

HANDBOOK 44 SCALE TEST PROCEDURES

Introduction

The Scale Test Procedure manual provides guidance in the procedure for testing electronic and mechanical scales: Bench/counter scales, portable platform, floor, built-in, and vehicle scales. These procedures are written to follow the specifications and tolerances for scale testing as specified in the National Institute of Standards and Technology (NIST) Handbook 44.

Scale test procedures are presented by scale division (d) size. Refer to the Table Of Contents to determine the correct procedure for the scale you are testing.

This manual also contains two tables which are to be used as a guide to completing the actual tests.

Table 1 - This table lists the tolerance values for Class II, III, III L, and IIII scales. Table 1 is located in Appendix B of this manual.

Table 2 - This table should be used to determine the necessary test weights and test loads required to correctly perform these tests. Table 2 is located in Appendix A of this manual.

Additional copies of this manual may be obtained by contacting the Marketing Communications Department of Mettler-Toledo, Inc. At fax number (614) 438-4783.

NOTE: The revision date of this manual may not reflect the current revision date of NIST Handbook on the revision date of the Mettler-Toledo Handbook 44 Field Manual. This manual is updated only when a revision to NIST Handbook 44 is made which affects the procedures defined in this manual.

Developed by the Office of Weights and Measures, Mettler-Toledo, Inc., Columbus, Ohio

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I. Electronic Scales

A. 1. Bench/Counter Scales where “d” = 0.005 lb

This test procedure is to be used on all Electronic Class III and Unmarked bench and counter scales where the division size is equal to 0.005 lb.

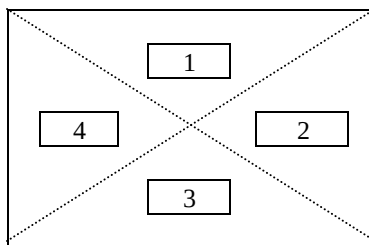
1.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0.000 lb	0			UR.4.1.
Add test load	2.500 lb	500	+/- 0.005 lb	+/- 0.0025 lb	
Add test load	10.00 lb	2000	+/- 0.010 lb	+/- 0.005 lb	
Add test load	20.000 lb	4000	+/- 0.015 lb	+/- 0.0075 lb	
Add test load	Full capacity		+/- 0.025 lb	+/- 0.0125 lb	
Over capacity blanking					S.1.7.

1.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	20.000 lb	4000	+/- 0.015 lb	+/- 0.0075 lb	
Remove test load	10.00 lb	2000	+/- 0.010 lb	+/- 0.005 lb	
Remove test load	2.500 lb	500	+/- 0.005 lb	+/- 0.0025 lb	
Return to zero	0.000 lb		+/- 0.005 lb	+/- 0.0025 lb	N.1.9.

1.3 Shift Test*. One-half capacity. Weights placed halfway between center and edges of platform. (reference N.1.3.1., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

1.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0.000 - 2.500	0.005 lb (1 d)	0.0025 lb (0.5 d)
2.505 - 10.000	0.010 lb (2 d)	0.0050 lb (1.0 d)
10.005 - 20.000	0.015 lb (3 d)	0.0075 lb (1.5 d)
20.005 - 50.000	0.025 lb (5 d)	0.0125 lb (2.5 d)

I. Electronic Scales

A. 2. Bench/Counter Scales where “d” = 0.01 lb

This test procedure is to be used on all Electronic Class III and Unmarked bench and counter scales where the division size is equal to 0.01 lb.

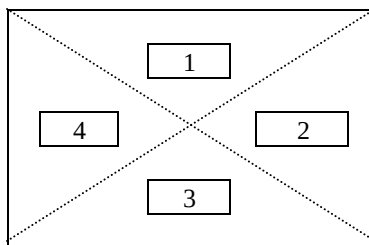
2.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0.00 lb	0			UR.4.1.
Add test load	5.00 lb	500	+/- 0.01 lb	+/- 0.005 lb	
Add test load	20.00 lb	2000	+/- 0.02 lb	+/- 0.010 lb	
Add test load	40.00 lb	4000	+/- 0.03 lb	+/- 0.015 lb	
Add test load	Full capacity		+/- 0.05 lb	+/- 0.025 lb	
Over capacity blanking					S.1.7.

2.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	40.00 lb	4000	+/- 0.03 lb	+/- 0.015 lb	
Remove test load	20.00 lb	2000	+/- 0.02 lb	+/- 0.010 lb	
Remove test load	5.00 lb	500	+/- 0.01 lb	+/- 0.005 lb	
Return to zero	0.00 lb		+/- 0.01 lb	+/- 0.005 lb	N.1.9.

2.3 Shift Test*. One-half capacity. Weights placed halfway between center and edges of platform. (reference N.1.3.1., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

2.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0.00 - 5.00	0.01 lb (1 d)	0.005 lb (0.5 d)
5.01 - 20.00	0.02 lb (2 d)	0.010 lb (1.0 d)
20.01 - 40.00	0.03 lb (3 d)	0.015 lb (1.5 d)
40.01 - 100.00	0.05 lb (5 d)	0.025 lb (2.5 d)

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

I. Electronic Scales

A. 3. Bench/Counter Scales where “d” = 0.02 lb

This test procedure is to be used on all Electronic Class III and Unmarked bench and counter scales where the division size is equal to 0.02 lb.

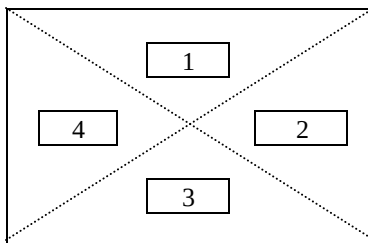
3.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0.00 lb	0			UR.4.1.
Add test load	10.00 lb	500	+/- 0.02 lb	+/- 0.01 lb	
Add test load	40.00 lb	2000	+/- 0.04 lb	+/- 0.02 lb	
Add test load	80.00 lb	4000	+/- 0.06 lb	+/- 0.03 lb	
Add test load	Full capacity		+/- 0.10 lb	+/- 0.05 lb	
Over capacity blanking					S.1.7.

3.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	80.00 lb	4000	+/- 0.06 lb	+/- 0.03 lb	N.1.9.
Remove test load	40.00 lb	2000	+/- 0.04 lb	+/- 0.02 lb	
Remove test load	10.00 lb	500	+/- 0.02 lb	+/- 0.01 lb	
Return to zero	0.00 lb		+/- 0.02 lb	+/- 0.01 lb	

3.3 Shift Test*. One-half capacity. Weights placed halfway between center and edges of platform. (reference N.1.3.1., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

3.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0.00 - 10.00	0.02 lb (1 d)	0.01 lb (0.5 d)
10.02 - 40.00	0.04 lb (2 d)	0.02 lb (1.0 d)
40.02 - 80.00	0.06 lb (3 d)	0.03 lb (1.5 d)
80.02 - 200.00	0.10 lb (5 d)	0.05 lb (2.5 d)

I. Electronic Scales

A. 4. Bench/Counter Scales where “d” = 0.05 lb

This test procedure is to be used on all Electronic Class III and Unmarked bench and counter scales where the division size is equal to 0.05 lb.

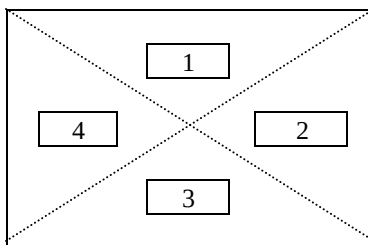
4.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0.00 lb	0			UR.4.1.
Add test load	25.00 lb	500	+/- 0.05 lb	+/- 0.025 lb	
Add test load	100.00 lb	2000	+/- 0.10 lb	+/- 0.050 lb	
Add test load	200.00 lb	4000	+/- 0.15 lb	+/- 0.075 lb	
Add test load	Full capacity		+/- 0.25 lb	+/- 0.125 lb	
Over capacity blanking					S.1.7.

4.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	200.00 lb	4000	+/- 0.15 lb	+/- 0.075 lb	
Remove test load	100.00 lb	2000	+/- 0.10 lb	+/- 0.050 lb	
Remove test load	25.00 lb	500	+/- 0.05 lb	+/- 0.025 lb	
Return to zero	0.00 lb		+/- 0.05 lb	+/- 0.025 lb	N.1.9.

4.3 Shift Test*. One-half capacity. Weights placed halfway between center and edges of platform. (reference N.1.3.1., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

4.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0.00 - 25.00	0.05 lb (1 d)	0.025 lb (0.5 d)
25.05 - 100.00	0.10 lb (2 d)	0.050 lb (1.0 d)
100.05 - 200.00	0.15 lb (3 d)	0.075 lb (1.5 d)
200.05 - 500.00	0.25 lb (5 d)	0.125 lb (2.5 d)

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

I. Electronic Scales

B. 1. Floor Scales where “d” = 0.1 lb

This test procedure is to be used on all Electronic Class III and Unmarked floor scales where the division size is equal to 0.1 lb.

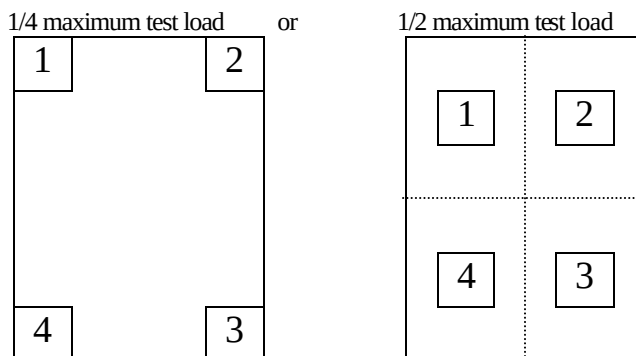
1.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0.0 lb				UR.4.1.
Add test load	50.0 lb	500	+/- 0.1 lb	+/- 0.05 lb	
Add test load	200.0 lb	2000	+/- 0.2 lb	+/- 0.10 lb	
Add test load	400.0 lb	4000	+/- 0.3 lb	+/- 0.15 lb	
Add test load	Full capacity		+/- 0.5 lb	+/- 0.25 lb	
Over capacity blanking					S.1.7.

1.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	400.0 lb	4000	+/- 0.3 lb	+/- 0.15 lb	
Remove test load	200.0 lb	2000	+/- 0.2 lb	+/- 0.10 lb	
Remove test load	50.0 lb	500	+/- 0.1 lb	+/- 0.05 lb	
Return to zero	0.0 lb		+/- 0.1 lb	+/- 0.05 lb	N.1.9.

1.3 Shift Test*. On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

1.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0.0 - 50.0	0.1 lb (1 d)	0.05 lb (0.5 d)
50.1 - 200.0	0.2 lb (2 d)	0.10 lb (1.0 d)
200.1 - 400.0	0.3 lb (3 d)	0.15 lb (1.5 d)
400.1 - 1 000.0	0.5 lb (5 d)	0.25 lb (2.5 d)

I. Electronic Scales

B. 2. Floor Scales where “d” = 0.2 lb

This test procedure is to be used on all Electronic Class III and Unmarked floor scales where the division size is equal to 0.2 lb.

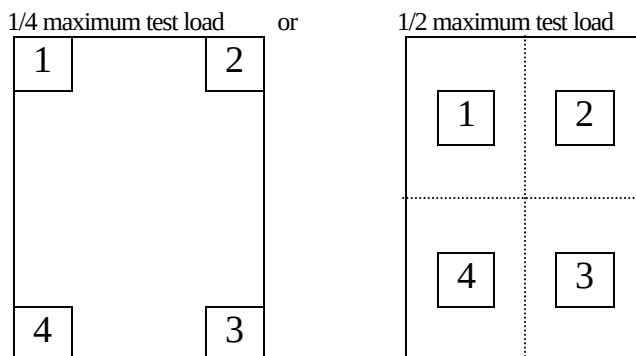
2.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0.0 lb				UR.4.1.
Add test load	100.0 lb	500	+/- 0.2 lb	+/- 0.1 lb	
Add test load	400.0 lb	2000	+/- 0.4 lb	+/- 0.2 lb	
Add test load	800.0 lb	4000	+/- 0.6 lb	+/- 0.3 lb	
Add test load	Full capacity		+/- 1.0 lb	+/- 0.5 lb	
Over capacity blanking					S.1.7.

2.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	800.0 lb	4000	+/- 0.6 lb	+/- 0.3 lb	
Remove test load	400.0 lb	2000	+/- 0.4 lb	+/- 0.2 lb	
Remove test load	100.0 lb	500	+/- 0.2 lb	+/- 0.1 lb	
Return to zero	0.0 lb		+/- 0.2 lb	+/- 0.1 lb	N.1.9.

2.3 Shift Test*. On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

2.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0.0 - 100.0	0.2 lb (1 d)	0.1 lb (0.5 d)
100.2 - 400.0	0.4 lb (2 d)	0.2 lb (1.0 d)
400.2 - 800.0	0.6 lb (3 d)	0.3 lb (1.5 d)
800.2 - 2 000.0	1.0 lb (5 d)	0.5 lb (2.5 d)

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

I. Electronic Scales

B. 3. Floor Scales where “d” = 0.5 lb

This test procedure is to be used on all Electronic Class III and Unmarked floor scales where the division size is equal to 0.5 lb.

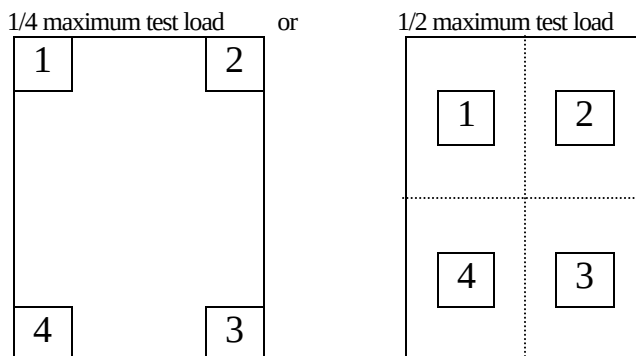
3.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0.0 lb				UR.4.1.
Add test load	250.0 lb	500	+/- 0.5 lb	+/- 0.25 lb	
Add test load	1 000.0 lb	2000	+/- 1.0 lb	+/- 0.50 lb	
Add test load	2 000.0 lb	4000	+/- 1.5 lb	+/- 0.75 lb	
Add test load	Full capacity		+/- 2.5 lb	+/- 1.25 lb	
Over capacity blanking					S.1.7.

3.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	2 000.0 lb	4000	+/- 1.5 lb	+/- 0.75 lb	
Remove test load	1 000.0 lb	2000	+/- 1.0 lb	+/- 0.50 lb	
Remove test load	250.0 lb	500	+/- 0.5 lb	+/- 0.25 lb	
Return to zero	0.0 lb		+/- 0.5 lb	+/- 0.25 lb	N.1.9.

3.3 Shift Test*. On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

3.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0.0 - 250.0	0.5 lb (1 d)	0.25 lb (0.5 d)
250.5 - 1 000.0	1.0 lb (2 d)	0.50 lb (1.0 d)
1 000.5 - 2 000.0	1.5 lb (3 d)	0.75 lb (1.5 d)
2 000.5 - 5 000.0	2.5 lb (5 d)	1.25 lb (2.5 d)

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

I. Electronic Scales

B. 4. Floor Scales where “d” = 1 lb

This test procedure is to be used on all Electronic Class III and Unmarked floor scales where the division size is equal to 1 lb.

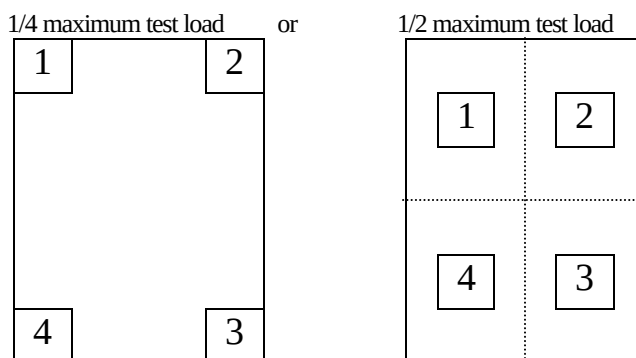
4.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0 lb				UR.4.1.
Add test load	500 lb	500	+/- 1 lb	+/- 0.5 lb	
Add test load	2 000 lb	2000	+/- 2 lb	+/- 1.0 lb	
Add test load	4 000 lb	4000	+/- 3 lb	+/- 1.5 lb	
Add test load	Full capacity		+/- 5 lb	+/- 2.5 lb	
Over capacity blanking					S.1.7.

4.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	4 000 lb	4000	+/- 3 lb	+/- 1.5 lb	
Remove test load	2 000 lb	2000	+/- 2 lb	+/- 1.0 lb	
Remove test load	500 lb	500	+/- 1 lb	+/- 0.5 lb	
Return to zero	0 lb		+/- 1 lb	+/- 0.5 lb	N.1.9.

4.3 Shift Test*. On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

4.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0 - 500	1 lb (1 d)	0.5 lb (0.5 d)
501 - 2 000	2 lb (2 d)	1.0 lb (1.0 d)
2 001 - 4 000	3 lb (3 d)	1.5 lb (1.5 d)
4 001 - 10 000	5 lb (5 d)	2.5 lb (2.5 d)

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

I. Electronic Scales

B. 5. Floor Scales where “d” = 2 lb

This test procedure is to be used on all Electronic Class III and Unmarked floor scales where the division size is equal to 2 lb.

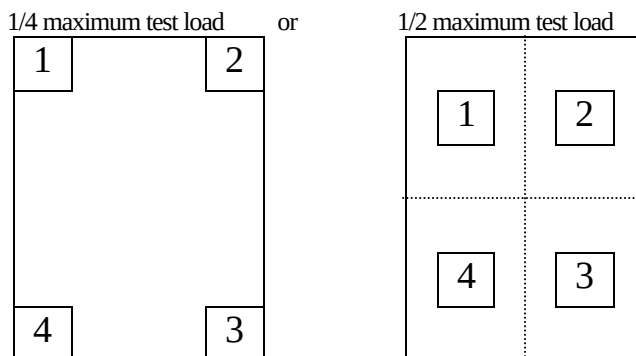
5.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0 lb				UR.4.1.
Add test load	1 000 lb	500	+/- 2 lb	+/- 1 lb	
Add test load	4 000 lb	2000	+/- 4 lb	+/- 2 lb	
Add test load	8 000 lb	4000	+/- 6 lb	+/- 3 lb	
Add test load	Full capacity		+/- 10 lb	+/- 5 lb	
Over capacity blanking					S.1.7.

5.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	8 000 lb	4000	+/- 6 lb	+/- 3 lb	
Remove test load	4 000 lb	2000	+/- 4 lb	+/- 2 lb	
Remove test load	1 000 lb	500	+/- 2 lb	+/- 1 lb	
Return to zero	0 lb		+/- 2 lb	+/- 1 lb	N.1.9.

5.3 Shift Test*. On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

5.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0 - 1 000	2 lb (1 d)	1 lb (0.5 d)
1 002 - 4 000	4 lb (2 d)	2 lb (1.0 d)
4 002 - 8 000	6 lb (3 d)	3 lb (1.5 d)
8 002 - 20 000	10 lb (5 d)	5 lb (2.5 d)

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

I. Electronic Scales

B. 6. Floor Scales where “d” = 5 lb

This test procedure is to be used on all Electronic Class III and Unmarked floor scales where the division size is equal to 5 lb.

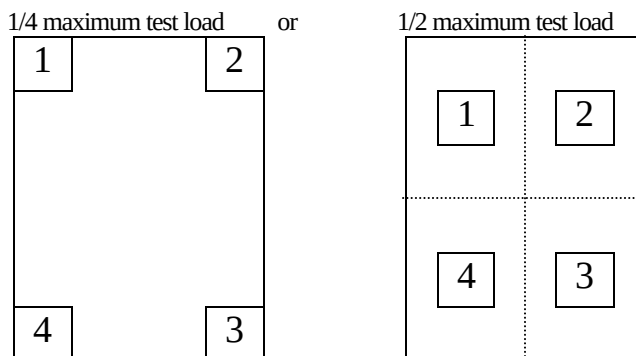
6.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0 lb				UR.4.1.
Add test load	2 500 lb	500	+/- 5 lb	+/- 2.5 lb	
Add test load	10 000 lb	2000	+/- 10 lb	+/- 5.0 lb	
Add test load	20 000 lb	4000	+/- 15 lb	+/- 7.5 lb	
Add test load	Full capacity		+/- 25 lb	+/- 12.5 lb	
Over capacity blanking					S.1.7.

6.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	20 000 lb	4000	+/- 15 lb	+/- 7.5 lb	
Remove test load	10 000 lb	2000	+/- 10 lb	+/- 5.0 lb	
Remove test load	2 500 lb	500	+/- 5 lb	+/- 2.5 lb	
Return to zero	0 lb		+/- 5 lb	+/- 2.5 lb	N.1.9.

6.3 Shift Test*. On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

6.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0 - 2 500	5 lb (1 d)	2.5 lb (0.5 d)
2 505 - 10 000	10 lb (2 d)	5.0 lb (1.0 d)
10 005 - 20 000	15 lb (3 d)	7.5 lb (1.5 d)
20 005 - 50 000	25 lb (5 d)	12.5 lb (2.5 d)

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

I. Electronic Scales

B. 7. Floor Scales where “d” = 10 lb

This test procedure is to be used on all Electronic Class III and Unmarked floor scales where the division size is equal to 10 lb.

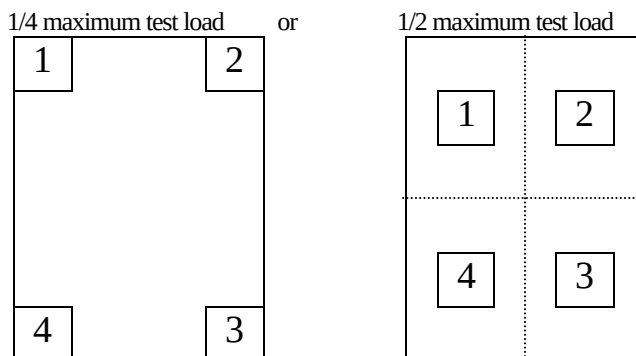
7.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0 lb				UR.4.1.
Add test load	5 000 lb	500	+/- 10 lb	+/- 5 lb	
Add test load	20 000 lb	2000	+/- 20 lb	+/- 10 lb	
Add test load	40 000 lb	4000	+/- 30 lb	+/- 15 lb	
Add test load	Full capacity		+/- 50 lb	+/- 25 lb	
Over capacity blanking					S.1.7.

7.2 Decreasing Load Test (reference N.1.2.1., N.1.2.2.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Remove test load	40 000 lb	4000	+/- 30 lb	+/- 15 lb	
Remove test load	20 000 lb	2000	+/- 20 lb	+/- 10 lb	
Remove test load	5 000 lb	500	+/- 10 lb	+/- 5 lb	
Return to zero	0 lb		+/- 10 lb	+/- 5 lb	N.1.9.

7.3 Shift Test*. On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

7.4 Tolerances

Test Load (lb)	Maintenance Tolerances in pounds, (as “d”) (T.N.3.1.)	Acceptance Tolerance in pounds, (as “d”) (T.N.3.2.)
0 - 5 000	10 lb (1 d)	5 lb (0.5 d)
5 010 - 20 000	20 lb (2 d)	10 lb (1.0 d)
20 010 - 40 000	30 lb (3 d)	15 lb (1.5 d)
40 010 - 100 000	50 lb (5 d)	25 lb (2.5 d)

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

I. Electronic Scales

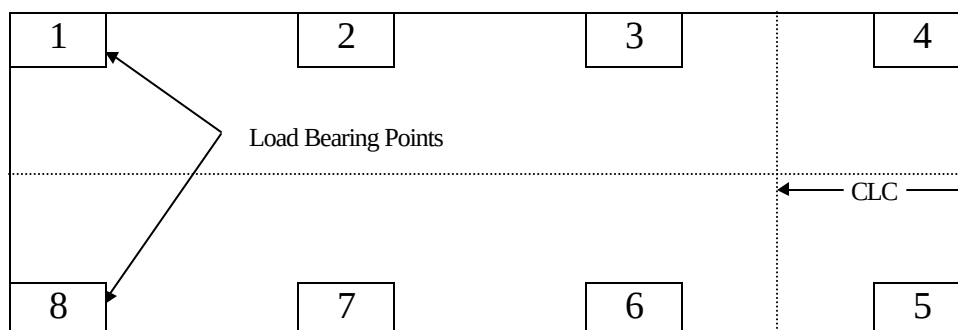
C. 1. Vehicle Scales where “d” = 10 lb

This test procedure is to be used on all Electronic Class III L and Unmarked electronic vehicle scales where the division size is equal to 10 lb.

1.1 Increasing Load Test (Test weights approximately centered on deck) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0 lb				UR.4.1.
Add test load	5 000 lb	500	+/- 10 lb	+/- 5 lb	

1.2 Shift Test #1* Place a 5 000 lb (500 d) test load over each section and at each midspan as shown below (reference N.1.3.4. and T.N.4.4)



1.3 Increasing Load Test - continued.

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Add test load	10 000 lb	1 000	+/- 20 lb	+/- 10 lb	

1.4 Shift Test #2* Place a 10 000 lb (1 000 d) test load over each section and at each midspan.

1.5 Increasing Load Test - continued.

Continue the Increasing Load Test until 12.5% of the scale capacity is reached. Refer to the tolerance chart below for the applicable tolerance for your test.

1.6 Strain Load Test: To “Used Capacity” (reference Table 4)

Place vehicle, with out test weights, on to scale platform. Place test weights on to scale platform. Read indication and check indicated weight value. NOTE: Tolerances applied during this test are those for the actual test weight value only.

*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

1.7 Tolerances:

Test Load (lb)	Maintenance Tolerances in pounds, (T.N.3.1.)	Acceptance Tolerance in pounds, (T.N.3.2.)
0 - 5 000	10	5
5 010 - 10 000	20	10
10 010 - 15 000	30	15
15 010 - 20 000	40	20
20 010 - 25 000	50	25
25 010 - 30 000	60	30
30 010 - 35 000	70	35
35 010 - 40 000	80	40
40 010 - 45 000	90	45
45 010 - 50 000	100	50
50 010 - 55 000	110	55
55 010 - 60 000	120	60
60 010 - 65 000	130	65
65 010 - 70 000	140	70
70 010 - 75 000	150	75
75 010 - 80 000	160	80
80 010 - 85 000	170	85
85 010 - 90 000	180	90
90 010 - 95 000	190	95
95 010 - 100 000	200	100

I. Electronic Scales

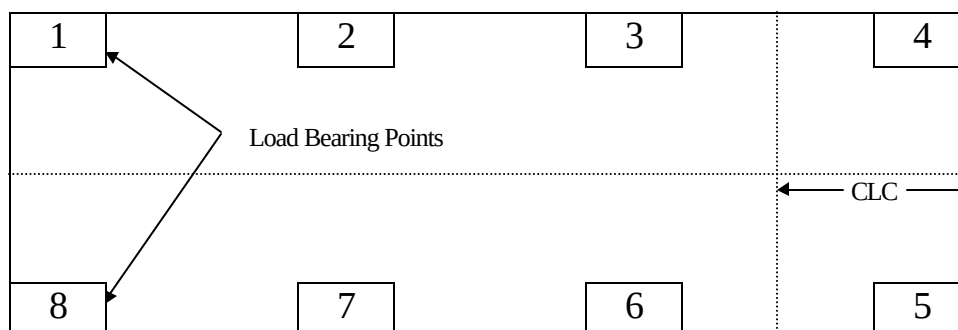
C. 2. Vehicle Scales where “d” = 20 lb

This test procedure is to be used on all Electronic Class III L and Unmarked electronic vehicle scales where the division size is equal to 20 lb.

2.1 Increasing Load Test (Test weights approximately centered on deck) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0 lb				UR.4.1.
Add test load	10 000 lb	500	+/- 20 lb	+/- 10 lb	

2.2 Shift Test #1* Place a 10 000 lb (500 d) test load over each section and at each midspan as shown below. (reference N.1.3.4. and T.N.4.4)



2.3 Increasing Load Test - continued.

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Add test load	20 000 lb	1 000	+/- 40 lb	+/- 20 lb	

2.4 Shift Test #2* Place a 20 000 lb (1 000 d) test load over each section and at each midspan.

2.5 Increasing Load Test - continued.

Continue the Increasing Load Test until 12.5% of the scale capacity is reached. Refer to the tolerance chart below for the applicable tolerance for your test.

2.6 Strain Load Test: To “Used Capacity” (reference Table 4)

Place vehicle, with out test weights, on to scale platform. Place test weights on to scale platform. Read indication and check indicated weight value. NOTE: Tolerances applied during this test are those for the actual test weight value only.

*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

2.7 Tolerances:

Test Load (lb)	Maintenance Tolerances in pounds, (T.N.3.1.)	Acceptance Tolerance in pounds, (T.N.3.2.)
0 - 10 000	20	10
10 020 - 20 000	40	20
20 020 - 30 000	60	30
30 020 - 40 000	80	40
40 020 - 50 000	100	50
50 020 - 60 000	120	60
60 020 - 70 000	140	70
70 020 - 80 000	160	80
80 020 - 90 000	180	90
90 020 - 100 000	200	100
100 020 - 110 000	220	110
110 020 - 120 000	240	120
120 020 - 130 000	260	130
130 020 - 140 000	280	140
140 020 - 150 000	300	150
150 020 - 160 000	320	160
160 020 - 170 000	340	170
170 020 - 180 000	360	180
180 020 - 190 000	380	190
190 020 - 200 000	400	200

I. Electronic Scales

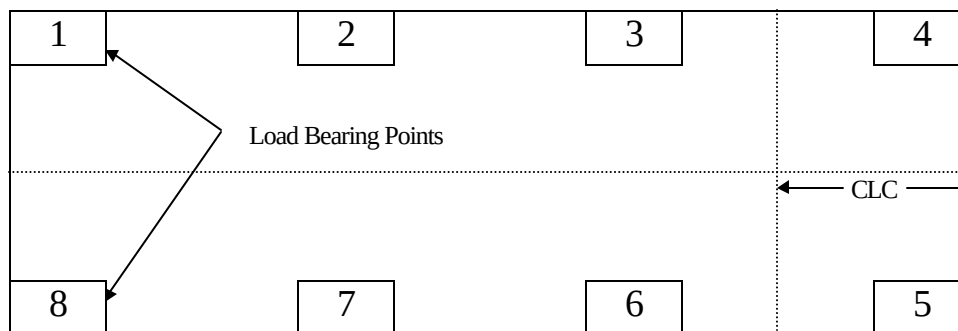
C. 3. Vehicle Scales where “d” = 50 lb

This test procedure is to be used on all Electronic Class III L and Unmarked electronic vehicle scales where the division size is equal to 50 lb.

3.1 Increasing Load Test (Test weights approximately centered on deck) (reference N.1.1.)

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Check for zero balance	0 lb				UR.4.1.
Add test load	25 000 lb	500	+/- 50 lb	+/- 25 lb	

3.2 Shift Test #1* Place a 25 000 lb (500 d) test load over each section and at each midspan as shown below. (reference N.1.3.4. and T.N.4.4)



3.3 Increasing Load Test - continued.

Test	Test Load	Number of Divisions (d)	Maintenance Tolerance	Acceptance Tolerance	Handbook 44 Reference
Add test load	50 000 lb	1 000	+/- 40 lb	+/- 20 lb	

3.4 Shift Test #2* Place a 50 000 lb (1 000 d) test load over each section and at each midspan.

3.5 Increasing Load Test - continued.

Continue the Increasing Load Test until 12.5% of the scale capacity is reached. Refer to the tolerance chart below for the applicable tolerance for your test.

3.6 Strain Load Test: To “Used Capacity” (reference Table 4)

Place vehicle, with out test weights, on to scale platform. Place test weights on to scale platform. Read indication and check indicated weight value. NOTE: Tolerances applied during this test are those for the actual test weight value only.

*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

3.7 Tolerances:

Test Load (lb)	Maintenance Tolerances in pounds, (T.N.3.1.)	Acceptance Tolerance in pounds, (T.N.3.2.)
0 - 25 000	50	25
25 050 - 50 000	100	50
50 050 - 75 000	150	75
75 050 - 100 000	200	100
100 050 - 125 000	250	125
125 050 - 150 000	300	150
150 050 - 175 000	350	175
175 050 - 200 000	400	200
200 050 - 225 000	450	225
225 050 - 250 000	500	250
250 050 - 275 000	550	275
275 050 - 300 000	600	300
300 050 - 325 000	650	325
325 050 - 350 000	700	350
350 050 - 375 000	750	400
375 050 - 400 000	800	
400 050 - 425 000	850	
425 050 - 450 000	900	
450 050 - 475 000	950	
475 050 - 500 000	1000	

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

II. Mechanical Scales

A. 1. Bench/Counter Dial Indication Scales

This test procedure is to be used on all Mechanical Class III and Unmarked bench and counter scales where the indicated weight is shown on a dial.

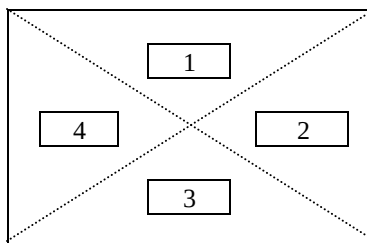
1.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Tolerances	Handbook 44 Reference
Check for zero balance	0		UR.4.1.
Add test load	500d	see section 1.4 below	
Add test load	2 000d	see section 1.4 below	
Add test load	4 000d	see section 1.4 below	
Add test load	Full capacity	see section 1.4 below	

1.2 Decreasing Load Test (reference N.1.2.2, N.1.2.9.)

Test	Number of Divisions (d)	Tolerances	Handbook 44 Reference
Remove test load	4000	see section 1.4 below	
Remove test load	2000	see section 1.4 below	
Remove test load	500	see section 1.4 below	
Return to zero			N.1.9.

1.3 Shift Test*. One-half capacity. Weights placed halfway between center and edges of platform. (reference N.1.3.1., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

1.4 Tolerances

Test Load in "d"	Maintenance Tolerances in "d" (T.N.3.1.)	Acceptance Tolerance in "d" (T.N.3.2.)
0 - 500	1	0.5
501 - 2 000	2	1.0
2 001 - 4 000	3	1.5
4 001 - 10 000	5	2.5

II. Mechanical Scales

A. 2. Bench/Counter Beam Indication Scales

This test procedure is to be used on all Mechanical Class III and Unmarked bench and counter scales where the indicated weight is shown on a beam.

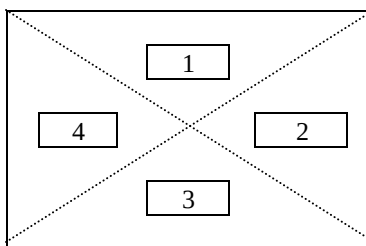
2.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Handbook 44 Reference
Check for zero balance (SR)	0	UR.4.1. and N.1.4.
Add test load	500 d	
Add test load	1 000 d	
Add test load	2 000 d	
Add test load	4 000 d	
Full capacity (SR)		N.1.4. and T.N.6.

2.2 Decreasing Load Test (reference N.1.2.2, N.1.2.9.)

Test	Number of Divisions (d)	Handbook 44 Reference
Remove test load	4000	
Remove test load	2000	
Remove test load	500	
Return to zero		N.1.9.

2.3 Shift Test*. One-half capacity. Weights placed halfway between center and edges of platform. (reference N.1.3.1., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

2.4 Tolerances

Test Load in "d"	Maintenance Tolerances in "d" (T.N.3.1.)	Acceptance Tolerance in "d" (T.N.3.2.)
0 - 500	1	0.5
501 - 2 000	2	1.0
2 001 - 4 000	3	1.5
4 001 - 10 000	5	2.5

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

II. Mechanical Scales

B. 1. Floor Scale With Dial Indication

This test procedure is to be used on all Mechanical Class III and Unmarked floor scales where the indicated weight is shown on a dial.

1.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

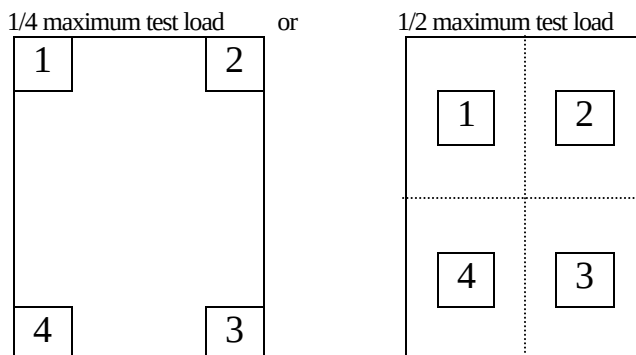
Test	Test Load	Tolerances	Handbook 44 Reference
Check for zero balance	0		UR.4.1.
Add test load	500d	see section 2.4 below	
Add test load	2 000d	see section 2.4 below	
Add test load	4 000d	see section 2.4 below	
Add test load	Full capacity	see section 2.4 below	
Strain load test	"Used Capacity"	see section 2.4 below*	N.3. and N.1.9.

* Tolerances apply to test weights only.

1.2 Decreasing Load Test (reference N.1.2.2, N.1.2.9.)

Test	Number of Divisions (d)	Tolerances	Handbook 44 Reference
Remove test load	4000	see section 2.4 below	
Remove test load	2000	see section 2.4 below	
Remove test load	500	see section 2.4 below	
Return to zero			N.1.9.

1.3 Shift Test.** On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



****NOTE:** Range of results must fall within the absolute value of *maintenance* tolerance.

1.4 Tolerances

Test Load in "d"	Maintenance Tolerances in "d" (T.N.3.1.)	Acceptance Tolerance in "d" (T.N.3.2.)
0 - 500	1	0.5
501 - 2 000	2	1.0
2 001 - 4 000	3	1.5
4 001 - 10 000	5	2.5

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

II. Mechanical Scales

B. 2. Floor Scale With Beam Indication

This test procedure is to be used on all Mechanical Class III and Unmarked floor scales where the indicated weight is shown on a beam.

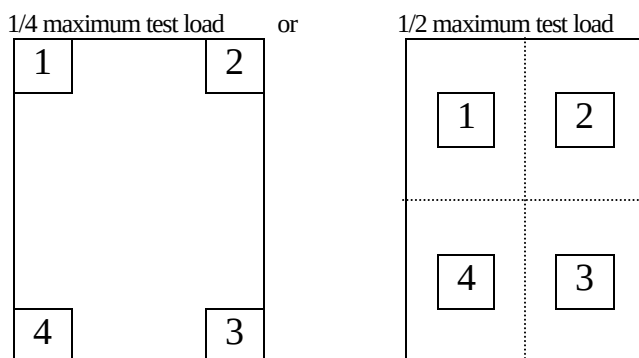
2.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Handbook 44 Reference
Check for zero balance (SR)	0	UR.4.1., T.2., T.N.6. and N.1.4.
Add test load	500 d	
Add test load	1 000 d	
Add test load	2 000 d	
Add test load	4 000 d	
Full capacity (SR)		N.1.4. and T.N.6.

2.2 Decreasing Load Test (reference N.1.2.9., N.1.2.2.)

Test	Number of Divisions (d)	Handbook 44 Reference
Remove test load	4000	
Remove test load	2000	
Remove test load	500	
Return to zero		N.1.9.

2.3 Shift Test*. On a floor scale two shift tests are acceptable. The first uses a test load equal to 1/4 of the scales capacity. Place the test load in the far corners of the platform. The second test, requires a test load equal to 1/2 of the scales capacity. Weights are placed halfway between center and edges of platform. (reference N.1.3.8., T.N.4.4.)



*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

2.4 Tolerances

Test Load in "d"	Maintenance Tolerances in "d" (T.N.3.1.)	Acceptance Tolerance in "d" (T.N.3.2.)
0 - 500	1	0.5
501 - 2 000	2	1.0
2 001 - 4 000	3	1.5
4 001 - 10 000	5	2.5

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision

II. Mechanical Scales

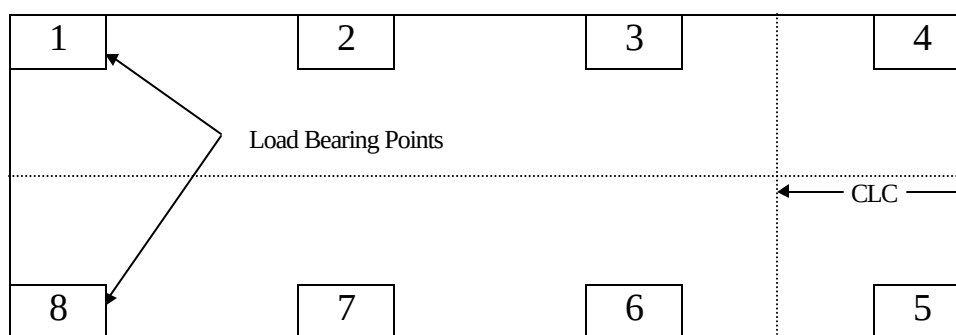
C. 1. Vehicle Scale With Dial Indication

This test procedure is to be used on all Mechanical Class III and Unmarked vehicle scales where the indicated weight is shown on a dial and $d = 10, 20, \text{ or } 50 \text{ lb}$.

1.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Handbook 44 Reference
Check for zero balance	0	UR.4.1.
Add test load	500d	

1.2 Shift Test #1* Place a 500d test load over each section and at each midspan as shown below. (reference N.1.3.4. and T.N.4.4)



1.3 Increasing Load Test - continued.

Test	Test Load	Handbook 44 Reference
Add test load	1 000d	

1.4 Drop Weight Test Test loads must include scale built-in drop weights to assure accuracy of drop weights

Drop Weight 1: (_____ lb) 2: (_____ lb) 3: (_____ lb)

1.5 Shift Test #2* Place 12.5% capacity in test weights over each section and at each midspan.

1.6 Strain Load Test: To "Used Capacity" Place vehicle, with out test weights, on to scale platform. Place test weights on to scale platform. Read indication and check indicated weight value. NOTE: Tolerances applied during this test are those for the actual test weight value only. (reference N.3. and N.1.9.)

1.7 Decreasing Load Test

Test	Test Load	Handbook 44 Reference
Remove test load	1/2 maximum capacity	N.1.2.2.
Return to zero		N.1.9.

1.8 Tolerances Refer tolerances tables for class III L scales in appendix. (reference T.N.3.1. and T.N.3.2.)

*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

II. Mechanical Scales

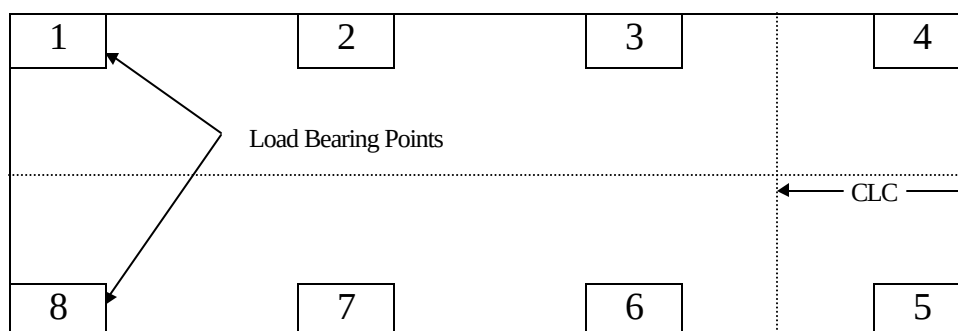
C. 2. Vehicle Scale With Beam Indication

This test procedure is to be used on all Mechanical Class III and Unmarked vehicle scales where the indicated weight is shown on a beam and $d = 10, 20, \text{ or } 50 \text{ lb.}$

2.1 Increasing Load Test (Test weights approximately centered) (reference N.1.1.)

Test	Test Load	Handbook 44 Reference
Check for zero balance	0	UR.4.1.
Check zero SR		T.2., T.N.6. and N.1.4.
Add test load	500d	

2.2 Shift Test #1* Place a 500d test load over each section and at each midspan as shown below. (reference N.1.3.4. and T.N.4.4)



2.3 Increasing Load Test - continued.

Test	Test Load	Handbook 44 Reference
Add test load	1 000d	

2.4 Shift Test #2* Place 12.5% capacity in test weights over each section and at each midspan.

2.5 Strain Load Test: To "Used Capacity" Place vehicle, with out test weights, on to scale platform. Place test weights on to scale platform. Read indication and check indicated weight value. NOTE: Tolerances applied during this test are those for the actual test weight value only. (reference N.3. and N.1.9.)

2.6 Decreasing Load Test

Test	Test Load	Handbook 44 Reference
Remove test load	1/2 maximum capacity	N.1.2.2.
Return to zero		N.1.9.

2.7 Tolerances Refer tolerances tables for class III L scales in appendix. (reference T.N.3.1. and T.N.3.2.)

*NOTE: Range of results must fall within the absolute value of *maintenance* tolerance.

III. Appendix

A. Table 1, Tolerance values for Class II, III, IIII, and III L scales

1.1 Tolerance Values For Class II Scales

Test Load in "d"	Maintenance Tolerances in "d"	Acceptance Tolerance in "d"
0 - 5 000	1	0.5
5 001 - 20 000	2	1.0
20 001 - 100 000	3	1.5

1.2 Tolerance Values For Class III Scales

Test Load in "d"	Maintenance Tolerances in "d"	Acceptance Tolerance in "d"
0 - 500	1	0.5
501 - 2 000	2	1.0
2 001 - 4 000	3	1.5
4 001 - 10 000	5	2.5

1.3 Tolerance Values For Class III L Scales

Test Load in "d"	Maintenance Tolerances in "d"	Acceptance Tolerance in "d"
0 - 500	1	0.5
501 - 1 000	2	1.0
1 001 +	add one (1) d for each additional 500 d or fraction thereof	add one-half (1/2) d for each additional 500 d or fraction thereof

1.4 Tolerance Values For Class IIII Scales

Test Load in "d"	Maintenance Tolerances in "d"	Acceptance Tolerance in "d"
0 - 50	1	0.5
51 - 200	2	1.0
201 - 400	3	1.5
401 - 1 000	5	2.5

III. Appendix

B. Table 2, Required test weights and test loads

The following table has been reproduced directly from NIST Handbook 44 for your convenience.

Table 4. Minimum Test Weights and Test Loads ¹			
Device capacity	minimums (in terms of device capacity)		(where practicable)
	Tests weights (greater of)	Test loads	
0 to 150 kg (0 to 300 lb)	100%		Test weights to dial face capacity 1 000d, or test load to used capacity, if greater than minimums specified During initial verification, a scale should be tested to capacity.
151 to 1 500 kg (301 to 3 000 lb)	25% or 150 kg (300 lb)	75%	
1 501 to 20 000 kg (3 001 to 40 000 lb)	12.5% or 500 kg (1 000 lb)	50%	
20 001 kg + (40 000 lb +)	12.5% or 5 000 kg (10 000 lb)	25% ²	

¹ If the amount of test weights in Table 4 combined with the load on the scale would result in an unsafe condition, then the appropriate load will be determined by the official with statutory authority.

* The term “test load” means the sum of the combination of field standard test weights and any other applied load used in the conduct of a test using substitution test methods. Not more than three substitutions shall be used during substitution testing, after which the tolerances for strain load tests shall be applied to each set of test loads.

² The scale shall be tested from zero to at least 12.5% of scale capacity using known test weights and then to at least 25% of scale capacity using either a substitution or strain load test that utilizes known test weights of at least 12.5% of scale capacity. Whenever practical, a strain load test should be conducted to the used capacity of the scale. When a strain load test is conducted, the tolerance applies only to the known test load.
(Amended 1988, 1989, 1994)

IV. Document Revisions

This page is used to document revisions to the information contained in this manual.

Page Number	Section	Change	Original	Year of Change
All	All	New Document	None	1997

References:

NIST Handbook 44, current revision

Mettler-Toledo, Inc., Handbook 44, current revision