

Automatic Bulk Weighing Systems

Device Description: _____

Contact Name: _____ Phone: _____

Company: _____ Address: _____

E-mail: _____ City: _____

Instructions For Completing Pre-Evaluation Checklists

You will usually need to complete **both** the “General” checklist and the specific checklist which is most applicable to your device or system type. For example, for a weighing device or weighing system the “General” checklist (which applies to all device types) and the “Scales” checklist should be completed. Both the “General” and “Watt-hour Meter” checklists should be completed and submitted with an electric watt-hour metering system application.

The exceptions are the computer software/hardware component pre-evaluation checklists which have the “General” requirements incorporated in them. Use the checklist for computer systems connected with either scales or measuring systems. Only one pre-evaluation checklist will be needed unless the software will be connected to both types of systems

These checklists include requirements extracted from the California Code of Regulations. Though not all-encompassing, the checklists contain requirements beyond those which would apply to any single device type or accessory. It is best to think of a device type as a weighing or measuring device system or as a component of such a system whichever best describes the device(s).

When applying the requirements to your device you have three options; Check

- YES** If your device or system complies
- NO** if the device or system does not comply.
- NA** if sections appear not to apply to the device or system type(s)

If selecting “**NO**”, consider if your device or system is ready for evaluation. If the deficiency is of such a nature that it will not effect the ability to test for accuracy, such as failure to conform with marking requirements or lack of provision for sealing, the evaluation can probably begin while deficiencies are being corrected.

If you are not able to conduct accuracy testing your system or device is probably not yet ready for an evaluation.

I have reviewed the enclosed specifications, tolerances, and test notes for the device type for which we have applied for evaluation and approval. To the best of my knowledge I have determined the device meets all applicable requirements.

Signed: _____

Date: _____

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<p>4027. A. Application.</p> <p>A.1. General. - This code applies to automatic bulk weighing systems, that is, weighing systems adapted to the automatic weighing of a commodity in successive drafts of predetermined amounts automatically recording the no-load and loaded weight values and accumulating the net weight of each draft.</p> <p>A.2. See also General Code requirements.</p>

	Yes	No	NA
<p>S. Specifications.</p> <p>S.1. Design of Indicating and Recording Elements and Recorded Representations.</p> <p>S.1.1. Zero Indication. - Provisions shall be made to indicate and record a no-load reference value and, if the no-load reference value is a zero value indication, to indicate and record an out-of-balance condition on both sides of zero.</p>			
<p>S.1.1.1. Digital Zero Indication. - A digital zero indication shall represent a balance condition that is within $\pm 1/2$ the value of the scale division.</p>			
<p>S.1.2. Value of Scale Division (d). - <i>The value of the scale division (d), expressed in a unit of weight, shall be equal to:</i></p> <p>(a) 1, 2, or 5; or (b) a decimal multiple or submultiple of 1, 2, or 5; or (c) a binary submultiple of a unit of weight.</p> <p><i>Examples: Scale divisions may be 0.01, 0.02, or 0.05; 0.1, 0.2, or 0.5; 1, 2, or 5; 10, 20, or 50; or 1/2, 1/4, 1/8, 1/16, etc.</i></p>			
<p>S.1.3. Capacity Indication and Recorded Representation. - An indicating or recording element shall not indicate or record any values when the gross load is in excess of 105 percent of the capacity of the system.</p>			
<p>S.1.4. Weighing Sequence. - For systems used to receive (weigh in), the no-load reference value shall be determined and recorded only at the beginning of each weighing cycle. For systems used to deliver (weigh out), the no-load reference value shall be determined and recorded only after the gross load reference value for each weighing cycle has been indicated and recorded.</p>			
<p>S.1.5. Recording Sequence. - Provision shall be made so that all weight values are indicated until the completion of the recording of the indicated value.</p>			
<p>S.1.6. Provision for Sealing Adjustable Components on Electronic Devices. - Provision shall be made for applying a security seal in a manner that requires the security seal to be broken before an adjustment can be made to any component affecting the performance of the device.</p>			
<p>S.2. Design of Balance and Damping Mechanism.</p> <p>S.2.1. Zero-Load Adjustment. - The weighing system shall be equipped with manual or semiautomatic means by which the zero-load balance or no-load reference value indication may be adjusted. An automatic zero setting mechanism is prohibited.</p>			

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	Yes	No	NA
<p>S.2.1.1. Manual. - A manual zero-load or no-load reference value setting mechanism shall be operable or accessible only by a tool outside of or entirely separate from this mechanism or enclosed in a cabinet.</p>			
<p>S.2.1.2. Semiautomatic. - A semiautomatic zero-load or no-load reference value setting mechanism shall meet the provisions of S.2.1.1. or shall be operable only when:</p> <p>(a) the indication is stable within ± 3 scale divisions, and (b) cannot be operated during a weighing operation.</p>			
<p>S.2.2. Damping Means. - A system shall be equipped with effective means necessary to bring the indications quickly to a readable, stable equilibrium. Effective means shall also be provided to permit the recording of weight values only when the indication is stable within plus or minus three scale divisions for devices with 10 000 scale divisions, or plus or minus one division for devices with less than 10 000 scale divisions.</p>			
<p>S.3. Interlocks and Gate Control.</p> <p>S.3.1. Gate Position. - Provision shall be made to clearly indicate to the operator the position of the gates leading directly to and from the weigh hopper.</p>			
<p>S.3.2. Interlocks. - Each automatic bulk weighing system shall have operating interlocks to provide for the following:</p> <p>(a) Product cannot be cycled and weighed if the weight recording element is disconnected or subjected to a power loss. (b) The recording element cannot print a weight if either of the gates leading directly to or from the weigh hopper is open. (c) A "low paper" sensor, when provided, is activated. (d) The system will operate only in the proper sequence in all modes of operation. (e) When an overflow alarm is activated, the system shall indicate and record an overflow condition.</p>			
<p>S.3.3. Overflow Sensor.</p> <p>(a) The weigh hopper shall be equipped with an overflow sensor which will cause the feed gate to close, activate an alarm, and inhibit weighing until the overflow condition has been corrected. (b) <i>If the system is equipped with a lower garner or surge bin, that garner shall also be equipped with an overflow sensor which will cause the gate of the weigh hopper to remain open, activate an alarm, and inhibit weighing until the overflow condition has been corrected.</i></p>			
<p>S.4. Design of Weighing Elements.</p> <p>S.4.1. Antifriction Means. - At all points at which a live part of the mechanism may come into contact with another part in the course of normal usage, frictional effects shall be reduced to a minimum by means of suitable antifriction means, opposing surfaces and points being properly shaped, finished, and hardened.</p>			
<p>S.4.2. Adjustable Components. - An adjustable component, such as a potentiometer, shall be held securely in adjustment and, except for a component for adjusting level or a no-load reference value, shall not be adjustable from the outside of the device.</p>			

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<p>S.4.3. Multiple Load-Receiving Elements. - A system with a single indicating or recording element, or a combination indicating recording element, that is coupled to two or more load-receiving elements with independent weighing systems, shall be provided with means to prohibit the activation of any load-receiving element (or elements) not in use, and shall be provided with automatic means to indicate clearly and definitely which load-receiving element (or elements) is in use.</p>			
<p>S.4.4. Venting. - All weighing systems shall be vented so that any internal or external pressure will not affect the accuracy or operation of the system.</p>			
<p>S.5. Marking Requirements.</p> <p>S.5.1. Capacity and Value of the Scale Division. - The capacity of the weighing system and the value of the scale division shall be clearly and conspicuously marked on the indicating element near the weight value indications.</p>			
<p>S.5.2. Weighing Elements. - On a weighing element not permanently attached to an indicating element, there shall be clearly and permanently marked for the purposes of identification, the name, initials, or trademark of the manufacturer, the manufacturer's designation that positively identifies the pattern or design, and the nominal capacity.</p>			
<p>S.5.3. Temperature Limits. - Unless the temperature range is -10 °C to +40 °C (14 °F to 104 °F), the temperature range shall be marked on the device.</p>			
<p>S.5.4. Accuracy Class.</p> <p>(a) All systems used to weigh grain shall be marked Class III. (b) All other systems shall be marked either Class III or III L.</p>			
<p>N. Notes.</p> <p>N.1. Testing Procedures.</p> <p>N.1.1. Test Weights. - The increasing load test shall be conducted using test weights equal to at least 10 percent of the capacity of the system:</p> <p>(a) on automatic grain bulk-weighing systems installed after January 1, 1984, and (b) on other automatic bulk-weighing systems installed after January 1, 1986.</p>			
<p>N.1.2. Increasing-Load Test. - An increasing-load test consisting of substitution and strain-load tests shall be conducted up to the used capacity of the weighing system.</p>			
<p>N.1.3. Decreasing-Load Test. - A decreasing-load test shall be conducted on devices used to weigh out.</p>			
<p>N.1.4. Zero-Balance or No-Load Reference Value Change Test. - A test for change of zero-balance or no-load reference value shall be conducted on all scales after the removal of any test load. The change shall not be more than the minimum tolerance applicable.</p>			
<p>N.1.5. Discrimination Test. - A discrimination test shall be conducted on all automatic indicating scales with the weighing device in equilibrium at zero-load and at maximum test load, and under controlled conditions in which environmental factors are reduced to the extent that they will not affect the results obtained.</p>			

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N.1.5.1. Digital Device. - On a digital device, this test is conducted from just below the lower edge of the zone of uncertainty for increasing-load tests, or from just above the upper edge of the zone of uncertainty for decreasing-load tests.			
N.2. Verification (Testing) Standards. - Standard weights and masses used in verifying weighing devices shall comply with requirements of National Institute of Standards and Technology Handbook 105-1 (Class F) or the tolerances expressed in Appendix A, Fundamental Considerations, paragraph 3.2. (i.e., one-third of the smallest tolerance applied).			
T. Tolerances.			
T.1. Tolerance Application. - Tolerance values shall be applied to all indications and recorded representations of a weighing system.			
T.1.1. To Errors of Underregistration and Overregistration. - The tolerances hereinafter prescribed shall be applied equally to errors of underregistration and errors of overregistration.			
T.1.2. To Increasing-Load Tests. - Basic tolerances shall be applied.			
T.1.3. To Decreasing-Load Tests. - Basic tolerances shall be applied to systems used to weigh out.			
T.1.4. To Tests Involving Digital Indications or Representations. - To the tolerances that would otherwise be applied, there shall be added an amount equal to one-half the value of the scale division. This does not apply to digital indications or recorded representations that have been corrected for rounding using error weights.			
T.2. Minimum Tolerance Values. - The minimum tolerance value shall not be less than half the value of the scale division.			
T.2.1. For Systems Used to Weigh Construction Materials. - The minimum maintenance and acceptance tolerance shall be 0.1 percent of the weighing capacity of the system, or the value of the scale division, whichever is less.			
T.3. Basic Tolerance Values.			
T.3.1. Acceptance Tolerance. - The basic acceptance tolerance shall be one-half the basic maintenance tolerance.			
T.3.2. For Systems Used to Weigh Grain. - The basic maintenance tolerance shall be 0.1 percent of test load.			
T.3.3. For all Other Systems. - The basic maintenance tolerance shall be 0.2 percent of test load.			
T.4. Time Dependence. - <i>At constant test conditions, the indication 20 seconds after the application of a load and the indication after 1 hour shall not differ by more than the absolute value of the applicable tolerance for the applied load.</i>			

