3 Surge Protection Device shall be as specified in RDSO Specifications		

Signature and Date

Seal of the Firm

**Annexure-D**

9	Visual Indicator			Colour and Aspect of of Visual Indicator	Visual Check with Simulator	The colour of visual indication shall be Purple with aspect of Steady for speed of the train within limit and pulsating with over- speed of the train		
10	Earth Enhancement Material			Make of Earth Enhancement material	Comparison with purchase order	The Earth Enhancement Material shall be procured from reputed OEM's or their authorized representative, to ensure matching with the equipment		The source of Earth Enhancement Material shall be indicated in Column No 3

Signature and Date

Seal of the Firm