

# **TEST MANUAL FOR ELECTRONIC WEIGHBRIDGE.**

**Capacity: >3000kg**

## **1.0.Construction**

Has a segmented platform covered with studded sheets of metal. Platform measures between 100cmx200cm and 250cmx 18000cm.

Rail weighbridges do not use platforms instead there are special design arrangements for fitting the loadcells to the live part of the railway line.

A weighbridge may also be in the form of electro-mechanical where the bottomwork is fully mechanical with knife-edges and levers and the headwork is digital.

A load cell is installed at the end of the transfer lever that responds to the forces from the bottom work and transforms the force into an electrical signal to be fed into a digital headwork (indicator system).

A weighbridge may be fitted with a minimum of four loadcells and a maximum of 8 loadcells depending on the capacity, size of platform and indicator system specifications.

The indicator is fixed remote from the platform.

## **2.0.Operation**

The signals from the loadcells are first amplified and then consolidated into one before further processing and display.

## **3.0.Application**

Used in industrial environments, general transport areas for goods. They are used for general determination of quantities of transported goods and for vehicle load control for road and rail network preservation and general safety.

## **4.0. Calibration**

Calibration is done either through the indicator system or through the junction box via installed potentiometers with the aid of standard weights.

In case of electro-mechanical weighbridges, adjustment is done both on the leverage ratio in the bottom work and at the indicator system.

#### **4.0. Testing**

The following tests are carried out i.e. weighing performance, eccentricity, discrimination, tare, repeatability and multiple indicator tests.

During testing, rolling loads are used.

##### **4:1. Weighing Performance Test**

The instrument is tested to its maximum load or to as near thereto as possible.

##### **4:2. Eccentricity Test**

Since the weighbridge has more than four points of support, the load is applied over each support on an area of a fraction  $1/n$  of the surface area of the load receptor, where  $n$  is number of points of support.

The load applied is  $1/(n-1)$  of the maximum capacity.

##### **4:3. Sealing and Stamping**

Sealing is done as per the approval directive for the model of the instrument.

The general focus for sealing is the indicator system and the junction box for equipment fitted with junction boxes.

# INSTRUMENT EXAMINATION SHEET

## RE- VERIFICATION AND INSPECTION

### (I) EXAMINATION

Recognition: Model No.....

Approval No.....

Entirety: Name parts discernible from outside.....

Denomination: Accuracy Class.....

Capacity: Max.....

Min.....

Verification scale interval.....

Is the instrument properly classified(Does the declared verification scale interval, and Maximum capacity match the declared Accuracy class ?).....

Strength(Is instrument strong enough).....

(Is instrument suitable for application).....

(Is instrument suitably designed to allow for verification?).....

Individuality (any novel feature not initially included in the approved design likely to affect weighing ?) .....

Trade Mark : Indicate manufacturer's Name or mark.....

Sealing/Stamping:

Can the instrument be used fraudulently ?.....

Are all the access points to the metrologically relevant parts sealable.....

Is there a provision for receiving a stamp?..... (II)

## (II) Determination of Maximum Permissible Errors (mpe)

### Procedure:

Record the value of the load at which mpe is to be determined ----- L

Record the verification scale interval of the machine under test (e or d) -----d

Divide L by d and record the result ---n

Compare the resultant value (n) with the values in the table below as per the instrument class;

Values of maximum Permissible error on initial verification

Maximum permissible errors on initial verification	Class I	Class II	Class III	Class III
$\pm 0.5 e$	$0 \leq m \leq 50000$	$0 \leq m \leq 5\ 000$	$0 \leq m \leq 500$	$0 \leq m \leq 50$
$\pm 1.0 e$	$50000 < m \leq 200000$	$5\ 000 < m \leq 20\ 000$	$500 < m \leq 2\ 000$	$50 < m \leq 200$
$\pm 1.5 e$	$200000 < m$	$20000 < m \leq 100\ 000$	$2\ 000 < m \leq 10000$	$200 < m \leq 1\ 000$

The corresponding mpe factor is used to calculate the mpe at the given load.

Example:

Weighing instrument class – III

Weighing Instrument capacity –15kg

Load position being tested (L)...5,000g point.

Verification scale interval of machine (d or e) -5g

**The mpe values is calculated as follows;**

$$\begin{aligned}n &= L/d \\ &= 5000g/5g \\ n &= 1000\end{aligned}$$

Check in the table where the value 1000 falls within class III

Value falls in the second row range of between 500 to 2000.

Check for the corresponding value of the maximum permissible error under the Maximum permissible error column.

The value is  $\pm 1.0 e$

Hence at the load of 5000g for a 15kg instrument with  $d(e) = 5g$ , the mpe is;

$$\pm 1.0 \times 5 = \pm 5.0 g$$

**( III ). TESTING**

**1. ECCENTRICITY USING ROLLING LOADS( Weighbridge)**

Scale interval(d) ----

Number of sections of the divided load receptor

**Load disposition positions on the load receptor**

1	2	3	4
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**$E = I - L$**

<b>Position (Section)</b>	<b>Direction (←   →)</b>	<b>Load,L</b>	<b>Indication, I</b>	<b>Error, E</b>	<b>mpe</b>
<b>1</b>	→				
	←				
<b>2</b>	→				
	←				
<b>3</b>	→				
	←				
<b>4</b>	→				
	←				

**Check if  $| E | \leq | mpe |$  then instrument is correct**

**Passed**

**Failed**

## 2. WEIGHING PERFORMANCE TEST

Scale interval(d) ----

$$E = I - L$$

Load, $L$	Indication, $I$		Error, $E$		mpe
	↓	↑	↓	↑	

Check if  $|E| \leq |mpe|$  then instrument is correct

Passed

Failed

### 3. DISCRIMINATION TEST

Scale interval (d) ----

Resolution during test (smaller than e): ---

Load, $L$	Indication, $I_1$	Extra load, = $1.4d$	Indication, $I_2$	$I_2 - I_1$
(Min)=.....				
1/2Max= .....				
Max=.....				

If  $|I_2 - I_1| \geq d$  then instrument is correct

Passed

Failed

#### 4. REPEATABILITY TEST

Scale interval(d) ----

$$E = I - L$$

Load(about 0.8Max)

	Indication of Load, I	E
1		
2		
3		

$E_{\max} - E_{\min}$  (weighing 1-3)

mpe

If a)  $E \leq mpe$  and

b)  $E_{\max} - E_{\min} \leq$  absolute value of mpe then instrument is correct

Passed

Failed