TESTING/VERIFICATION MANUAL FOR WEIGHBRIDGES

1. DEFINITION:

A weighbridge shall mean a weighing instrument constructed with compound levers, with the indicator system carried on foundations separate from the lever system to weigh loads of capacities 1000 kg (one tonne) and over.

2. CAPACITIES:

Weighbridge may be of the following capacities:-

1, 2, 3, 5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100, 150, 200, 250, 300, 400 tonnes

CAPACITY DETERMINATION

EXPLANATION I

While arriving at the capacity of the machine the maximum graduation shown on the steelyard in the case of "loose weight" type machines shall not be taken into account.

2.1.2 EXPLANATION II

The capacity of the machine shall include the capacity of graduated tare bar or bar where provided.

2.1.3 EXPLANATION III

When tare bars are used and are not graduated except with a zero mark, they shall not be taken into account when calculating the capacity of the machines. Un-graduated tare bars shall be marked with zero.

3.0 GENERAL REQUIREMENTS:

3.0.1. FRAMEWORK

Where the weighbridge is fitted with a framework, it shall be built up of mild steel sections or cast iron or cast steel. It shall be of rigid structure suitably strengthened so that it is capable of resisting excessive vibrations and shall not throw the lever system out of alignment. Brackets shall be provided on the side and end frames to secure the framework.

3.0.2. STEELYARD (WHEREVER PROVIDED)

(i) The steelyard of a weighbridge shall not have any readily removable parts except the support for the proportional weights. There shall be one or more stops to prevent the sliding poise or poises from traveling behind the zero mark.

(ii) The minimum travel of the steelyard in weighbridges shall be 10mm each way

(iii) The top and bottom of the guide or steelyard shall be fitted with non-magnetic materials

(iv) When the steelyard is provided with notches, these shall be suitably protected.

(v) The value of the smallest graduation on the minor bar shall not exceed the maximum permissible error for that capacity.

3.0.3. WEIGHBRIDGE ROVIDED WITH DIAL

(i) Rack and pinion shall be of suitable band wearing material finished smooth

(ii) The extremity of the pointer shall, in no position be at a greater distance from the graduated surface of the dial than

5mm. If the pointer is in a different plane, the extremity of the pointer shall be on the graduated portion of the dial, but shall be so made as not to completely obscure the graduation mark, or make it difficult to read any graduation mark; and

(iii) The dial shall be graduated into reasonably equal parts and the minimum distance between graduation marks shall be not less than 2mm.

3.0.4. PROPORTIONAL WEIGHTS (WHEREVER PROVIDED)

(i) All proportional weights shall be identified with the machine by a number or any other suitable mark of identification which shall be indelible

(ii) The proportional weights shall be hexagonal in shape with a slot of suitable size to allow them being placed on the counter balance. The counter balance shall be identified with the machine.

(iii) The proportional weights shall be made of cast iron or brass.

(iv) The proportional weights shall have one rectangular loading hole which shall be undercut or tapering outwards so as to hold lead securely for adjustment. The undercut hole shall be reasonably large to accommodate the lead required for adjustment. The surface of the lead in the loading hole of a new proportional weight shall be at least 3mm inside from the bottom surface of the weight.

(v) The smallest denomination of the proportional weight shall be equivalent to the weight represented by the maximum graduation on the minor bar.

(vi) The denominations of the proportional weights shall be 1kg, 2kg, 5kg, or a multiple or submultiples of 10 or a power of 10 of any of these weights. Any number of proportional weights in any one of the aforesaid denominations may be included

provided the total equivalent of all the proportional weights does not exceed the capacity of the weighing instrument.

3.0.5. GRADUATION

The value of the smallest graduation on dials or minor steelyards of weighing instruments expressed in units of mass, shall be in the form of 1 x 10^n, 2x10^n or 5x10^n, 'n' being a positive or negative whole number or zero.

3.0.6. PLATFORM

(i) The platform shall be either chequered or plain and shall be made of cast iron or steel plates or any other materials of equal strength. It shall be rigid and sufficiently strong to carry the maximum load. The foundation of machines above 5 tonnes shall be provided for manhole to facilitate easy access to the pit.

(ii) If a moveable hutch barrow, frame or bucket is used with the ordinary platform, it shall form an essential part of the machine without which it is not possible to balance the machine. The moveable hutch, barrow, frame or bucket shall be identified with the machine and when in position on the platform, it shall be as central as possible.

3.0.7. BALANCING ARRANGEMENT

The balancing arrangement shall have a range not exceeding 0.5 percent of the capacity of the machine and not less than 0.1 per cent of the capacity each way. Where a balance box is provided to contain the balancing ball, the balance box shall be securely attached

to steelyard, preferably by passing a bolt through the casting to the steelyard. The balancing ball shall be actuated by a detachable key.

4. TESTS AND TEST REQUIREMENTS

4.1. GENERAL EXAMINATION

The weighbridge shall be fully visually examined as per requirement of the laws. The purpose of the general examination is to recognize the instrument, ascertain its entirety; know or determine its denomination in terms of capacity, whether it bears a certification on stamp plug; whether it has individual features; whether its trade mark is a new one or it already exists in the pattern approval records.

4.2. ZERO LOAD TEST

The steelyard of a weighbridge shall remain horizontal at no-load. In case of a machine fitted with dial, the pointer shall be at zero mark, at no load. Repeatability of zero indication shall be done with load and without load.

4.3. ELECTRONIC WEIGHBRIDGES ACCURACY TESTS

The electronic weighbridges shall be tested to verify the accuracy in accordance with the OIML International Recommendations, such as OIML R74, R76, R106, R107, R60, etc. The permissible tolerances stated in the International Recommendations shall be applicable on testing and verifying the accuracy of electronic weighbridges.

4.4. MAJOR GRADUATIONS OF NOTCHES TESTS

Weighbridges shall be tested to verify the accuracy of major graduations or notches up to the total capacity.

4.5. BALANCE RANGE TEST

The Balance range test shall be performed such that to determine whether the Balancing arrangement requirement are met. The maximum balance range reference tolerances shall not exceeding 0.5% of the capacity of the machine. And minimum balance range not less than 0.125% of the capacity each way. One percent (1%) of the capacity load shall be placed on the platform in order to get the ranges either ways enabling to read beyond the zero.

4.6. PROPORTIONAL WEIGHTS

All proportional weights, where these are provided, shall be tested and then suitably sealed to prevent tampering. Proportional weights shall also be indelibly identified with particular machines only.

4.7. INDICATION ACCURACY TESTS

The error, plus or minus, for load up to half of the maximum capacity, shall be not more than half the maximum permissible error prescribed at full load, for loads between half and full capacity, the error shall not exceed the maximum permissible error prescribed at full load.

4.8. CORNER TESTS

For Road Weighbridge, corner test shall be performed at one quarter of the maximum load (or as near thereto as practicable) such load paced in the middle or at any of the corners of the platform, the weighbridge shall show the correct weight within half the maximum prescribed permissible error. The errors due to differences in the load gauges as shown by the variations of

loads placed at the Centre from the Corners, and variations from corner to corner shall not exceed half the error at full load.

4.9. END TO END TESTS

End to end Tests instead of corner tests shall be done to Rail weighbridges. For a single unit weighbridge, half load of the total capacity shall be placed at the middle, then at the two ends consecutively. For a double unit weighbridge, quarter load of the total capacity shall be placed at the middle of joint of two platforms, then at the two ends of the platforms successfully. For each type; the readings at three points and their variations from the middle to the ends, or variation from end to end, shall not exceed half of the error at full load.

4.10. SENSITIVITY AND ERROR TESTS

Weighbridges with steelyard arrangement shall be tested for sensitiveness and dial type machine for error at full load or as near to it as practicable. The sensitiveness and error shall not exceed the prescribed limits. No sensitiveness test shall be carried out in dial type machines.

5.0 IDENTIFICATION OF PARTS

Detachable parts which may affect the accuracy of the weighbridge shall be indelibly numbered or marked so as to facilitate identification.

4.0 SEALING

- Dial type machines shall be fitted with a soft metal plug to receive the stamp or seal of the verification authority. The plug or stud fitted on the

dial or frame shall be so supported as to prevent the risk of any damage to the instrument.

- On machines other than dial type, a plug or stud shall be provided in a conspicuous position on the indicating lever or steelyard.

TABLE: I

RANGE OF BALANCING ARRANGEMENT

CAPACITY TONNE (t)	RANGE OF BALANCING ARRANGEMENT	
	MAXIMUM 0.5% OF CAPACITY (kg)	MINIMUM 0.125% OF CAPACITY EACH WAY (kg)
1	5	2.5
2	10	5
3	15	7.5
5	25	12.5
10	50	25
15	75	37.5
20	100	50
25	125	62.5
30	150	75
40	200	100
50	250	125
60	300	150
80	400	200
100	500	250
150	750	375
200	1000	500
250	1250	625
300	1500	750
400	2000	1000

TABLE: II

SENSITIVENESS AND ERRORS FOR WEIGHBRIDGES

CAPACITY OF MACHINE	SENSITIVE-NESS WHEN FULLY LOADED	VERIFICATION MAXIMUM PERMISSIBLE ERROR IN EXCESS OR DEFICIENCY WHEN FULLY LOADED		SENSITIVE-NESS WHEN FULLY LOADED	INSPECTION MAXIMUM PERMISSIBLE ERROR IN EXCESS OR DEFICIENCY WHEN FULLY LOADED	
(TONNE)	(kg)	NON-DIAL TYPE MACHINES (kg)	MACHINES FITTED WITH DIAL	(kg)	NON-DIAL TYPE MACHINES (kg)	MACHINES FITTED WITH DIALS
1	1	1	A Weight corresponding to one half the interval between consecutive graduations	2	2	A Weight corresponding to the interval between consecutive graduations
2	1.5	2	-do-	3	4	-do-
3	1.5	2	-do-	3	4	-do-
5	1.5	2	-do-	3	4	-do-
10	2.0	3	-do-	4	6	-do-
15	2.5	4	-do-	5	8	-do-
20	3.0	5	-do-	6	10	-do-
25	3.5	6	-do-	7	12	-do-
30	4.0	7	-do-	8	14	-do-
40	5.0	7	-do-	10	14	-do-
50	5.5	8	-do-	11	16	-do-
60	5.5	8.5	-do-	11	17	-do-
80	6.0	10	-do-	12	20	-do-

100	6.5	11.5	-do-	13	23	-do-
150	8.0	15	-do-	16	30	-do-
200	9.0	16	-do-	18	38	-do-
250	12.0	25	-do-	24	50	-do-
300	15.0	30	-do-	30	60	-do-
400	20.0	40	-do-	40	80	-do-

TEST FORM FOR WEIGHBRIDGES (MECHANICAL)

1. OWNER'S NAME AND ADDRESS

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2. GENERAL EXAMINATION:

Type …… Model …… Serial No. …….

Maximum Capacity …… Stamping plug (provided / not provided)……..

Last stamped……

Balance at zero load

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Ascertain travel of steelyard (if applicable minimum of 10 mm each way)

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Ascertain the value of the smallest graduation on the minor bar (for steelyard type)

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Ascertain the extremity of the pointer from the dial (for weighbridges provided with dial, maximum 5 mm)

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Ascertain the distance between graduation marks (minimum 2 mm)

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Check printing mechanism (if provided)

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3. ACCURACY TEST:

(a) Check the range of balancing arrangement

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(Note: The range shall not exceed a maximum of 0.5% of the capacity and a minimum range of 0.125% of capacity each way)

(b) Testing for accuracy of minor bar graduations and tare device

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(c) Testing for accuracy of major graduations up to quarter or half load capacity for road or rail Weighbridges respectively

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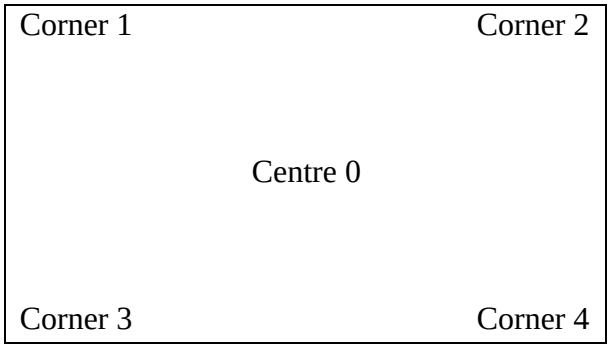
(d) Conduct corner :

For road weighbridge, corner test shall be performed at one quarter of the maximum load (or as
near thereto as practicable); the errors due to differences in the load gauges as shown by the variations of loads placed at the center from the corners and variations from corner to corner
shall not exceed half the error at full load.



No.	Position	Results		Variation	Observed error	Tolerance (half Error at full load)
1.	C_0 & C_1					
2.	C_0 & C_2					
3.	C_0 & C_3					
4.	C_0 & C_4					
5.	C_1 & C_2					
6.	C_1 & C_3					
7.	C_1 & C_4					
8.	C_2 & C_3					
9.	C_2 & C_4					
10.	C_3 & C_4					

(e) END TO END TEST FOR RAIL WEIGHBRIDGES:

For a single unit weighbridge, half load of the total capacity shall be placed in the middle , then at the two ends consecutively. For a double unit weighbridge, quarter load of the total capacity shall be placed at the middle of joint of two platforms, then at the two ends of platforms successively. For each type, the readings at three points and their variations from the middle to the ends, or variation from end to end, shall not exceed half the error at full load.

E_1 M E_2	**E_1 M E_2**

No.	Positions	Results	Variation	Observed error	Tolerance (half error at full load)
1.	M & E_1				
2.	M & E_2				
3.	E_1 & E_2				

(f) ACCURACY TESTS ABOVE QUARTER OR HALF LOAD CAPACITY (FOR ROAD AND RAIL WEIGHBRIDGES RESPECTIVELY AS THE CASE MAY BE) UP TO FULL CAPACITY:

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4. SENSITIVITY AND ERROR TESTS AT FULL LOAD:

(Weighbridge with steelyard arrangement shall be tested for sensitiveness and error while the dial

type for error only at full load or as near to full load as practicable. The sensitiveness and error shall

not exceed the prescribed limits. No sensitiveness test shall be carried out in dial type instruments)

Sensitivity …….. Error ……..

5. CONDUCT BACKWARD ACCURACY TEST:

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6. DECISION:

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Name of Assizer ……..

Signature ……. **Date** ……

Name of Owner / Operator / Agent …….

Signature …….

Date…….