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Non Automatic Weighing Devices	Issued: 2004-03-01	Revision Number: Original	

STP-13 INCREASING / DECREASING TEST AND RETURN-TO-ZERO TEST

REFERENCE

Sections 8, 9, 11 and 16 of the Non Automatic Weighing Devices Specifications.

PURPOSE

The purpose of this test is to determine the basic performance characteristics of the scale - linearity, accuracy and hysteresis.

PRETEST DETERMINATION

A scale that incorporates an IZSM the range of which exceeds 20% of Max:

If a scale has an initial zero setting mechanism (IZSM) the range of which can exceed 20% of Max, this should be mentioned in the Notice of Approval. If such a scale is used with more than one load receiving element or platter, the scale uses an "extended" range of the load cell(s). At the initial inspection, this "extended" weighing range is tested. The device is therefore set to zero using the IZSM and an increasing load test is performed to capacity. The scale is then re-zeroed by activating the IZSM with the load on the platter. The increasing load test is then continued until the device blanks (Max + IZSM range). This "extended" increasing load test is not necessary if the IZSM range is limited to 20% of Max.

Scale equipped with an additive tare feature

An additive tare feature allows a tare of a load equal to Max without reducing the weighing range of the device. If the scale has a full or partial additive tare, the full range of the additive tare and the weighing range must be tested. Set the device to zero and perform an increasing load test up to Max (or the maximum tare effect). Tare the load on the platter and complete the increasing load test up to Max + the additive tare effect. Remove the loads in reverse sequence (decreasing load test).

Selection of Test Loads

Use at least five known test loads for the increasing and decreasing tests. When practical, choose the loads so that they are close to the turning point (the point where the limit of error increases) of each limit of error step. For instance, on a Class III scale, loads must be close to but not greater than 500 e, 2000 e, 4000 e and Max. In the case of multi-interval devices, more than five known test loads may be necessary as there could be more than five turning points.

"Small Weight" Method

This is a procedure to determine the true error (or internal error) of a digital indicating scale by adding to or removing small weights corresponding to 1/10 e from the load receiving element. This procedure is used to bring the scale to the same exact weight indication when replacing the known weights by material when performing a strain or substitution test.

TEST PROCEDURES

Using Known Test Weights up to Max

- Zero the scale.
- Successively apply a minimum of five known test loads from zero to Max taking into consideration the instructions provided under "Selection of test loads" above.
- Remove the loads in reverse sequence.
- Record the weight indications for each load and at zero upon the removal of the load.

Strain Load Tests

When the amount of test weights available is less than Max, unknown loads are used to test the device up to its maximum capacity.

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- Zero the scale and test the low range of the scale by performing an increasing and decreasing load test using the available known test weights.
- Place a strain load on the load receiving element and note the exact weight indication using the "small weights" method, or tare the load. Do not use the zero setting mechanism to set the strain load to zero.
- Successively apply the known test weights taking into consideration the instructions provided under "Selection of test loads" above.
- Remove the known test loads in reverse sequence.
- After the completion of the strain load test, remove the unknown strain load and the known test weights, cancel the tare (if applicable) and ensure that the device has returned to zero.

Number of Strain Tests

The minimum number of strain load tests for initial and subsequent field inspections is:

two for platform scales: one near the mid range of the scale capacity and one close to the range of use of the device;

three for hopper and tank scales: one at approximately 30% of Max, one at approximately 60% of Max and one between 90% and 100% of Max;

two for vehicle scales or combination vehicle/railway scales: one within the normal tare weighing range and one within the normal gross weighing range of the device; and

two for railway scales: one within the normal tare weighing range and one within the normal gross weighing range of the device.

Substitution Tests

Substitution tests may be conducted on platform scales, hopper scales and tank scales if performed under stable environmental conditions (no wind, no rain). The weight indication and the weight of the substitution material must both be stable.

- Set the device to zero.
- Apply the known test weights to the load receptor taking into consideration the instructions provided under "Selection of test loads" above. Note the exact weight indication using the "small weights" method and record the error. Remove the test weights (decreasing load test).
- Add sufficient material to the load receiving element to exactly duplicate the indication obtained with the test weights. This is now considered to be a known test load.
- Apply the test weights to the load receptor.
- Repeat the procedure up to Max.

INTERPRETATION OF RESULTS

For each increasing and decreasing load test, the error of indication must be within the limits of error.

When unloaded the device must return to zero within 0.5 e, within:

5 seconds, for scales of any capacity that normally weigh single discrete loads, applied and removed in a single unit (computing scales, platform scales, overhead track scales, etc.).

15 seconds, for scales up to 10 000 kg in capacity that normally weigh product that is not applied in one discrete load (hopper and tank scales).

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30 seconds, for scales over 10 000 kg in capacity that normally weigh product that is not applied in one discrete load (vehicle scales, railway scales, hopper and tank scales).

When a strain load test is performed, upon the removal of the known test weights, the scale must return to the initial indication within 0.5 e.

NOTE 1

When performing strain load tests, the limit of error applies to the known test load that is added to the strain load. Limits of error are applied as if the scale started at zero.

NOTE 2

When performing substitution tests, the limit of error applies to the total load on the load receiving element (the sum of the known test load and the substitution material).

NOTE 3

For field tests, except for load discrimination tests, strain tests and substitution tests, there is no need to establish the true internal error using the "small weights" method. Limits of error apply to the difference between the weight value indicated or recorded and the value of the known test load.

NOTE 4

Limits of error apply to gross weights as well as net weights. For instance, a platter tare value of 600 e is entered. The scale indicates zero (net) with the 600 e load on the platter. From zero to 500 e (net), the in-service limit of error is then 1 e and not 2 e.

NOTE 5

Despite any variation between results permitted by the Specifications, all results must be within the limit of error envelope.

MULTIPLE RANGE WEIGHING DEVICES

Procedure

Each weighing range is tested individually.

- Zero the scale.
- Successively apply a minimum of five known test loads from zero to Max.
- Remove the loads in reverse sequence.
- Record the weight indications for each load and at zero upon the removal of the loads.
- Repeat the test for each range.
- 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 (if the switch over is automatic the device should have returned to the lowest range automatically). Record the indication near zero at the time the device switches to the lowest range.

INTERPRETATION OF RESULTS

Multiple range devices must:

- for each load, provide a weight indication within the limits of error envelope as prescribed by the Non Automatic Weighing Devices Specifications; and

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-return to zero from Max_i within $0.5 e_i$. After returning to zero from any load greater than Max_i , and immediately after switching to the lowest weighing range, the indication must be within $0.5 e_i$.

REVISION

Original document