PART 3 - PERFORMANCE TESTS

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Devices to be tested for influence factors and disturbances

Device Type	Temp. Accuracy	Temp. Zero Drift	Barometric Pressure	Warm-up Time	Short Time Power Reduction	Power Interruption	Creep	Creep Return to Zero	Burst ESD	Damp Heat
Electronic Scales ≤ 1000 kg	X	X	X[1]	X	?	X	X	X	?	X
Electronic Scales >1000 kg			X[1]	X	?	X	X	X	?	
Electronic Indicators[2]	X	X		X	?	X			?	X
Electronic Weighing Elements Max ≤ 1000 kg[3]	X	X	X[1]	X			X	X	?	X
Electronic Weighing Elements Max > 1000 kg			X[1]	X			X	X	?	
Mechanical scales Lever /beam and pendulum dials							X	X		
Dials (spring)	X	X					X	X		

Note: the 1000 kg capacity limit for electronic scales is due to the actual dimension of the environmental chamber needed to perform influence factor tests. This limit would change should the Laboratory acquire a larger environmental chamber.

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1 *Testing is limited to some canister load cells*

2 *Indicating elements processing only digital information do not have to be tested for compliance with influence factors*

3 Weighing elements that provide digital signals ("smart" load cells) are considered, for testing purposes, complete electronic devices.

Recommended Test Sequence

Phase 1: Tests performed at ambient conditions (20NC/50% RH)

A. The device is configured, pre-tested and calibrated as close to zero error as possible. No other calibration is permitted before the device is moved to the environmental chamber.

* Exercise the device (3 times up to at least 90% Max)
* Load discrimination near zero and near capacity
* Increasing and decreasing load tests
* Repeatability, return to zero tests
* Eccentricity (Shift/corner tests)
* Tilting (off level) and suitability of level indicator tests
* Power interruption test
* AC/DC voltage variation tests
* RFI test, (27 and 460 MHz)
* Susceptibility to magnetism test (if necessary)
* Warm up test
* Burst test
* Electrostatic Discharge test
* Short Time Power reduction test

Phase 2 Temperature variation effect on the device performance

B. The device is moved to the environmental chamber set at ambient temperature, installed, pre-tested and re-calibrated if necessary. During the tests, no adjustment is permitted.

First : tests at 20NC/50% RH
* Condition the DUT
* Exercise the DUT (3 times up to at least 90% Max)
* Increasing and decreasing load test
* Recovery period [4]
* Creep test
* Recovery period
* Creep-Return-to Zero

Passage from 20NC to -10NC
* Temperature effect on no-load indication

Second : test at -10NC
* Condition the DUT (2 hours minimum after temperature stabilization)
* Exercise the DUT
* Increasing and decreasing load test
* Recovery period
* Creep test

Passage from -10NC to 40NC
* Temperature effect on no-load indication

[4] Recovery periods must last for at least the time required to perform the previous test.

Third: tests at 40NC/50% RH [5]*Condition the DUT (2 hours minimum after temperature stabilization)
* Exercise the DUT
* Increasing and decreasing load test
* Recovery period
* Creep test

Passage from 40NC to 20NC * Temperature effect on no-load indication

Fourth: tests at 20NC/50% RH *Condition the DUT (2 hours minimum after temperature stabilization)
* Exercise the DUT
* Increasing and decreasing load test

Damp Heat at 40NC/85% RH * Condition the DUT
* Wait 48 hours
* Increasing and decreasing load test

Damp Heat at 20NC/50% RH *Condition the DUT (2 hours minimum after temperature stabilization)
* Exercise the DUT
* Increasing and decreasing load test

Phase 3: Permanence test at ambient conditions (20NC/50% RH)

C. The device is moved to the permanence testing machine, installed, pre-tested and re-calibrated if necessary.

* Load discrimination test near zero and near capacity
* Increasing and decreasing load tests
* Repeatability, return to zero tests
* Eccentricity (Shift/corner tests)

* Permanence test (25000 applications)
* Increasing and decreasing load test

* Permanence test (25000 additional applications)
* Increasing and decreasing load test

* Permanence test (25000 additional applications)
* Increasing and decreasing load test

* Permanence test (25000 additional applications)
* Load discrimination test near zero and near capacity
* Increasing and decreasing load tests
* Repeatability, return to zero tests
* Eccentricity (Shift/corner tests).

[5] Measures must be take to avoid condensation on the device

LG-3.01 LINEARITY, HYSTERISIS and REPEATABILITY AT AMBIANT TEMPERATURE

APPLICATION

This test is intended for complete mechanical or electronic weighing devices, indicating and load receiving/weighing elements tested separately.

SETTINGS

1. AZSM may be in operation during the tests. It must be set to the lowest value; if zero is the lowest selectable value, it will be set to zero. However, the amount that the AZSM may track at once may not be set to a value larger than 0.6 **e** which is the maximum value allowed by the Specifications.

2.1 If the IZSM range does not exceed 20% of the device capacity, tests will be performed with the IZSM set at the upper limit of its range. **The IZSM range of an indicating element tested separately may not exceed 20%.**

2.2 If the IZSM range exceeds 20%, tests will be performed twice. A first series of tests using the lighter platter provided by the applicant, and the second series with the IZSM set to the upper limit of its range.

3. The weighing device must be levelled, adjusted as to zero error as possible and pre-loaded (exercised) 3 times up to at least 90% Max.

4. The device must be configured for the maximum capacity and smallest verification scale interval for which the approval is sought.

5. If so equipped, the "enhance resolution feature" of the device will be used during the tests. If this feature is not available, use the small weight method to determine the device errors before rounding (internal errors). This is not necessary if the errors are marginal.

6. This test is performed at ambient temperature ($\approx$ 20°C, or at the mid point of the temperature range if significantly different from 20°C, and at relative humidity of $\approx$ 50%.

PROCEDURE

A. Pre-condition the device: the DUT must have reached a stable temperature at ambient condition.

B. Set the device to zero.

C. Perform a minimum of three increasing and decreasing load tests to capacity using at least 5 known test weights. Loads must be centred on the load receiving element. Loads must be selected in relation to the device capacity, the value of the verification scale interval and the turning points of the tolerances. Determine the true error before rounding (internal or true errors). Record the results.

Multiple range weighing devices

D. Perform a minimum of three increasing and decreasing load tests using at least 5 known test weights in each individual range. Record the results.

E. Load the scale to the maximum capacity of the highest range (or manually select the highest range and then

load the device to capacity); Remove the load: the indications should return to zero immediately. Switch the device to the lowest range immediately (If the switch over is automatic, the device should have returned to the lowest range automatically). Note the indication near zero at the time the device switches to the lowest range. Observe the weight indication for 5 minutes. Record any changes.

INTERPRETATION OF RESULTS

Reference: Sections 9, 10, 11,12, 13, and 17of the Specifications

- All functions must operate as designed and as intended.

Linearity and hysteresis

- Each individual result must be within the tolerance envelope as prescribed by the Specifications.

Return to zero

- The device must return to zero from Max within 0.5 **e** for a complete device, and within 0.35 **e** for an indicating or load receiving/weighing element tested separately.

- A multiple range device must return to zero from Max_i within $\mathbf{0.5e_i}$. After returning to zero from any load greater than Max_1 and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than $\mathbf{0.5e_1}$ during the following five minutes.

Repeatability

- Compare the results for each individual load of increasing and decreasing tests. The maximum difference between the results for the same load must not exceed the in-service limits of error as prescribed by the Specifications. In addition, all results must be within tolerances.

Note that:	-	**the error of any single weighing result must not exceed the maximum limit of error for the given load.**
	-	**a major element (module) tested separately and that is the only component of the weighing system subject to measurement errors due to disturbance or influence factors is allowed entire applicable limits of error (i.e. a weighing element which produces an output digital signal readable by a computer).**

LG-3.02 LOAD DISCRIMINATION

APPLICATION

Load discrimination tests are performed on complete electronic or mechanical non automatic scales, and weighing elements tested separately using a high precision electronic indicator (Resolution must be at least ten times the DUT resolution). This test is not applicable to electronic indicators tested separately.

The load discrimination test is used to determine whether the device is capable of sensing a small change of load and of changing its registration accordingly. Frictional forces, binding or system inertia can prevent a mechanical device from sensing the prescribed "Load Discrimination Test Load". Frictional forces, binding, the use of oversized (capacity) load cells, the use of an electronic indicator with an inadequate display sensitivity (μ Volts/Display Digit) or inadequate digital filter algorithms could cause an electronic weighing device to fail to detect the addition of the prescribed "Load Discrimination Test Load".

SETTINGS

1. AZSM may be in any status. This test is performed at the same time the increasing and decreasing load test is performed.

2.1 If the IZSM range is limited to 20% of Max, the test will be performed with the IZSM set at the upper limit of its range.

2.2 If the IZSM range exceeds 20%, tests will be performed twice: with the lighter platter provided by the applicant, and with the IZSM set to the upper limit of its range.

3. The device must be configured for the maximum capacity and smallest verification scale interval for which the approval is sought.

4. This test is performed at ambient temperature (≈ 20°C, or at the mid point of the temperature range if significantly different from 20°C).

5. The test must be performed at zero load (or near zero) and near Max.

A. **AUTOMATIC DIGITAL INDICATING DEVICES**

PROCEDURE

A.1 If necessary, put a small load on the platter to bring the scale out of its AZSM range. The indication is near zero.
A.2 Successively add small weights equal to 1/10 d until the ZU is reached; the indication should be alternating between two values; remove one small weight to obtain a solid indication; the indication is at the high point of the scale interval. Record the indication.
A.3 Smoothly add a load equal to 1.4 d. Record the indication.
A.4 Repeat the test near the maximum capacity.

(See points 2,1 and 2,2 above)

Note: The test can also be done by removing the 1.4 d test weight. To do so, bring the indication right

above the ZU and then remove the 1.4 d load.

INTERPRETATION OF RESULTS

Reference: Section 15 of the Specifications.

The addition or removal of the 1.4 d test load must cause a change in the indication of 2 d.

B. AUTOMATIC ANALOGUE INDICATING DEVICES

PROCEDURE

B.1 At the no load condition, press on the platter to generate motion of the indicating element (pointer). Allow the indicator to stabilize.
B.2 Smoothly add (or remove) a load equal to 1.4 d and allow the indicating element to stabilize. Record the indication.
B.3 Repeat the test near maximum capacity.

INTERPRETATION OF RESULTS

Reference: Section 15 of the Specifications.

The addition or removal of the 1.4 d test load must cause a change in the indication of 1 d.

C. NON AUTOMATIC INDICATING DEVICES - BEAM SCALES WITH NO ADDITIONAL MEANS OF INDICATION

PROCEDURE

C.1 Set the device to zero (beam in horizontal position at mid distance between the trig loops or the limiting stops).
C.2 Add or remove a load equal to 1 d (in-service limit of error) when the test is performed near zero.
C.3 Repeat the test near maximum capacity. Add or remove a small load corresponding to the in-service limit of error applicable to the load on the platter, without exceeding 2 d.

INTERPRETATION OF RESULTS

Reference: Section 14 of the Specifications.

The addition or removal of the test load must cause the weighbeam to change from the center position to the outer limit of the trig loop or limiting stops.

D. NON AUTOMATIC INDICATING DEVICES - BEAM WITH ADDITIONAL INDICATING MEANS (over/under indicator having graduations without assigned values)

PROCEDURE

D.1 Set the device to zero.
D.2 Add or remove a load equal to 1 d (in-service limit of error) when the test is performed near zero.
D.3 Repeat the test near maximum capacity. Add or remove a small load corresponding to the in-service limit of error applicable to the load on the platter, without exceeding 2 d.

INTERPRETATION OF RESULTS

Reference: Section 14 of the Specifications.

The addition or removal of the test load must cause the position of the indicator to change by the distance indicated below:

i) 1 mm for Class I and II devices;
ii) 2 mm for Class III and IIII devices with a Max $\leq$ 30 kg;
iii) 5 mm for Class III, III HD and IIII devices with a Max > 30 kg.

LG-3.03 ECCENTRICITY

APPLICATION

Eccentricity tests are performed on complete devices and weighing elements tested separately. Shift tests are also performed on single point hanging scales if the load receptor is relatively large.

The purpose of this test is to reveal the ability of load cell(s), load cell mounting and check systems of a weighing elements to ignore or compensate for the torsion effects of non axial loads. The purpose of this test is also to ensure that the load cells of electronic scales or the lever of mechanical scales can be adequately "balanced" in order to obtain accurate weighing regardless of the position of the load on the platter.

The device must be capable of weighing accurately despite of changes of position of the test load over the load receiving element.

SETTINGS

1. AZSM may be in any status. When practical, this test can be performed while performing Increasing/Decreasing load tests.

2.1 If the IZSM range does not exceed 20% of the device capacity, tests will be performed with the IZSM set at the upper limit of its range.

2.2 If the IZSM range exceeds 20%, tests will be performed twice. A first series of tests using the lighter platter provided by the applicant, and the second series with the IZSM set to the upper limit of its range.

3. The device must be set for the maximum capacity and smallest verification scale interval for which the approval is sought.

4. If so equipped, the "enhance resolution feature" of the device will be used during the tests. If this feature is not available, use the small weight method to determine the device errors before rounding.

5. This test is performed at ambient temperature (≈ 20°C); or at the mid point of the temperature range if significantly different from 20°C.

PROCEDURE

A. Bench , Counter or Hanging Scales, other Small Platform Scales, and Equal Arm Scales with load receiving elements having no more than four points of support.

A.1 Stabilize the device at nominal conditions; zero the device.

A.2 Apply a load equal to ≈ 1/2 Max on the center of the platter. Record the indication.

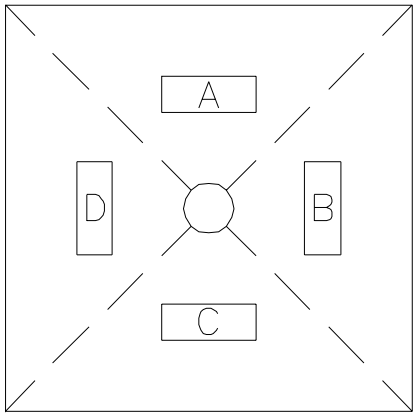
A.3 Apply the same test load on the device in such a manner that the center of gravity of the test load lies approximately at the center of one of the numbered target boxes in the following illustrations. Record the indication.

A.4 Proceed in the same manner with the other points of application. Record the indication.

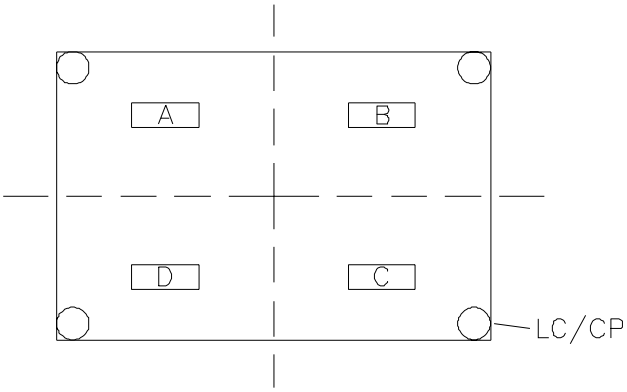
Note: In the case of weighing elements that comprise 4 load cells (one at each corner), a load of 1/4 Max

applied to each corner is also a valid test.

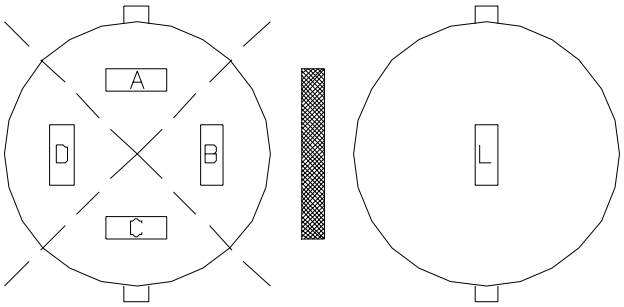
Bench, Counter or Hanging Scales
(one single load cell)



Other Platform Scales
(More than one load cell)



Equal Arm Scales



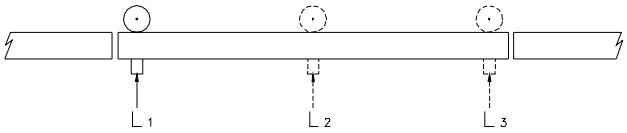
B) **Monorail scales**

B.1 Stabilize the device at nominal conditions; zero the device.

B.2 Apply a rolling load corresponding to the usual rolling load, the heaviest and the most concentrated one which may be weighed, but not exceeding 0.8 times Max at different points of the load receiving element.

B.3 Record the indications.

Monorail Scales



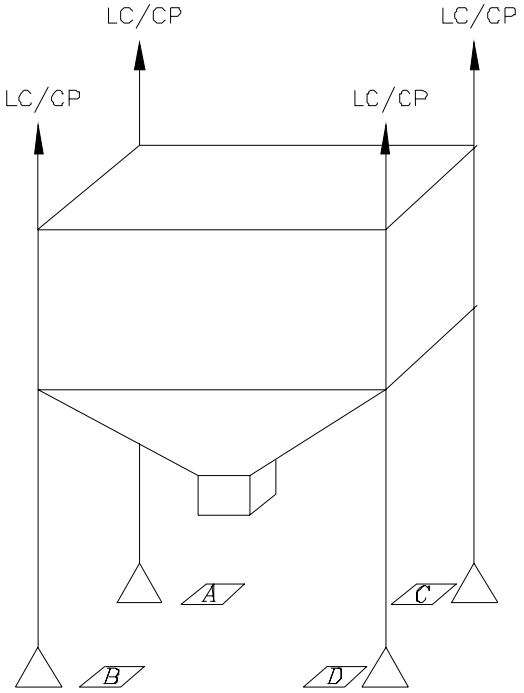
C) **Tank or Hopper Scales**

C.1 Stabilize the device at nominal conditions; zero the device.

C.2 Use a load of at least 1/10 without exceeding 1/4 of Max. Apply the load to each point of support. Care must be taken to keep the center of gravity of the load within the parameter formed by the points of support; otherwise the tank or hopper could tilt or shift.

C.3 Record the indications.

Tank or Hopper Scales



INTERPRETATION OF RESULTS

Reference: Sections 9, 10, 11, 12 and 14 of the Specifications

The difference between the results for different position of the load must not exceed the absolute value of the In-Service limit of error for that load; and

Each individual results must be within the limits or error permitted.

LG-3.04 TILTING (OFF LEVEL POSITION)

APPLICATION

This test is performed on any complete portable or movable devices or weighing elements tested separately, that are of a type other than suspended, and that are not equipped with a suitable level indicating means. Devices aimed are: bench and counter scales, floor scales, weighing systems mounted on a vehicle (On-board weighing systems for NH_3, on-board waste weighing systems, scales mounted on lift trucks). "Portable" vehicle scales do not fall into this category. The purpose of this test is to ensure that the performance is not affected when the device is off level.

SETTINGS

1. The AZSM may be activated. It must be set so that the weight value that can be tracked at once does not exceed 0.6 e.

2.1 If the IZSM range does not exceed 20% of Max, the test will be performed with the IZSM set at the maximum of the range.

2.2 If the IZSM range exceed 20%, the test will be performed twice: the first test with the IZSM set to the lowest possible value; the second test with the IZSM set to the to the maximum of its range.

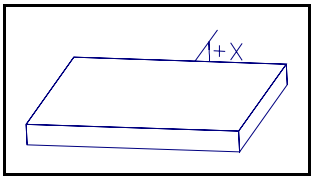
3. If the device has an "enhance" resolution feature, perform the test with that feature activated; or use the small weight method to determine errors before rounding.

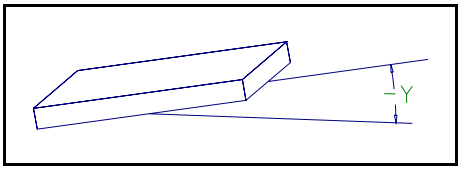
5. This test is performed at ambient temperature only.

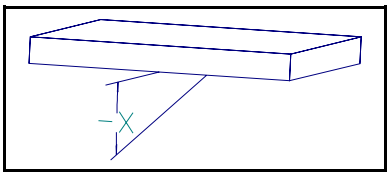
PROCEDURE for portable or movable scales

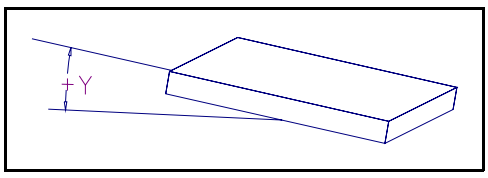
Note: The device is tested for accuracy when levelled, first; then off-level tests are performed.

A. The procedure consists of inclining the device in the four directions (+x, -x, +y, -y) using a suitable support. The tests is performed when the device is off level by the lesser of:
   a) 3 degrees; or
   b) the maximum angle at which the device still provides an indication or registration.









B. For each of the four

inclinations, set the device two zero and perform an increasing and decreasing load test.

Note: It is not necessary to proceed further if at the first inclination the device does not perform within the prescribed limits of error.

INTERPRETATION OF RESULTS

Reference: Section 9, 10, 11 and 22 of the Specifications

The device meets the requirements if it performs within prescribed limits of error when off level.

Note: If the device can not perform within the prescribed limits of error, it must be equipped with a suitable level indicating means permanently installed.

PROCEDURE for On-Board Weighing Systems

(Level Testing)

C. With the vehicle resting on a level surface, visually inspect, checking for possible binding and additional items secured to the device that may have an effect on accuracy (e.g. mudflaps and fenders must be secured to the frame of the vehicle, not the device).

D. Perform load discrimination tests near zero and at capacity; increasing and decreasing load tests; section/corner tests; repeatability; blanking at capacity and motion detection; return to zero; etc.. The device must perform within the prescribed limits of error.

(Off Level)

E. Visually inspect the device while performing the following tests to ensure that the inclination does not cause a shift that may affect the device accuracy.

D. Elevate the front or rear wheels to 3 degrees or the maximum inclination at which a weight indication is still provided. Perform the tests indicated in D above, except the section and repeatability test.

F. Elevate either the driver side or passenger side to 3 degrees or the maximum inclination at which a weight indication is still provided. Perform the tests indicated in D above, except the section and repeatability test.

G. Elevate a single rear wheel combination until the side to side inclination is 3 degrees or the point at which a weight indication is still provided. This test cause the frame to twist and will reveal defects in poorly constructed devices. Perform the tests indicated in D above, except the section and repeatability test.

H. Scales mounted on lift trucks (or similar vehicles) must blank their indications when the lift truck is moving, unless the scale can provide an accurate weight indication. Perform an accuracy (in-motion) test using different loads within the capacity range of the device. The test must simulate actual conditions of use.

INTERPRETATION OF THE RESULTS

Reference: Section 9, 10, 11 and 22 of the Specifications

The device meets the requirements if :

a) it provides a weight indication when off level up to at least 3 degrees;
b) it performs within the prescribed limits of error when off level by the larger of 3 degrees or the maximum angle at which it still provides a weight indication;
c) it blanks its indications and prevent the recording of weight values when it ceases to perform within tolerances.

d) in the case of a scale mounted on a lift truck, it provides weight indications within the permissible limits of error while the lift truck is moving, or blanks its indications.

LG-3.05 SUITABILITY OF THE LEVEL INDICATOR

APPLICATION

This test is intended for complete portable or movable devices and weighing elements whose performance is affected when off level. Such devices must be equipped with a suitable level indicating means. This test is to ensure that the level indicating means is sensitive enough to accurately indicate the limit of inclination at which the device ceases to perform within tolerances.

SETTINGS

1. The AZSM may be activated. It must be set so that the weight value that can be tracked at once does not exceed 0.6 e.

2.1 If the IZSM range of the device does not exceed 20% of Max, the test will be performed with the IZSM set at the maximum of the range.

2.2 If the IZSM range exceed 20% of Max, the test will be performed twice: the first test with the IZSM set to the lowest possible value; the second test with the IZSM set to the to the maximum of its range.

3. The device must be levelled using the level indicating means, and adjusted to as close to zero error as possible.

4. If the device has an "enhance" resolution feature, perform the test with that feature activated; or use the small weight method to determine errors before rounding.

5. This test is performed at ambient temperature only.

PROCEDURE

A) Incline the DUT in one direction (arbitrary referred to as -x) up to the point of limit where the level indicating means still indicates a level condition or at least 2/1000 (.12 degree) whichever is greater.

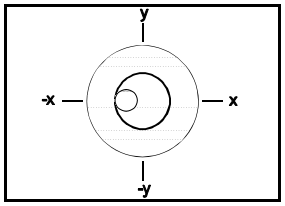


Figure 5

B) Set the device to zero if necessary; perform an increasing and decreasing load test. If necessary, use the small weight method to find errors before rounding. Record the results.

C) Repeat the test described in B) for the other three inclinations (+x, -y, +y) (See the following illustrations).

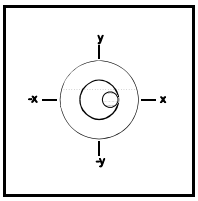


Figure 6

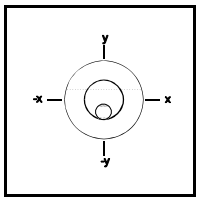


Figure 7

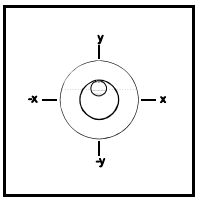


Figure 8

INTERPRETATION OF RESULTS

Reference: Sections 9, 10, 11 and 22 of the Specifications

The device meets the requirements if, at the limits of inclination in all four directions, it performs within applicable limits of error.

LG-3.06 WARM UP TIME

APPLICATION

This test is intended for any electronic devices and electronic major components. The purpose of this test is to ensure that weight indications provided by a device while it warms up are accurate.

SETTINGS

1. The AZSM may be activated. It must be set to the lowest value; if zero is the lowest selectable value, it will be set to zero. The amount that the AZSM may track at once may not be set to a value larger than 0.6 **e** which is the maximum value allowed by the Specifications.

2. The AZSM will be set to the maximum of its range.

3. The device must have been set to as close to zero error as practicable.

4. If the device has an "enhance" resolution feature, perform the test with that feature activated; or use the small weight method to determine errors before rounding.

5. This test is performed at ambient temperature only.

PROCEDURE

A. Turn off and disconnect from the power source the DUT for a period of at least eight (8) hours (i.e. disconnect a wall mount transformer or pull the plug of AC device; remove the batteries of a DC device).

B. Re-connect the DUT to the power source and switch it "on".

C. Record the first available indication (i.e. the first indication that can be used for the purpose of the transaction).

D) Set the device to zero.

E) Apply a load equal to at least 70% of Max.

F) Record the indication.

INTERPRETATION OF RESULTS

Reference: Sections 9, 10, 11, 31 and 32 of the Specifications

The device meets the requirements if the first weight indications available are within the applicable limits of error. Otherwise, weighing operations (printing or indicating weight values) must be inhibited during the warming up period.

LG-3.07 POWER INTERRUPTION

APPLICATION

This test is performed on complete electronic scales and electronic indicators tested separately. This test is to ensure that momentary power failures that can occur during weighing operations will not lead to measurement errors that can not be easily detected. This test also apply to battery-powered devices where the battery is replaceable or rechargeable.

SETTINGS

Removable or rechargeable battery must be disconnected; the AZSM may be in any status.

PROCEDURE

A. Place a load on the load receiving element and zero the device (by activating the non-automatic zero setting mechanism).

B. Place an additional load on the load receiving element and note the registration.

C. Unplug the DUT by pulling the plug and, in no less than five (5) and no more than ten (10) seconds, restore the power to the DUT and record the manner the scale returns to operation. Note the registrations.

D. Repeat the test, but this time interrupt the power using the power switch of the DUT..

E. Repeat the test with a Keyboard or Platter tare entered; repeat the test with preprogrammed tares entered (i.e. tares associated to PLU codes); repeat the test with an "in-bound" weight entered.

INTERPRETATION OF RESULTS:

Reference: Section 9, 10, 11, 31, and 32 of the Specifications.

The DUT is deemed to comply with the requirements if, after interrupting and restoring the power to the DUT, the registration has:

1. - returned to zero within the prescribed range; or
   - returned to an accurate weight value; or
   - Display a meaningless output or error signal which requires operator intervention.;

   and

2. - retain the information in memory (In-bound weights and uncompleted transactions shall not be lost during a power failure or when restarting the system).

LG-3.08 AC VOLTAGE VARIATIONS

APPLICATION

This test is performed on any complete electronic devices or major electronic components powered from an AC source. Voltage variations are susceptible to occur during the normal use of devices. The purpose of this test is to ensure that voltage variations does not affect the device performance.

SETTINGS

1. AZSM may be in operation during the tests. It must be set to the lowest value; if zero is the lowest selectable value, it will be set to zero. The amount that the AZSM may track at once may not be set to a value larger than 0.6 d which is the maximum value allowed by the Specifications.

2.1 If the IZSM range does not exceed 20% of Max, tests will be performed once with the IZSM set at the upper limit of its range.

2.2 If the IZSM range exceeds 20% of Max, tests will be performed twice: a first series of tests using the lightest platter provided by the applicant, and the second series with the IZSM set to the upper limit of its range.

3. The weighing device must be levelled to its reference position.

4. The device must be set for the maximum capacity and smallest verification scale interval for which the approval is sought.

5. If so equipped, the "enhance resolution feature" of the device will be used during the tests. If this feature is not available, use the small weight method to determine the device errors before rounding.

6. This test is performed at ambient temperature ($\approx$ 20°C); or at the mid point of the temperature range if significantly different from 20°C; and $\approx$ 50% RH.

7. Power source must be stable to within ± 2%

TEST PROCEDURE

A. Let the Power Supply and the DUT warm up for the minimum time recommended by the manufacturer.

B. Set the voltage at the nominal value.

C. Perform an increasing and decreasing test and record the results.

D. Activate the device functions to ensure they operate normally (tare, printing, motion detection, etc.)

E. Record the following data: a) time, b) temperature, c) relative humidity, d) voltage, e) loads, f) indications, g) errors, and h) note any malfunctions of the features.

F. Decrease the voltage to the minimum voltage specified; repeat steps C), D) and E).

G Increase the power supply voltage to the maximum voltage specified; repeat steps C), D) and E).

Maximum and minimum voltage specified

1. If the nominal voltage is not indicated on the marking plate, 117 volts or 225 volts, as the case may be, is deemed to be the nominal voltage. Then, the minimum and maximum voltage are 100 volts or 191 volts (-15%) and 129 volts or 247,5 volts (+10%) respectively.

2. If the marking plate indicates a nominal voltage other than 117 volts, the indicated voltage will be considered as the nominal voltage. The minimum and maximum voltage will be calculated from the **nominal voltage indicated on the plate.**

3. If a voltage range is indicated (i.e. 100 volts to 130 volts), the mid point of the range will be taken as the nominal voltage. The device will be tested to the greater of: 1) the **nominal voltage -15% / +10%** or 2) the voltage range indicated on the plate.

4. If the device ceases to indicate weight values while the voltage is well within the -15% / +10% range limits, the tests will be performed at the limits of indication.

INTERPRETATION OF RESULTS

Reference: Section 9, 10, 11 and 27 of the Specifications

The DUT is deemed to have met the requirements if, during the voltage variations, the device:

a) operates within the prescribed limits of error and all the functions operate normally; or
b) ceases to display weight and price values and prevents the transmission and storage of data.

LG-3.09 DC VOLTAGE VARIATIONS

APPLICATION

This test is performed on any complete electronic devices or major electronic components that operate from a DC power source (Batteries or other DC sources). Voltage variations are susceptible to occur during the normal use of devices. The purpose of this test is to ensure that voltage variations does not adversely affect the device performance and normal operating characteristics. DC power operated devices must continue to operate normally despite of a power reduction to the point where no weight indication is provided and power increase by 10% of the nominal value.

SETTINGS

1. AZSM may be in any status. If "on", it must be set to the lowest value; if zero is the lowest selectable value, it will be set to zero. The amount that the AZSM may track at once may not be set to a value larger than 0.6 d which is the maximum value allowed by the Specifications.

2.1 If the IZSM range does not exceed 20% of Max, tests will be performed with the IZSM set at the upper limit of its range.

2.2 If the IZSM range exceeds 20%, tests will be performed twice:. a first series of tests using the lighter platter provided by the applicant, and the second series with the IZSM set to the upper limit of its range.

3. The weighing device must be levelled to its reference position.

4. The device must be set for the maximum capacity and smallest verification scale interval for which the approval is sought.

5. If so equipped, the "enhance resolution feature" of the device will be used during the tests. If this feature is not available, use the small weight method to determine the device errors before rounding.

6. This test is performed at ambient temperature ($\approx$ 20°C); or at the mid point of the temperature range if significantly different from 20°C; and $\approx$ 50% RH..

7. Power source must be stable to within ± 2%

TEST PROCEDURE

A. Let the Power Supply and the DUT warm up for the minimum time recommended by the manufacturer.

B. Set the voltage at the nominal value.

C. Perform an increasing and decreasing test and record the results.

D. Activate the device functions to ensure they operate normally (tare, printing, motion detection, etc.)

E. Record the following data: a) time, b) temperature, c) relative humidity, d) voltage, e) loads, f) indications, g) errors, and h) note any malfunctions of the features.

F. Decrease the voltage until the device ceases to provide a weight indication. Increase the voltage until the

device resumes the indication; re-zero and repeat steps C), D) and E).

G Increase the power supply voltage up to 10% above the device nominal voltage; re-zero and repeat steps C), D) and E).

Note: It may be necessary to increase the voltage beyond the limit point of display, and then decrease the voltage in order to be able to reach the lowest voltage at which an indication is provided.

Some devices have an extended voltage range, for instance from 12 to 72 DC volts. In such a case, the device will be tested at the lowest voltage where a weight indication is provided and 10% above the high limit of the voltage range.

INTERPRETATION OF RESULTS

Reference: Section 9, 10, 11 and 28 of the Specifications.

The DUT is deemed to have met the requirements if during the voltage variations the device:

a) operates within the prescribed limits of error and all the functions operate normally; or
b) ceases to display weight and price values and prevents the transmission and storage of data.

LG-3.10 IMMUNITY TO RADIATED ELECTROMAGNETIC FIELD

APPLICATION

This test is performed on any complete weighing devices and major elements that incorporate electronic components susceptible to be affected by radiated electromagnetic fields. This test consists of exposing the device to an electromagnetic field emitted by radio transmitters at frequencies of 27 MHz and 460 MHz with an intensity of up to ≈ 3 V/m.

NOTE TO THE ATTENTION OF DEVICE MANUFACTURERS
This test method will be used until Measurement Canada acquires the necessary facilities and equipment to perform immunity to radiated electromagnetic field tests over the entire 26 MHz to 1000 Mhz range as recommended by OIML, (R 76-1).

SETTINGS

1. The AZSM can be in any status.

2. Ensure that the radio transceiver batteries have been fully charged.

3. Set the IZSM to the maximum of its range.

4. The test is performed at ambient temperature only (≈ 20NC and ≈ 50% RH).

5. The field strength will be measured using an appropriate field strength meter; results of tests while the field intensity exceed ≈ 3 V/m will not be considered.

6. The determination of error before rounding using the small weights method is not necessary.

PROCEDURE

A. Place, on the platter of the device, a load approximately equal to 1/2 Max. Record the value displayed.

B. Perform a summary test at each radio frequencies by bringing the radio antenna close to the DUT at various angles (orientations), above, around and under the device; observe the indication. If the device does not appear to be affected by the RFI, then there is no need to proceed further. If the device is affected, it will be necessary to repeat the test, and this time to measure the field strength at the device.

C. Place the field strength meter in close proximity to the device. Using the handheld radio transmitters, expose the DUT to field strength equal to ≈ 3 V/m. Bring the antenna around, above and under the device, at different angles. Attempt to maintain the field intensity at the device at ≈ 3 V/m. Observe the indication during the test and attempt to print weight values. Record the results. Do not consider the results obtained while the field strength exceeds ≈ 3 V/m.

INTERPRETATION OF RESULTS

Reference: Section 30 of the Specifications.

The device meets the requirements if the weight indications and registrations with and without disturbance: 1) do not exceed the value of e, or 2) if the device detects and reacts to a significant fault as follows:

a) blanks the indication and prevent the printing of weights; or
b) provides an error message and prevent weighings; or
c) provides an indication that is completely unstable so that it is not interpreted, or transmitted into memory or to the recording element as a correct measurement value.

LG-3.11 SUSCEPTIBILITY TO MAGNETISM - MAGNETIC LOADS

APPLICATION

This test is performed on any complete weighing devices and load weighing elements that incorporate loadcells functioning on the principle of "electromagnetic force compensation.

SETTINGS

1. The AZSM can be in any status.

2. The test is performed at ambient temperature only (≈ 20NC and ≈ 50% RH).

PROCEDURE

Using a ferromagnetic calibrated test weight

A. Zero the DUT

B. Place on the load receiving element a test weight ≈ 1/2 Max and which is made of a ferromagnetic material (iron or steel). Note the indication and remove the test weight.

C. Place on the load receiving element a test weight of the same capacity as that used in step "B" but made of non-magnetic material (brass, austenitic non-magnetic stainless steel). Note the indication and remove the test weight.

Using a ferromagnetic calibrated steel plate

D. Zero the DUT.

E. Place on the load receiving element a ferromagnetic steel plate. Add a calibrated non magnetic test weight ≈ 1/2 Max (brass, aluminum, austenitic non-magnetic stainless steel). Record the indication.

F. Remove the plate; reset the DUT to zero; add a non magnetic plate and test weight of the same mass and note the indication.

INTERPRETATION OF RESULTS

Reference : Sections 9, 10, 11 and 30 of the Specifications.

The DUT meets the requirements if the indication obtained using the ferromagnetic material (test weight or plate) is equal to the indication obtained using the non-magnetic material.

LG-3.12 SUSCEPTIBILITY TO MAGNETISM - FERROMAGNETIC PLATE

APPLICATION

This test is performed on any complete weighing devices and load weighing elements that incorporate loadcells functioning on the principle of "electromagnetic force compensation.

SETTINGS

1. The AZSM can be in any status.

2. The test is performed at ambient temperature only (≈ 20NC and ≈ 50% RH).

3. The DUT must have been tested prior to the following test, and must perform within applicable LOEs.

PROCEDURE

A. Place the DUT on a ferromagnetic plate (steel or iron). Zero the DUT.

B. Perform an increasing and decreasing load test.

INTERPRETATION OF RESULTS

Reference : Sections. 9, 10, 11 and 30 of the Specifications.

The DUT meets the requirements if the indication obtained using the ferromagnetic material is within the prescribed LOEs.

LG-3.13 TEMPERATURE EFFECT ON LINEARITY, HYSTERESIS, REPEATABILITY

APPLICATION

This test is intended for any complete devices and major components (including Analogue to Digital signal converters) incorporating electronic components susceptible to be affected by temperature fluctuations. This test is to be performed also on mechanical scales using temperature compensated springs. The purpose of this test is to ensure that devices are able to measure within applicable limits of error at any temperatures between -10°C to 40°C, unless otherwise marked on the device

Not all devices are affected by all of the influence factors, hence not all influence factor tests need to be performed on all devices. For example, indicating elements that processes only digital information (slave display) do not have to be tested for compliance under influence factors.

SETTINGS

1. AZSM may be in operation during the tests. It must be set to the lowest value; if zero is the lowest selectable value, it will be set to zero. The amount that the AZSM may track at once can not exceed 0.6d which is the maximum value allowed by the Specifications.

2. If a device is provided with an IZSM, the tests will be performed once with the IZSM set to the maximum of its range.

3. The weighing device must be levelled to its reference position, be adjusted as close as possible to zero error at ≈ 20°C (or the mid point of the temperature range marked on the device, if significantly different from 20°C) after it has reached his thermal equilibrium with power applied. Except for zero-setting, the device must not be adjusted or re-adjusted at any time during the test.

4. The device must be set for the maximum capacity and smallest verification scale interval for which the approval is sought.

5. If so equipped, the "enhance resolution feature" of the device will be used during the tests. If this feature is not available, use the small weight method to determine the device errors before rounding.

6. This test is performed at the following temperatures:

First round:	at nominal temperature (≈ 20°C, or at the mid point of the temperature range if significantly different from 20°C);
Second round:	at low temperature (- 10°C, or the lower point of the temperature range marked on the device);
Third round:	at high temperature (+ 40°C, or the higher point of the temperature range marked on the device).
Fourth round	at nominal temperature (≈ 20°C, or at the mid point of the temperature range if significantly different from 20°C).

7. When the environmental chamber has reached the desire temperature, allow a minimum of 2 hours after the DUT temperature has stabilized.

The temperature of the DUT can be monitored by attaching a thermocouple with adhesive tape inside the DUT onto a component of relatively large mass. However, the thermocouple must not be attached to any live component(s) of the DUT. The temperature will be deemed to be stable when the temperature obtained from the thermocouple will have stabilized within ± 1°C. Once stabilized, the temperature obtained from the thermocouple will likely be different than the overall temperature of the environmental chamber. The requirement is only that the temperature of the DUT stabilizes to within ± 1°C.

8. Moisture content in the environmental chamber must not exceed ≈ 50% RH at test temperatures.

9. The test equipment such as load cell simulators, high precision reference indicators, must be isolated from the test conditions and maintained at constant ambient temperature and humidity.

10. Note that the following tests are performed together: temperature effect on linearity and hysteresis, creep and temperature effect on no load condition.

PROCEDURE

A) With the DUT switched "on" and in the environmental chamber, stabilize the DUT at ≈ 20°C. Monitor the temperature of the DUT until it has reached stability. Wait an additional 2 hours.

B) Exercise (3 times up to at least 90% Max) the DUT; set the DUT to zero.

C) Perform at least two increasing and decreasing load tests to capacity using at least five known weights. Loads must be selected in relation to the device capacity, the value of the verification scale interval and the turning points of the tolerances. Determine the true error before rounding. Record the following data: a) time, b) temperature, c) relative humidity, d) loads, e) indications, f) errors, and g) note any malfunctions of the device features.

D. Repeat the test sequence at -10°C, + 40°C (or at the lowest and highest temperatures marked on the device). Record the following data: a) time, b) temperature, c) relative humidity, d) loads, e) indications, f) errors, and g) note any malfunctions of the device features.

Additional tests for multiple range weighing devices

E. Set the device to zero in the lowest range. Perform three increasing and decreasing load tests using at least 5 known weights.

F. Repeat the test for the other ranges.

G. Load the scale to the maximum capacity of the highest range (or manually select the highest range and then load the device to capacity); Remove the load: the indications should return to zero immediately. Switch the device to the lowest range immediately (If the switch over is automatic, the device should have returned to the lowest range automatically). Note the indication near zero at the time the device switches to the lowest range. Observe to weight indication during the next 5 minutes and record any changes.

H. Repeat the tests at the other reference temperatures.

I. Record the following data: a) time, b) temperature, c) relative humidity, d) loads, e) indications, f) errors, and g) note any malfunctions of the device features.

INTERPRETATION OF RESULTS

Reference: Sections 9, 10,11, 12, 13, 17 and 25 of the Specifications

- All functions of the device must operate as designed.

- Linearity and hysteresis — Each individual result must be within the tolerance envelope as prescribed by the Specifications.

- Repeatability — Compare the results for each individual load of increasing and decreasing tests. The maximum difference between the results for the same load must not exceed the in-service tolerances as prescribed by the Specifications.

- Return to zero — The device must return to zero from Max within 0.5 **e** for a complete device, and within 0.35 **e** for indicating or load receiving/weighing elements tested separately.

  A multiple range device must return to zero from Max_i within $\mathbf{0.5\ e_i}$. After returning to zero from any load greater than Max_1 and immediately after switching to the lowest weighing range, the indication shall be within $\mathbf{0.5\ e_1}$.

  Note that the error of any single weighing result must not exceed the maximum limit of error for the given load.

The following tests are grouped and performed in a pre-determined sequence: LG-3.13 Temperature Effect on Linearity, Hysteresis, Repeatability; LG-3.14 Creep and Creep-Return-to-Zero; LG-3.15 Temperature Effect on the No-Load Indication; **See the Recommended** Test Sequence on page 3.4.

LG-3.14 CREEP and CREEP- RETURN-TO-ZERO

APPLICATION

This test is performed on any complete mechanical or electronic weighing device and on any mechanical or electronic weighing element tested separately.

SETTINGS

1. AZSM may be in operation during the tests. It must be set to the lowest value; if zero is the lowest selectable value, it will be set to zero. The amount that the AZSM may track at once can not exceed 0.6 **e** which is the maximum value prescribed by the Specifications.

2. If a device is provided with an IZSM, the tests will be performed once with the IZSM set to the maximum of its range.

3. The device must be set for the maximum capacity and smallest verification scale interval for which the approval is sought.

4. If so equipped, the "enhance resolution feature" of the device will be used during the tests. If this feature is not available, use the small weight method to determine the device errors before rounding.

5. The creep test is performed at the following temperatures:

First round:	at nominal temperature (≈ 20°C, or at the mid point of the temperature range if significantly different from 20°C);
Second round:	at low temperature (- 10°C, or the lower point of the temperature range marked on the device);
Third round:	at high temperature (+ 40°C, or the higher point of the temperature range marked on the device).
Fourth round	at nominal temperature (≈ 20°C, or at the mid point of the temperature range if significantly different from 20°C).

6. The creep-return to zero test is performed at ambient (≈ 20°C) temperature only.

7. Note that these tests are combined with the test performed to assess the temperature effect on linearity and hysteresis.

8. The temperature of the DUT must have stabilized to within ± 1°C.

> The temperature of the DUT can be monitored by attaching a thermocouple with adhesive tape inside the DUT onto a component of relatively large mass. However, the thermocouple must not be attached to any live component(s) of the DUT. The temperature will be deemed to be stable when the temperature obtained from the thermocouple will have stabilized within ± 1°C. Once stabilized, the temperature obtained from the thermocouple will likely be different than the overall temperature of the environmental chamber. The requirement is only that the temperature of the DUT stabilizes to within ± 1°C.

9. Moisture content in the environmental chamber must not exceed ≈ 50% RH at test temperatures.

10. The test equipment such as load cell simulators, high precision reference indicators, must be isolated from the test conditions and maintained at constant ambient temperature and humidity.

11. The increasing and decreasing load tests must be performed before the creep test and creep-return-to-zero test; a recovery time period equal to the accuracy (increasing and decreasing) test time is permitted before conducting the creep test; the scale should be exercised 3 times up to at least 90% Max before conducting the creep and creep-return-to zero test if an extended period of time has passed since the scale was last tested.

PROCEDURE

Creep test

A. Following the increasing and decreasing load test, allow the device to "recover" for a period of time equal to the increasing and decreasing test time. Exercise the scale 3 times up to at least 90% Max.

B. Place on the weighing element a load equal to at least 90% of Max, and take a reading 20 seconds after the indication has stabilized. Observe the indication for one hour. Take a second reading.

C. Remove the load and wait for the indication to stabilize (no more than 20 seconds). Take a reading.

Note that if a single range device returned to zero within 0.5 e immediately after the removal of the load that has remained on the platter for one hour, there is no need to perform the creep-return-to-zero test.

Creep test on a multiple range device

D. The test describe in A, B and C above must be performed for each of the ranges.

INTERPRETATION OF RESULTS

Reference: Section 18 of the Specifications.

The device meets the requirements if the difference between the indication obtained 20 seconds after placing the load on the device and the indication observed during the following one hour does not exceed the absolute value of the applicable limit of error for that load.

Creep-Return-to-Zero Test (at ≈ 20°C only)

E. Allow the device to recover for a minimum of one hour. Exercise the device with a load of 90% Max.

F. Place on the weighing element a load equal to at least 90% of Max. Leave that load on the device for a period of 1/2 hour.

G. Remove the load and take a reading as soon as the indication has stabilized (wait no more than 20 seconds).

Creep-Return-to-Zero test on multiple range devices (at ≈ 20°C only)

H. Allow the device to recover for a minimum of one hour. Exercise the device with any convenient load that is available.

I. Place, on the weighing element, a load equal to ≈ 90% of the maximum capacity of the lowest range. Leave that load on the device for a period of 1/2 hour.

J. Remove the load and take a reading as soon as the indication has stabilized.

K. Place, on the weighing element, a load equal to at least 90% of the maximum capacity of the highest range. Leave that load on the device for a period of 1/2 hour.

L. Remove the load and take a reading as soon as the indication has stabilized (Wait no more than 20 seconds).

M. Immediately, switch the device to the lowest range, take a reading of the weight indication. Observe the weight indication for 5 minutes. Record any changes in the weight indication.

INTERPRETATION OF RESULTS

Reference: Section 17 of the Specifications.

- The deviation on returning to zero as soon as the indication has stabilized shall not exceed **0.5 e.**

- **On multi-interval device**, the deviation shall not exceed $\mathbf{0.5\ e_1}$

- On a **multiple range device**, the deviation on returning to zero from Max_i shall not exceed $\mathbf{0.5e_i}$; moreover, after returning to zero from any load greater than $\mathbf{Max_1}$ and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than $\mathbf{e_1}$ during the following 5 minutes.

LG-3.15 TEMPERATURE EFFECT ON THE NO-LOAD INDICATION

APPLICATION

This test is performed on any complete electronic device, any electronic indicator or weighing element tested separately.

SETTINGS

1. AZSM must be turned off or set to zero value. If it is not convenient to do so, a small weight (i.e. 10 to 20 graduations) may be placed on the platter to bring the indication off the AZSM range.

2. The device must be set for the maximum capacity and smallest verification scale interval for which the approval is sought.

3. The test is performed when the environmental chamber's temperature is being changed. The sequence is as follows:

   First test: from 20°C (or the mid point of the temperature range if significantly different from 20°C) to - 10°C (or the lower point of the temperature range marked on the device);

   Second test: from - 10°C to + 40°C (or the higher point of the temperature range marked on the device);

4. The temperature of the DUT must have stabilized to within ± 1°C.

> The temperature of the DUT can be monitored by attaching a thermocouple with adhesive tape inside the DUT onto a component of relatively large mass. However, the thermocouple must not be attached to any live component(s) of the DUT. The temperature will be deemed to be stable when the temperature obtained from the thermocouple will have stabilized within ± 1°C. Once stabilized, the temperature obtained from the thermocouple will likely be different than the overall temperature of the environmental chamber. The requirement is only that the temperature of the DUT stabilizes to within ± 1°C.

5. Moisture content in the environmental chamber must not exceed ≈ 50% RH at test temperatures.

6. The test equipment such as load cell simulators, high precision reference indicators, must be isolated from the test conditions and maintained at constant ambient temperature and humidity.

7. The temperature in the chamber is changed at a rate not to exceed 1°C per minute.

8. If so equipped, the "enhance resolution feature" of the device will be used during the tests. If this feature is not available, use the error weight method to determine the device errors before rounding.

PROCEDURE

For each test described in 3 above, perform the following procedure:

A. Stabilize the DUT at no load condition and at the start temperature for a period of time equal to the time that was required to apply an remove the load during the previous test.

B. Zero the DUT, if the AZSM is disabled; or place a small load (**±5 e**) on the platter, and record the registration (Determine the error before rounding using small denomination weights).

C. **From 20°C to -10°C** Lower the temperature of the environmental chamber down to -10°C at a rate not to exceed 1NC per minute.

D. When the DUT has reached temperature stability, wait an additional 2 hours.

E. Using small denomination weights, determine and record the registration prior to rounding. Record the results

F. **From -10°C to 40°C** Increase the temperature of the environmental chamber up to 40°C at a rate not to exceed 1°C per minute.

G. When the DUT has reached temperature stability, wait an additional 2 hours.

H. Using small denomination weights, determine and record the registration prior to rounding. Record the results

INTERPRETATION OF RESULTS

Reference: Section 24 of the Specifications.

The device meets the requirements if the indication at zero or near zero does not vary by more than:

i) one verification scale interval (e) per 1°C change in temperature, for Class I devices;
ii) three verification scale intervals (e) per 5°C change in temperature, for Class III HD devices; and
iii) one verification scale interval (e) per 5°C change in temperature, for all other device classes.

LG-3.16 DAMP HEAT, STEADY STATE

APPLICATION

This test is intended for any complete electronic weighing devices, and for any electronic weighing elements or electronic indicating elements tested separately. The test consists of exposure of the DUT to a constant temperature and constant relative humidity.

Note that the damp heat steady state test is not presently performed by the Laboratory. MC intents to implement this test in the future.

SETTINGS

1. AZSM may be in operation during the tests. It must be set to the lowest value; if zero is the lowest selectable value, it will be set to zero. The amount that the AZSM may track at once can not exceed 0.6 **e** which is the maximum value allowed by the Specifications.

2. If a device is provided with an IZSM, the tests will be performed once with the IZSM set to the maximum of its range.

3. The weighing device must be levelled to its reference position, be adjusted as close as possible to zero error at ≈ 20°C (or the mid point of the temperature range marked on the device, if significantly different from 20°C) after it has reached thermal equilibrium with power applied. Except for zero-setting, the device must not be adjusted or re-adjusted at any time during the test.

4. The device must be set for the maximum capacity and smallest verification scale interval for which the approval is sought.

5. If so equipped, the "enhance resolution feature" of the device will be used during the tests. If this feature is not available, use the small weight method to determine the device errors before rounding.

6. When the environmental chamber has reached the desire temperature, allow a minimum of 3 hours for the temperature of the DUT to stabilize.

The temperature of the DUT can be monitored by attaching a thermocouple with adhesive tape inside the DUT onto a component of relatively large mass. However, the thermocouple must not be attached to any live component(s) of the DUT. The temperature will be deemed to be stable when the temperature obtained from the thermocouple will have stabilized within ± 1°C. Once stabilized, the temperature obtained from the thermocouple will likely be different than the overall temperature of the environmental chamber. The requirement is only that the temperature of the DUT stabilizes to within ± 1°C.

7. The test equipment such as load cell simulators, high precision reference indicators, must be isolated from the test conditions and maintained at constant ambient temperature and humidity.

8. This test is performed following the series of temperature test described in LG-3.13. The first test (**≈ 20°C/50% RH**) described below is in fact the last test in the series of temperature test. See the Recommended Test Sequence on page 3.3.

PROCEDURE

At ≈ 20°C/50% RH

A. Condition the device. Record the temperature and humidity rate.

B. Perform a minimum of three increasing and decreasing load test and record the results.

At 40°C/85% RH

C. Increase the temperature of the chamber and raise the humidity rate.

D. Condition the device.

E. When the device has reached temperature and humidity stability, allow for 48 hours. The temperature and humidity rate must remain constant.

F. Then perform a minimum of three increasing and decreasing load tests. Record the results.

At 20°C/50% RH

G. Condition the device. Record the temperature and humidity rate.

H. Perform a minimum of three increasing and decreasing load test and record the results.

INTERPRETATION OF RESULTS

Reference: Section 9, 10, 11 and 29 of the Specifications

The device meets the requirements if under the above conditions it perform within applicable limits of error.

For more details concerning the procedure, see OIML IR 76-1, annexe B.2.2, and IEC Publications 68-2-3 (1969) and 68-2-28 (1980)

LG-3.17 ELECTROSTATIC DISCHARGE TEST

APPLICATION

This test is intended for any complete electronic weighing devices and for any electronic major elements tested separately.

SETTINGS AND PROCEDURE

For more details concerning the procedure, see OIML IR 76-1, annexe B.3.3, and IEC Publications series 801-2.

Note that the electrostatic discharge test is not presently performed by the Laboratory. MC intents to implement this test in the future.

LG-3.18 SHORT TIME POWER REDUCTION TEST

APPLICATION

This test is intended for any complete electronic weighing devices and for any electronic major elements tested separately.

SETTINGS AND PROCEDURE

For more details concerning the procedure, see OIML IR 76-1, annexe B.3.1.

Note that the short time power reduction test is not presently performed by the Laboratory. MC intents to implement this test in the future.

LG-3.19 BURST TEST

APPLICATION

This test is intended for any complete electronic weighing devices and for any electronic major elements tested separately.

SETTINGS AND PROCEDURE

For more details concerning the procedure, see OIML IR 76-1, annexe B.3.2, and IEC Publications series 801-4.

Note that the burst test is not presently performed by the Laboratory. MC intents to implement this test in the future.

LG-3.20 ENDURANCE (PERMANENCE) TEST

APPLICATION

This test is intended for any complete mechanical or electronic weighing devices and for any weighing elements tested separately with capacities of up to 1000 kg (2000 lb). Devices are subjected to the repetitive loading and unloading of specific loads applied 100 000 times. The endurance test is performed after all other tests.

SETTINGS

1. AZSM may be in operation during the tests. It must be set to the lowest value; if zero is the lowest selectable value, it will be set to zero. The amount that the AZSM may track at once may not be set to a value larger than 0.6 d which is the maximum value allowed by the Specifications.

2 If a device is provided with an IZSM, the test will be performed only once with the IZSM set at the upper limit of its range.

3. The weighing device must be levelled to its reference position, be adjusted as close as possible to zero error, and pre-loaded to the maximum capacity at least once.

4. The device must be set for the maximum capacity and smallest verification scale interval for which the approval is sought.

5. If so equipped, the "enhance resolution feature" of the device will be used during the test. If this feature is not available, use the small weight method to determine the device errors before rounding.

6. This test is performed at ambient temperature ($\approx$ 20°C); or at the mid point of the temperature range if significantly different from 20°C.

7. The following test load shall be used:

   Devices with Max ≤ 100 kg: a load equal to 1/2 Max;
   Devices with Max > 100 kg: a load between 1/4 and 1/2 of Max without exceeding 250 Kg.

PROCEDURE

A. After having moved the device to the permanence testing bench, perform an increasing and decreasing test, an eccentricity test, a load discrimination or sensitivity test, to ascertain that the device measures as close to zero error as possible. Recalibrate the DUT as necessary.

B. Apply the test load 25 000 times; perform an increasing and decreasing load test and record the results.

C. Apply the test load an additional 25 000 times; perform an increasing and decreasing load test and record the results.

D. Apply the test load an additional 25 000 times; perform an increasing and decreasing load test and record the results.

E. Apply the test load an additional 25 000 times.

F. Perform a load discrimination test, an increasing and decreasing load test, an eccentricity test

G. Record the results.

INTERPRETATION OF RESULTS

Reference: Sections 9, 10, 11, 12, 13, 14, 15, 16, and 21 of the Specifications.

The device meets the requirements if all the results remains within the applicable limits of error.

Class III HD In-Service Limits of Error

Verification scale interval	2 kg	5 kg	10kg	20 kg
In-Service LOE in Terms of Verification Scale Interval	**Load in kg**	**Load in kg**	**Load in kg**	**Load in kg**
1	0 - 1000	0 - 2500	0 - 5000	0 - 10000
2	+1000 - 2600	+2500 - 6500	+5000 - 13000	+10000 - 26000
3	+2600 - 4200	+6500 - 10500	+13000 - 21000	+26000 - 42000
4	+4200 - 5800	+10500 - 14500	+21000 - 29000	+42000 - 58000
5	+5800 - 7400	+14500 - 18500	+29000 - 37000	+58000 - 74000
6	+7400 - 9000	+18500 - 22500	+37000 - 45000	+74000 - 90000
7	+9000 - 10600	+22500 - 26500	+45000 - 53000	+90000 - 106000
8	+10600 - 12200	+26500 - 30500	+53000 - 61000	+106000 - 122000
9	+12200 - 13800	+30500 - 34500	+61000 - 69000	+122000 - 138000
10	+13800 - 15400	+34500 - 38500	+69000 - 77000	+138000 - 154000
11	+15400 - 17000	+38500 - 42500	+77000 - 85000	+154000 - 170000
12	+17000 - 18600	+42500 - 46500	+85000 - 93000	+170000 - 186000
13	+18600 - 20200	+46500 - 50500	+93000 - 101000	+186000 - 202000
14	+20200 - 21800	+50500 - 54500	+101000 - 109000	+202000 - 218000
15	+21800 - 23400	+54500 - 58500	+109000 - 117000	+218000 - 234000
16	+23400 - 25000	+58500 - 62500	+117000 - 125000	+234000 - 250000
17	+25000 - 26600	+62500 - 66500	+125000 - 133000	+350000 - 266000
18	+26600 - 28200	+66500 - 70500	+133000 - 141000	+266000 - 282000
19	+28200 - 29800	+70500 - 74500	+141000 - 149000	+282000 - 298000
20	+29800 - 31400	+74500 - 78500	+149000 - 157000	+298000 - 314000
21	+31400 - 33000	+78500 - 82500	+157000 - 165000	+314000 - 330000
22	+ 33000	+82500	+165000	+330000

The following formula may be used to calculate in-service limits of error for class IIIHD devices:

$$\frac{(L / e - 500)}{800} + 1 = \text{(Round the value up to the next whole number) In-service limit of error in term of e}$$

L = Load or standard used to determine the LOE
e = the value of verification scale interval

The result is divided by 2 to find the acceptance LOE

Example:

In-service LOE for a known test load of 11 500 kg
e = 5 kg

11 500 kg ÷ 5 kg = 2 300
2 300 - 500 = 1 800
1 800 ÷ 800 = 2.25
2.25 + 1 = 3.25
3.25 rounded up = 4 e
Hence, the in-service LOE is 20 kg (4 X 5 kg)
The acceptance LOE is 10 kg