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Non Automatic Weighing Devices	Issued: 2012-05-01	Revision Number: 3	

ZERO SETTING MECHANISMS

REFERENCE

Sections 40 to 44 of the *Specifications Relating to Non-automatic Weighing Devices (1998)*.

PURPOSE

There are several requirements that establish the proper operation of zero setting mechanisms to ensure accuracy and to prevent the perpetration of fraud or measurement errors. These requirements depend upon the type of zero setting mechanisms and applications. These requirements are found in sections 40 to 44 of the *Non Automatic Weighing Devices Specifications* and in the Laboratory Manual.

The Laboratory performs a complete evaluation of the zero setting mechanisms at the time of approval. Configuration parameters and limitations concerning zero setting mechanisms are indicated in the Notice of Approval (NOA). Field inspectors must ensure that the zero setting mechanisms are configured or set in accordance with those parameters and limits, particularly when the device is initially inspected. Consult the NOA for limits and restrictions on the use of the various zero setting mechanisms.

DEFINITIONS

Automatic Zero-Setting Mechanism (AZSM) - mechanism for setting the indication to zero automatically without the intervention of an operator. This feature is restricted for use only when the indication is below zero and has remained stable for at least 5 seconds.

Automatic Zero-Tracking Mechanism (AZTM) - mechanism for maintaining the zero indication within certain limits automatically.

Initial Zero-Setting Mechanism (IZSM) - mechanism for setting the indication to zero automatically at the time the device is switched/powerd on and before it is ready to use.

Manual Zero-Setting Mechanism (MZSM) - mechanism for setting the indication to zero by the operator.

Semi Automatic Zero-Setting Mechanism (SAZSM) - mechanism for setting the indication to zero automatically following a manual command (push-button zero).

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PROCEDURES

AUTOMATIC ZERO-SETTING MECHANISM

The AZSM automatically re-zeros a scale which is not displaying a zero indication. AZSMs must only operate when in the Gross mode. AZSMs may only operate when the scale is off zero in a negative direction (weight is below zero) and must be a sealable parameter. The use of AZSMs is not appropriate in all instances and may be prohibited in the NOA or on the inspection certificate. In these cases, the AZSM must be disabled and sealed to ensure it is not used. The AZSM is not appropriate for use with any device that utilizes a removable load receiving element (LRE) as part of normal operation (e.g. candy scoop).

- Check that any means to enable/disable the AZSM can be disabled and that the feature is sealable.
- Ensure that the use of the AZSM is appropriate for the application.
- The AZSM must only operate when the device is in Gross mode.
- The NOA will identify devices with AZSM features that have been evaluated and approved for use in trade. If the AZSM is not mentioned in the NOA, it may still be used subject to suitability of use and performance testing.

In order to determine if a device has AZSM and if the feature is operating correctly, perform the following test (negative direction):

- Zero the device.
- Place a **5d** load on the device.
- Zero the device using the Semi-Automatic Zero Setting Mechanism (SAZSM)
- Remove the load and note the indication (**-5d**, ----, error, etc.)
- Without adjusting the balance condition of the device, observe the scale indications after one minute (or the specified AZSM activation time if known).
- If the device has returned to zero, it is deemed to have an automatic zero setting mechanism which is functioning in the negative direction.

Interpretation of Results

The device may be equipped with an AZSM that operates in the negative direction. This feature must not operate unless the load is stable for at least 5 seconds. The use of AZSM is not suitable for all applications.

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If the device has an AZSM which operates in the negative direction, the inspector must ensure that this feature does not operate in the positive direction. The device AZSM must not be set or configured to re-zero a positive weight value (greater than 0 indication). Perform the following test (positive direction):

- Zero the device.
- Place a **5d** load on the device. Without adjusting the balance condition of the device, observe the scale indications after one minute (or the specified AZSM activation time if known).
- If the device has returned to zero indication it is deemed to have an automatic zero setting mechanism which is functioning in the positive direction.

Interpretation of Results

The device may not be equipped with an AZSM operational in the positive direction. This feature must be disabled and sealed or the device declared non-compliant.

AUTOMATIC ZERO-TRACKING MECHANISM

The device's AZTM must not be set or configured to re-zero a weight value in excess of **0.6d** in a single operation. Perform the following test:

- Zero the device.
- Place a known test load "A" equal to or greater than **d** (e.g. **10d**), plus a load "B" equal to **0.7d** on the device load receiving element.
- Remove the known test load "A", wait for at least 10 seconds to see if the device will automatically re-zero test load "B".

Interpretation of Results

- The device is deemed to comply with the requirement if it does not automatically re-zero loads in excess of **0.6d**. Re-zeroing of any load less than or equal to **0.6d** is acceptable.

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INITIAL ZERO-SETTING MECHANISM

This test is performed at the time the device is initially inspected only. This test is to determine if the value that the IZSM can zero exceeds 20% Max. Perform the following test (complete electronic scale):

- Remove the platter in order to reach the lowest point of the IZSM range.
- Remove power from device and wait at least 10 seconds. Restore power to the device to activate the IZSM.
- Put the platter back on the scale and note the indication; if necessary, add weights to reach 20% Max.
- Remove power from the device and wait at least 10 seconds. Restore power to the device to activate the IZSM; if the device resets to zero, add an additional load of approximately 5% Max to the platter.
- Remove power from the device and wait at least 10 seconds. Restore power to the device; if the IZSM range is limited to 20% Max, the device will not reset to zero.

Note: Applies to self-contained devices with user-removable platters (LRE) only.

Note: On some devices, it is sufficient to switch it off and on to activate the IZSM, while others will require disconnection from the power source. In either case, the 10 seconds allows time for the device to completely shut down.

Interpretation of Results

The maximum IZSM range of a device must not be set for more than 20% Max unless otherwise indicated in the NOA.

Procedure (Component Electronic Scale)

Larger devices typically do not have user removable platters. The test for the IZSM is conducted as follows:

- Ensure the platter is completely empty and there is no ancillary equipment on the LRE.
- Add weights equivalent to 20% Max.
- Remove power from device and wait at least 10 seconds.
- Restore power to the device to activate the IZSM; if the device resets to zero, add an additional load of approximately 5% Max to the platter.
- Remove power from the device and wait at least 10 seconds. Restore power to the device; if the IZSM range is limited to 20% Max, the device will not reset to zero.

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Note 1: A device comprised of an electronic indicating element and a weighing element which were approved separately, may not have the IZSM range set for more than 20% Max.

Note 2: It is sufficient to switch some devices off and on to activate the IZSM, while others will require disconnection from the power source. In either case, the 10 seconds allows time for the device to completely shut down.

Note 3: If the LRE is equipped with ancillary equipment that cannot be removed, the IZSM should be tested as is and the results noted on the certificate. If the IZSM range remains at 20% (i.e. has not be reduced by an amount approximating the weight of the ancillary equipment), the installation should be brought to the attention of the local Gravimetric Specialist.

Interpretation of Results

The maximum IZSM range of a device must not be set for more than 20% Max unless otherwise indicated in the NOA.

MANUAL ZERO-SETTING MECHANISM

If the balance at zero-load is achieved by the addition of supplementary material, the material must be enclosed in a cavity covered with a cap (affixed with screws, etc.) so that it cannot be readily removed or altered and so that it cannot shift position in such a way that the balance condition of the device is affected during the weighing operation.

If a device is provided with a balance ball and a captive screw or nut arrangement, the maximum effect must not exceed 4e per revolution, and means must be provided to ensure sufficient friction to prevent a zero change during weighing operation.

A device intended for direct sales may not be fitted with a MZSM unless operated only with a detachable tool.

The total range of zero setting (positive and negative portion) may not exceed 4% Max unless the gross load that can be weighed is not increased beyond the device capacity limit.

SEMI AUTOMATIC ZERO-SETTING MECHANISM

The total zero-setting range (negative and positive) may be set to exceed 4% Max only if the gross load that can be weighed is not increased beyond the capacity limit of the device. The following test is to ensure that, when the device's SAZSM range is set for more than 4% Max, the weighing range decreases by an amount equal or greater than the value in excess of 4% Max corrected by the SAZSM.

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Procedure

- Place a load equal to 4% Max on the platter and reset the device to zero using the SAZSM.
- If the device does not reset to zero, there is no need to pursue the test.
- If the device resets to zero, add a load equal to 5% Max on the platter. Set the device to zero by activating the SAZSM. Load the device until it blanks and record the last weight value indicated.

Interpretation of Results

Any value in excess of 4% Max, corrected by the SAZSM, must result in an equal decrease in the gross load that can be weighed.

COMBINED ZERO/TARE BUTTONS

See the Field Inspection Manual for NAWDS, section STP-11 for additional requirements regarding this feature.

ZERO RETURN OF ON-BOARD WEIGHING SYSTEMS

An on-board weighing system designed and used to weigh dynamically need not return to zero indication between weighings if it is designed to operate in this manner and calculates accurate net weights.

REVISIONS

The purpose of this revision is to:

- add IZSM test procedure for devices with non-removable platters (LRE). These devices are referred to as component devices.
- clarify and reformat IZSM test procedures for all devices.
- change all "e" references to "d" in the Automatic Zero-Tracking Mechanism (AZTM) test procedure section.

The purpose of revision 2 was to:

- add requirements for Automatic Zero Setting Mechanisms (AZSM).
- correct terminology for Automatic Zero Tracking Mechanism (AZTM).
- reorder definitions and procedures alphabetically.
- add OBWS zero return requirements.

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The purpose of revision 1 was to:

- add 10-second delay on power cycle to IZSM procedure.
- clarify Interpretation section for AZSM procedure.
- delete "to the Public" from Direct Sales references.
- correct grammatical and general formatting issues.
- correct references to *Specifications Relating to Non-automatic Weighing Devices (1998)*.