

## SECTION- II

TECHNICAL SPECIFICATIONABBREVIATIONS

A-1,A-2, A-3, A-4	Standard paper sizes
AC	Alternating Current
AMC	Annual Maintenance Contract
AT	Acceptance of Tender
BG	Bank Guarantee
CME	Chief Mechanical Engineer
CME/PCM	Chief Mechanical Engineer/Post Contract Management
CNC	Computer Numeric Control
COFMOW	Central Organisation for Modernisation of Workshops
COS	Controller of Stores
Db	Decibel
DC	Direct Current
FA&CAO	Financial Advisor & Chief Accounts Officer
GA (Drawing)	General Arrangement (Drawing)
HRC	Hardness Rockwell 'C' Scale (value)
Hz	Hertz
IEC-Pub	International Electro technical Commission - Publication
JCN	Joint Commissioning Note
JRI	Joint Receipt Inspection
kW	Kilo Watt
LC	Letter of Credit
LD	Liquidated Damages
LOA	Letter of Acceptance
NC	Numeric Control
NIT	Notice Inviting Tenders
PBG	Performance Bank Guarantee
PDF	Portable Document Format
PLC	Programmable Logic Controller
PTC	Proving Test Certificate
PU	Production Unit (Any of the six Railway Production Units e.g. RCF, ICF etc.)
RDSO	Research Design & Standards Organisation
SS	Stainless Steel/Solid State
WBG	Warranty Bank Guarantee

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**SPECIFICATION FOR STATIC ELECTRONIC WEIGHBRIDGE  
(ROAD, RAIL cum ROAD, RAIL)**

**1. BASIC DESIGN FEATURES:****1.1 FEATURES:**

- 1.1.1 The machine shall be capable of continuous working, and shall be operated normally in three shifts per day (each shift is of 8.0 Hrs.). The machine shall be suitable particularly for heavy-duty industrial work.
- 1.1.2 The general electrical specification of the machine shall be as per clause 2.
- 1.1.3 General characteristics of the machine shall be as per clause 3.
- 1.1.4 All Steel Structures and housings should be surface treated to prevent corrosion and painted.
- 1.1.5 Suitable industry standard safety of the operator and maintenance personnel should be built in into the design.
- 1.1.6 All parts of the equipments should be capable of working in hot dusty and humid environment. They should work continuously at the rated capacity upto a temperatures of 50 degree Celsius and Relative Humidity upto 98%.
- 1.1.7 Machine Maintainability
- a) The machine design shall be such that it requires minimum possible maintenance and gives trouble free service.
- b) All assemblies/parts of the machine shall be easily accessible for maintenance.

- 1.2 The weighbridges should be **"Static Type Pit Type Rail Electronic Weighbridge of 100 MT Capacity having Single platform"** suitable for weighing of different type of Rolling Stock (Coaches & Wagons) up to 100 MT as per technical Specifications and Leading Parameters detailed in Schedule I.

**Note: Consignee will provide the rails to bidder for installation of Rail Weighbridge at consignee's site.**

**1.3 GENERAL:**

- 1.3.1 In addition to the technical Specification given at Schedules I as applicable, the weighbridge shall also be able to meet the technical requirements given below:
- Final calibration of the weighbridge should be through software. The calibration program should be accessible only through a double password.
  - A separate resident file should be created on HDD of PC (detailed at 1.5.6 of Section-II), to automatically log date and time.
  - The junction box, if any and the control room etc. should have the arrangement of bolting/locking to prevent it being tampered by unauthorized persons. All the subassemblies/ assemblies, alteration of which can lead to erroneous weighment should be made tamperproof.

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- 1.3.2 The system shall work in an ambient condition of temperature range of - 2°C to 55°C and relative humidity of 98% and comparatively dusty atmosphere. All equipment's should be designed to function effectively under these conditions. All the enclosures of the equipment's should have to confirm to suitable standard (IP etc) to ensure all-weather proofing.

#### 1.4 SPECIFIC CHARACTERISTICS

##### 1.4.1 RIGIDITY- CONTROL- SAFETY:

- 1.4.1.1 The weighbridge shall be rugged and designed, to meet the weightment requirements specified under Schedule- I.
- 1.4.1.2 The weighbridges shall be provided with all safety devices against over load, lightening/surge and should incorporate safety devices so as to ensure complete protection for operation and weighbridges from all operational failures. Suitable interlocking arrangements against faulty sequence of operation, sudden power failure/fluctuation in supply voltage beyond permissible range and malfunctioning in system shall be provided. Protective guards wherever necessary should be provided. **The bidder shall explain in detail the various safety provisions available in the weighbridges.**
- 1.4.1.3 The controls of weighbridge shall be governed by keyboard provided with the weighing electronics/P.C.

#### 1.5 GENERAL REQUIREMENTS:

##### 1.5.1 PLATFORM STRUCTURE

- 1.5.1.1 The weighbridge platform shall be a robust modular construction with heavy-duty platform rigid deck with adequate ribbed section and antiskid plate, and of following approximate size:

- (i) **Rail Weighbridge** : 22000.mm x 3000 mm size for 100 MT Capacity  
(Single Platform)

- 1.5.1.2 The weighbridge platform structure shall be suitably painted with anti-corrosion paint.
- 1.5.1.3 **The design details of platform shall be fully explained along with material specifications in the offer.**

##### 1.5.2 LOAD CELLS

- 1.5.2.1 The weighing system shall comprise of double-ended shear beam strain gauge digital load cells. The weighbridge shall be supported by these load cells. The no. of load cells provided shall not be less than 6 nos. and actual no. of load cell used should be indicated in the offer. **Non-linearity of each cell will not exceed 0.025% and total error will not exceed 0.02% of full load scale capacity of each cell.** The weighbridge shall be so designed as to ensure that lateral force and other undesirable forces do not act on load cells. **The design details of load cells shall be explained in the offer.** The load cell should be able to withstand the impact load.
- 1.5.2.2 The load cells should be weather proof and shall be suitably protected to withstand environmental

  
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conditions viz. flooding, rain water, temperature variations from  $-10^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  with humidity level max. up to 98%. **The degree of protection should be IP- 68.**

1.5.2.3 The load cell shall be provided with integral cable and make of load cell will be Appalto/ Keli/Zermic.

### 1.5.3 WEIGH ELECTRONICS

1.5.3.1 The weigh electronic system should be provided with digital display unit which should be microprocessor based having the following features

- i) Analogue to digital converter enabling flicker free display,
- ii) Facility for auto calibration (from NABL accredited laboratory),
- iii) Auto balance,
- iv) Diagnostics load cell connectors,
- v) Weight display,
- vi) Weight indicator,
- vii) Provision for connection to PC,

1.5.3.2 The system should also have digital display of weight through a remote weight indicator. The remote weight indicator should be of electromagnetic red bright LED type and should be of 7 numeric characters and shall be installed outside the control room. Character size should be minimum 4".

1.5.3.3 The design details of remote weight indicator shall be explained in the offer.

1.5.3.4 The printed weight tickets shall have the following information:

- i) Date and time
- ii) Lorry/vehicle number
- iii) Product code/description
- iv) Source
- v) Destination
- vi) User message

**The format for above data may be submitted along with the tender bid.** Modifications if required shall be suggested by the consignee for incorporation.

1.5.3.5 The system shall also have facility of diagnostics. In case of fault, descriptive message should be displayed on visual display unit. The details of diagnostics available shall be explained in offer.

### 1.5.4 CABLING – JUNCTION BOX

1.5.4.1 The control room will be constructed at a distance of approximately 15 meters from the weighbridge. The system shall have cables from the load cells, which shall terminate in a weatherproof junction box suitably fixed on the weighbridge. Further, from junction box the cable will run to the control room housing the digital weight indicator. The cable shall preferably run in a MS conduit pipe for providing extra protection to the cables. Alternatively, armoured cable to be provided.

### 1.5.5 CIVIL WORKS

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- 1.5.5.1 The Static Weighbridge shall be supplied on **Turnkey basis** including civil and electrical works like construction of foundation for the weighbridge, construction of control room size – 4 m x 4 m x 1.3 m (with dust room facilities of size 1 m x 3 m x 3 m), for housing the weigh electronics, PC keyboard and stacking records etc., and fitted of two tube lights, ceiling fan in the room and fitting of electrical power swit & sockets as per consignee requirement are to be provided by the firm. The purchaser will indicate site for weigh bridge control room and will provide electrical supply at 230V  $\pm$  10%, 50  $\pm$  3% Hz up to the site.
- 1.5.5.2 Control room should be air-conditioned and will house the weigh electronics and the P.C. **Air conditioner of minimum 1.5 T capacity and 5 star rating, Voltage stabilizer for Air Conditioner will be provided by the firm.** Cables and power socket for Air Conditioner, etc. shall also be provided by the firm as part of civil work. The AC should be secured against theft.
- 1.5.5.3 **Tenderer shall carry out a site visit before initiating process for GA drawing making so that consignee requirements can be taken into account by the tenderer.**
- 1.5.6 **PC (PERSONNEL COMPUTER)**

The supplier shall supply PC which will be parallel and in addition to the weigh electronics with Software package suitable for operating applications of the weighbridges will be directly linked to the control console for operation, viewing and printing output. The complete configuration shall be specifically designed for weighing system. The PC shall have the following characteristics:

**Only IBM, Lenovo, HP & Dell makes are acceptable:**

CPU	Intel i5 CPU @ 3.10 GHz or Higher
Mother Board	Intel Q77 chipset OEM Certified
Memory	8 GB DDR3 RAM or Higher
Hard Disk Drive	1 TB SSD
Monitor	24" LED (Support 1366 x 768 NI Resolution) of same make of CPU
Multi Media Card	Sound card, Inbuilt/2 amplified speakers and microphone
Key Board	104 Keys Board
Mouse	Optical Mouse with Mouse Pad
Ports	4 USB 2.0 Ports
Printer	Laser Jet Printer B&W
Networking Facilities	Ethernet Card inbuilt in mother board.
Operating system	Microsoft Window 11 or latest along with licensed MS Office software.
Antivirus	Antivirus with two year licensed pack
UPS	With minimum 2 Hrs. Power Backup

## 2. GENERAL ELECTRICAL SPECIFICATION

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- 2.1 The provision of this General Specification shall apply, where ever relevant.
- 2.2 All equipments and material shall comply with appropriate Indian Standards (latest), International Standards or National Standards of the country of origin provided the latter are equivalent to or better than the former. The tenderer shall indicate the Standards applicable. The following standards are applicable in particular. (Corresponding International Standards like ASA, NEMA, BSS, DIN etc. may also be quoted).

IS	325-1979 (latest)	Three phase induction motors (corresponding to IEC pub-34-1) (Latest).
IS	1248 (Latest)	Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest)
IS	1231-1974 (Latest)	Dimensions of three phase induction motors (corresponding to IEC Pub-72-1) (Latest).
IS	1271-1985 (Latest)	Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub-85) (Latest)
IS	6875 (Latest)	Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).
IS	375-1963 (Latest)	Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring.
IS	996-1979 (Latest)	Single phase small AC and universal electrical motors.
IS	1356 (Latest)	Electrical equipment of machine tools.
IS	2516 (Latest)	Circuit breakers (corresponding to IEC Pub-56) (Latest)

- 2.3 The electrical equipments shall comply with the requirement of Indian Electricity Act and Rules (latest).
- 2.4 All instruments shall be of the Industrial Grade "A" (IS-1248) switch board type the range of the instrument shall be such that the maximum load expected in the circuit shall produce a deflection of 60% to 80% of the full scale.

## 2.5 POWER SUPPLY

- 2.5.1 Firm should confirm satisfactory performance of the machine at incoming power supply of 230V  $\pm$  10%, 50  $\pm$  3% Hz.

## 2.6 ATMOSPHERIC CONDITIONS

- 2.6.1 The ambient temperature at the site at which the machine will be installed may vary from - 4°C to + 50°C over the year. The relative humidity may be as high as 98%. The atmosphere is expected to be dusty. The machines offered shall be suitably tropicalised to work under these atmospheric conditions without any adverse effect on their performance.

- 2.7 The temperature rise shall not reach such a value that there is a risk of injury to any insulating material

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or adjacent parts.

### 3. GENERAL CHARACTERISTIC

#### 3.1 RIGIDITY AND STABILITY

- 3.1.1 The machine shall be robust, rigid and of sturdy construction. It shall be designed to meet heavy duty demands of various operations on the machine under normal Workshop environment for such machines. It shall be free for vibrations even when working at full capacity.
- 3.1.2 Change in ambient temperature shall not affect the performance of the machine.
- 3.1.3 There shall be no change in the performance of the machine either on switching on the machine or after continuous running.
- 3.1.4 There shall be no resonant vibrations throughout the working range of the machine at all load levels.

#### 3.2 SAFETY CONTROLS

- 3.2.1 The machine shall incorporate safety devices to provide protection to the operator and machine against all possible operational and machinery failures.
- 3.2.2 Suitable interlock shall be provided to prevent machine operations in the event of:
- 3.2.2.1 Faulty sequence of operation.
- 3.2.2.2 Fluctuation in supply voltage.
- 3.2.2.3 Resumption of power supply after power failure.
- 3.2.3 A fault or damage in the control circuit or interruption re-establishment after an interruption of fluctuation in whatever manner in the power supply to the machinery must not lead to dangerous situations in particular.
- 3.2.3.1 The machinery must not start unexpectedly.
- 3.2.3.2 The machinery must not be prevented from stopping if command has already been given.
- 3.2.3.3 No moving part of the machinery or piece held by the machinery shall fall or be ejected.
- 3.2.3.4 The protection devices must remain effective.
- 3.2.4 Safety features shall also include.
- 3.2.4.1 Safety device against overload for all mechanical and electric items to the extent possible.

#### 3.3 MACHINE MAINTAINABILITY

- 3.3.1 The machine shall be so designed as to require minimum possible maintenance and to give trouble free service.
- 3.3.2 All assemblies/parts of the machine shall be easily accessible for maintenance.
- 3.3.3 The machine shall not require major dis-assembly for checking and replacement of a particular part, especially for parts requiring periodical check up and replacement.

#### 4.0 TECHNICAL LITERATURE:

- 4.1 One copy of the printed illustrative catalogue showing features of the machine and its elements must be enclosed with each copy of the bid.

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- 4.2 The technical literature shall be provided for the complete machine, including imported and indigenously purchased components / sub- assemblies. The successful tenderer will have to furnish 4 (four) copies each of the following manuals directly to the consignee along with the machine. Out of these 04 sets, the bidder shall be required to submit one set of all documents in best available condition one month prior to the training for the machine. One set of technical literature should cover the following details:
- (i) **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 (from NABL accredited laboratory) and zero balance, carrying out diagnostic tests and system set up before start of weighing.
    - (a) **Maintenance manual:** It shall contain detailed description of the system and its functioning. This manual shall contain -
      - (b) Drawings and circuit diagrams with component layout wherever required.
      - (c) Complete wiring diagram with all wires numbered and components/cards labelled.
      - (d) List of parts with part number of the assembly and also part number of the original manufacturer and manufacturer's address.
  - (ii) Machine Software listing (if provided).
  - (iii) Spare part manual including part lists no, hard copies in A-4 size as well as in PDF format.

**Note: All manual and literature should be in English/Hindi.**

#### 5.0 SPARES:

- 5.1 Since the machine will be under comprehensive preventive maintenance during warranty period of two (02) years and under AMC for five (05) years after the warranty period, it is the sole responsibility of bidders to stock such spares as required for smoother execution of PMC during warranty and AMC in order to achieve response time in compliance to machine availability as per stipulated requirements.

#### 6.0 CONSUMABLES:

- 6.1 Since the machine will be under comprehensive preventive maintenance during warranty period of two (02) years and under AMC for five (05) years after the warranty period, it is the sole responsibility of bidders to stock such consumables as required for smoother execution of PMC during warranty and AMC in order to achieve response time in compliance to machine availability as per stipulated requirements.

#### 7.0 SPECIAL FEATURES:

- 7.1 Special features incorporated in the machine, if any, shall be indicated separately in the bid clearly indicating the advantages.

#### 8.0 DEVIATIONS:

- 8.1 The tenderer shall certify that the offered machine fully meet the specification. Various design features incorporated in the machine to fulfill different technical performance requirements shall be fully explained in the offer. However, minor deviations from these specifications which do not affect or in

  
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any way interfere with the stipulated performance standards or would result in improved safety/reliability or would reduce recurring maintenance/operating cost of the machine, can be considered for acceptance. The tenderer in such eventuality shall clearly indicate the details of these deviations and their implications as per the following format.

- 8.2 All Deviations shall be clearly indicated in the deviation statement as per the format of submission of technical bid Annexure - A.

## 9.0 INSPECTION AND TESTING AT CONSIGNEE'S SITE:

- 9.1 The machine shall be inspected and tested, by the purchaser or his authorized representative at the consignee's site. **The bidder must ensure compliance of Quality Assurance Plan as given in Annexure – 'J' of Section III of this specification.**

- 9.2 A full load test at full rated capacity of Electronic Weigh Bridge will be carried out at consignee's site after commissioning of Weigh Bridge. Consignee will provide the load to bidder for testing at site. Capability of the machine must be demonstrated as per technical Specification to the satisfaction of such authorized representative.

- 9.3 Following tests during commissioning of weighbridges shall be carried out at consignee's site:

### 9.3.1 Zero Operation and Indication Test

Indicator after the test load has been removed, should returns to zero/balance.

### 9.3.2 Zero Tracking Test

A weighbridge with zero tracking will automatically return to zero if the amount left on the platform does not exceed half a scale interval. This can be up to 5 kg on a weighbridge with 10 kg scale intervals.

### 9.3.3 Eccentricity Test

The eccentricity test is designed to ensure that the weigh bridge weight shows the same on any part of platform. To carryout this test:

- Place a test weight of at least 50% of the rated capacity of the weighbridge in the centre of the Platform of weighbridge and note the reading.
- Progressively place the test weights over the load bearing points of load cells until all load bearing points have been tested. Record the indications in each position.
- Place the test load distributed on all load bearing points and at centre. There should not be more than one scale interval variation between all the indications.

### 9.3.4 Accuracy Test

- Place 10 Tons of standard weights, duly stamped by weighs and measures department at the centre of Weigh Bridge. Note the readings.
- Now place 5 Tons of standard weights at the centre of Weigh Bridge. Note the readings.
- In both the cases the deviations in the readings should not be more than 10kgs compared to standard weights placed for measurements.
- Standard weight required for accuracy test shall be arranged at consignee site by supplier firm.

## 9.4 CALIBRATION, TESTING AND CERTIFICATION

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- 9.4.1 **At the time of commissioning:** During commissioning of weighbridge, firm shall arrange for,
- Calibration of the weighbridge from NABL accredited laboratory.
  - Testing, stamping and certification of the weighbridge from Weight and Measurement department of the State. The certification shall have to be got done in accordance with standards for Weights and Measures General Rules (Latest) applicable in the state.
- 9.4.2 **During Warranty and CAMC Period:** Firm shall perform the following during warranty period and CAMC period,
- Calibration (by firm itself) has to be done annually during warranty period and CAMC period.
  - Testing, stamping and certification of the weighbridge from Weight and Measurement department of the State during warranty period and CAMC period will have to be done annually by the firm.
- 9.5 The complete machine shall be inspected at manufacturer's premises as per approved GA drawing. Inspecting authority shall not carry out the final inspection in case GA Drawing is not approved by the consignee.

## 10. TRAINING:

- 10.1 Free training by the firm shall be imparted in operation and maintenance of the machine. The training to be imparted shall cover operation, troubleshooting and repair of all mechanical, electrical & electronics equipments, PLC etc as applicable. This training shall be provided to 06 employees nominated by consignee, for a period of four days free of cost at the manufacturer's/consignee's premises. All charges pertaining to travel, boarding and lodging shall be borne by Indian Railways.
- 10.2 Subsequently, technical experts from the manufacturer will fully and adequately provide training to operators and maintenance staff nominated by the consignee at the time of commissioning of the machine.
- 10.3 The supplier will be responsible for co-coordinating with the consignee the travel plans of trainees to ensure that the training is imparted on the machine at its assembly and testing stage. The bidder shall also submit training schedule along with the offer.

**Note: All training should be imparted in English/Hindi only.**

## 11. FOUNDATION & RELATED DRAWINGS

### 11.1 SUBMISSION OF GA, FOUNDATION & RELATED DRAWINGS FOR APPROVAL:

- 11.1.1 For each machine, the supplier shall first submit 01 copy of foundation drawings with details of construction of foundations, complete layout of machine elements and other related diagrams (Mechanical, Electrical & Electronics) along with machine weight, overall dimensions, electrical load with length of Single Phase, 230 V AC electric power cable for approval as per time schedule specified in Section-I to each consignee for approval and to enable the consignee for making necessary arrangements for Installation & Commissioning of Machine on receipt. After getting approval from consignee, the supplier shall supply directly to each consignee 6 copies of approved GA foundation drawings and related diagrams for each machine as per time schedule specified in Section- I from the date of approval of GA drawing for information only. This information should be furnished on the pattern indicated in detail in the following IS Specifications (Latest) or relevant international standards
- IS: 2974 (Pt.I Para 4.1) for reciprocating type machine.
  - IS: 2974 (Pt.III Para 3.1) for rotary type machine (medium & high frequency).
  - IS:2974 (Pt.IV para 4.1) for rotary type machines of low frequency.

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