Section 2.22. Automatic Bulk Weighing Systems[1]

A. Application

A.1. General. – This code applies to ~~automatic bulk~~ weighing systems, ~~that is, weighing systems~~ capable of ~~adapted to the automatic~~ automatically weighing ~~of a commodity in~~ successive drafts of a commodity without operator intervention. ~~predetermined amounts automatically recording the no-load and loaded weight values and accumulating the net weight of each draft~~.

(Amended 1987)

S. Specifications

S.1. Design of Indicating and Recording Elements and Recorded Representations.

S.1.1. Zero Indication. – ~~Provisions~~ An automatic bulk weighing system 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.

S.1.5. Recording Sequence. – ~~Provision~~ An automatic bulk weighing system shall ~~be made so that~~ indicate all weight values ~~are indicated~~ until ~~the completion of the~~ recording of the indicated value is completed.

S.1.7. No Load Reference Values. – An automatic bulk weighing system shall indicate and record weight values with no load in the load-receiving element. No load reference values must be recorded at a point in time when there is no product flow into or out of the load receiving element. Systems may be designed to stop operating if a no load reference value falls outside of user designated parameters. If this feature is designed into the system then the no load reference value indicated when the system is stopped must be recorded, an alarm must activate, weighing must be inhibited, and some type of operator intervention must be required to restart the system after it is stopped.

S.1.8. Loaded Weight Values. – An automatic bulk weighing system shall indicate and record loaded weight values for each weighment.

S.1.9. Net Weight Values. – An automatic bulk weighing system shall calculate and record net weight for each weighment.

S.1.10. Net Weight Accumulation. – An automatic bulk weighing system shall accumulate and record the sum of all net weight values for all weighments performed during a weighing process.

S.3. Interlocks and ~~Gate Control~~ Product Flow Control.

S.3.1. ~~Gate Position~~ Product Flow Control. – ~~Provision~~ An automatic bulk weighing system shall ~~be made to~~ clearly indicate to the operator product flow status ~~the position of the gates leading directly~~ to and from the ~~weigh hopper~~ load receiving element. Many types of equipment can be used to control the flow of product into and out of a load receiving element automatically including but not limited to gates, conveyors, augers, robots, pipes, tubes, elevators, buckets, etc.

S.3.2. Interlocks. – Each automatic bulk weighing system shall have operating interlocks to provide for the following:

(a) Product cannot be cycled and weighed if the weight recording element is disconnected or subjected to a power loss.

(b) The recording element can only ~~cannot print~~ record a weight if ~~either of the gates~~ equipment controlling product flow to or from the load-receiving element is in a condition which prevents product entering or leaving the load receiving element. ~~leading directly to or from the weigh hopper is open.~~

S.3.3. Overfill ~~Sensor~~ And Interference Detection.

(a) An automatic bulk weighing system must have a means to detect when ~~The~~ the ~~weigh hopper~~ load-receiving element ~~shall be equipped with an~~ is overfilled. When an overfill condition exists ~~sensor which will cause the feed~~ product flow to the load receiving element must be stopped, ~~gate to close~~ an alarm must activate, ~~activate an alarm, and inhibit~~ weighing must be inhibited until the overfill condition has been corrected, and some type of operator intervention must be required to restart the system. An alarm could be many things including a flashing light, siren, horn, flashing computer screen, etc. The intent of an alarm is to make the operator aware there is a problem which needs corrected.

(Added 1993)

(b) ~~If the system is equipped with a~~ Downstream storage devices and other equipment, permanent or temporary, ~~lower garner or surge bin, that garner~~ ~~shall also~~ which have the potential to interfere with weighment when overfilled or not functioning properly must have a means to prevent interference. When interference exist the system must stop, an alarm must activate, product flow must stop, weighing must be inhibited until the interference has been corrected, and some type of operator intervention is required to restart the system. ~~be equipped with an overfill sensor which will cause the gate of the weigh hopper to remain open, activate an alarm, and inhibit weighing until the overfill condition has been corrected.~~

[Nonretroactive as of January 1, 1998]

(Amended 1997)

N. Notes

N.1. Testing Procedures.

N.1.1. Test Weights. – The increasing load test shall be conducted using test weights equal to at least 10 % of the capacity of the system:

(a) on automatic ~~grain~~ bulk~~-~~ weighing systems installed after January 1, 1984 used to weigh grain; and

UR.4. System Modification. – Components of ~~The~~ the automatic bulk weighing system, shall not be modified except when the modification has been approved by a competent engineering authority, preferably that of the engineering department of the manufacturer of the scale, and the official with statutory authority having jurisdiction over the scale.

1. (Amended 1991)

Appendix D. Definitions

alarm. – A device that signals, warns or alerts an operator of a possible problem with the functioning of a weighing or measuring device and its' associated equipment (e.g. a flashing light, siren, horn, flashing computer screen, etc.). [2.22]

automatic bulk weighing system. – A weighing system capable of automatically ~~adapted to the automatic~~ weighing ~~of bulk~~ successive drafts of a commodity without operator intervention. ~~commodities in successive drafts of predetermined amounts, automatically recording the no-load and loaded weight values and accumulating the net weight of each draft.~~ [2.22]

operator. – The person controlling a weighing or measuring device and its' associated equipment. [2.22]

Notes for the Proposed Changes

The wording “automatic bulk weighing systems” should not be used in the definition of the same.

The no load and loaded weight recordings are important, but they are specifications and should not be included in the application code. They are therefore included in the specifications section.

Operator intervention could be many things. Some examples include but are not limited to pushing a reset button, turning power off then back on, typing a password, or entering a statement into a system log. The intent with including the term “human intervention” is to not include all systems which have a high degree of automation, only the ones that cycle repeatedly and can potentially operate without anyone present to observe weighing malfunctions.

There are many types of load receiving elements that will work with an automatic bulk weighing system to include but not limited to tanks and hoppers so the previous language referring to hoppers was removed and replaced with the generic but accurate term “load receiving element”.

The old language implied separate sensors (e.g. bindicators) were required. Newer systems have already bypassed the use of separate sensors and utilize the weight indications to identify an overfilled condition, similar to how the indications are used to regulate product flow into the load receiving element for some devices. Concerns for this approach have been raised for situations when an indicator is not functioning properly. That is a legitimate concern, but my reply then is: What is the backup for an indicator not indicating properly on any other type of device? This is something we know happens with other devices and commonly may not be detected until a device inspection and test is completed. Thus one reason routine inspections and testing are required.

Many types of equipment can be used to control the flow of product into and out of a load receiving element automatically including but not limited to gates, conveyors, augers, robots, pipes, tubes, elevators, and buckets. Examples would be a conveyer delivering product – in such a case the recording element should not record if the conveyer is still moving or in the case of a pneumatic transfer tube the recording element should not record if the blower forcing air through the tube is still operating. Therefore the old language referring to gates was removed and replace with more generic terminology which can be applied to any equipment used to control product flow not just gates.

Many types of equipment can be used for downstream commodity storage including but not limited to hoppers, tanks, bins, flat storage, trucks, totes, rail cars and pits.

A downstream storage device itself may not interfere with the weighing process directly, but it also cannot create a situation in which an overfill condition or some other malfunction of the equipment interferes with the weighing process. An example would be a grain storage hopper located under a weigh hopper in a position which when grain is mounded up above the storage hopper the grain touches the bottom of the weigh hopper and interferes with the weighing process. For this example if the storage hopper can be lowered far enough below the weigh hopper so that the mounded grain when it reaches its’ maximum potential height cannot touch the weigh hopper then it would not need the capability to detect an overfill condition. The same scenario would apply to a truck parked under the load receiving element, or a conveyer under the load receiving element.

“Automatic grain bulk-weighing systems” is not a recognized type of device and so that wording was changed to refer to automatic bulk weighing systems used to weigh grain.

Most automatic bulk weighing systems have components which are not part of an NTEP’ed device but yet are necessary to make the system functional. Examples include product storage bins, conveyance equipment, further processing equipment (seed treatment drum, etc.), noncommercial weighing/measuring components used for roduction controls, and dust collection systems. An evaluation must be made on a case by case basis to determine if any of the supplemental components affect the metrological functions.

Other suggestions for improvement would be to define “weighing process”