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Section 4.42. Farm Milk Tanks

A. Application

A.1. General. – This code applies to farm milk tanks on the premises of producers when these are used, or are to be used, for the commercial measurement of milk.

A.2. Exceptions. – This code does not apply to tanks mounted on highway vehicles.

A.3. Additional Code Requirements. – In addition to the requirements of this code, Farm Milk Tanks shall meet the requirements of Section 1.10. General Code.

S. Specifications

S.1. Components. – A farm milk tank, whether stationary or portable, shall be considered suitable for commercial use only when it comprises:

- (a) a vessel, whether or not it is equipped with means for cooling its contents;
- (b) a means for reading the level of liquid in the tank, such as a removable gauge rod or surface gauge; and
- (c) a chart for converting level-of-liquid readings to volume.

Each compartment of a subdivided tank shall, for the purposes of this code, be construed to be a farm milk tank.

S.2. Design of Tank.

S.2.1. Level. – A farm milk tank shall be designed to be in normal operating position when it is in level. The tank shall be so constructed that it will maintain its condition of level under all normal conditions of lading.

S.2.2. Level-Indicating Means. – A tank shall be permanently equipped with sensitive means by which the level of the tank can be determined.

S.2.2.1. On a Stationary Tank. – A stationary tank shall be provided with such level-indicating means as a two-way or circular level, a plumb bob, two-way leveling lugs, or the like; or the top edge or edges of the tank shall be so constructed throughout as to provide an accurate reference for level determinations; provided, that when leveling lugs or the top edge or edges of the tank are used as the reference for level determinations, there shall be supplied with the tank a sensitive spirit level of appropriate dimensions, and the positions where such level is intended to be used shall be permanently marked on the reference surface of the tank; and provided further, that when leveling lugs are used they shall be so designed, constructed, and installed at the factory that any alteration of the original position or condition, such as by hammering or filing, would be difficult and would become obvious. A stationary tank with a nominal capacity of 2 000 L or 500 gal, or greater shall be provided with at least two similar level-indicating means, and these shall be located in opposite and distant positions from each other to facilitate an accurate level determination in both directions of the tank's horizontal plane.

(Amended 1980)

S.2.2.2. On a Portable Tank. – A portable tank shall be provided with either a two-way or a circular level.

S.2.3. Portable Tank. – A portable tank shall be of the center-reading type; that is, it shall be so designed that the gauge rod or surface gauge, when properly positioned for use, will be approximately in the vertical axis of the tank, centrally positioned with respect to the tank walls.

S.2.4. Capacity. – *A farm milk tank shall be clearly and permanently marked on a surface visible after installation with its capacity as determined by the manufacturer. The capacity shall not exceed an amount that can be agitated without overflowing and that can be measured accurately with the liquid at rest.*
[Nonretroactive as of January 1, 1979]

S.3. Design of Indicating Means.

S.3.1. General. – *A tank shall include indicating means and shall be calibrated over the entire range of the volume of the tank from 5 % of capacity or 2 m³ (500 gal) whichever is less, to its maximum capacity.*
[Nonretroactive as of January 1, 1986]
(Added 1985)

S.3.2. Gauge-Rod Bracket or Supports. – If a tank is designed for use with a gauge rod, a substantial and rigid gauge-rod bracket or other suitable supporting elements for positioning the gauge rod shall be provided. A gauge rod and its brackets or other supporting elements shall be so constructed that, whenever the rod is placed in engagement with the bracket or supports and released, the rod will automatically seat itself at a fixed height and in a vertical position. When a gauge rod is properly seated on its brackets or supports, there shall be a clearance of at least 7.5 cm (3 in) between the graduated face of the rod and any tank wall or other surface that it faces.

S.3.3. Gauge Rod. – When properly seated in position, a rod shall not touch the bottom of the tank unless this is required by the design of the supporting elements. The rod shall be graduated throughout an interval corresponding to the volume range within which readings of liquid level are to be made.

S.3.4. Surface-Gauge Bracket or Supports. – If a tank is designed for use with a surface gauge, a substantial and rigid surface-gauge bracket or other suitable supporting elements for positioning the surface gauge shall be provided. A surface gauge and its brackets or other supporting elements shall be so constructed that, whenever the gauge assembly is placed in engagement with the bracket or supports, the indicator, if not permanently mounted on the tank, will automatically seat itself in correct operating position, and the graduated element will be vertically positioned and will be securely held at any height to which it may be manually set.

S.3.5. Surface Gauge. – When properly engaged with its bracket and set to its lowest position, a surface gauge shall not touch the bottom of the tank. The gauge shall be graduated throughout an interval corresponding to the volume range within which readings of liquid level are to be made.

S.3.6. External Gauge Assemblies.

S.3.6.1. Design and Installation. – The gauge assembly shall be designed to meet sanitary requirements and shall be readily accessible for cleaning purposes. The gauge assembly shall be mounted in a vertical position and equipped with a sliding mechanism to assist in determining the liquid level.

S.3.6.2. Gauge Tube. – The gauge tube shall be borosilicate glass or approved rigid plastic or rigidly supported flexible tubing with a uniform internal diameter not less than 2 cm (¾ in). It shall be designed and constructed so that all product in the gauge can be discarded in such a manner that no product in the gauge tube will enter the discharge line or tank.
(Amended 1983)

S.3.6.3. Scale Plate. – The scale plate shall be mounted adjacent to and parallel with the gauge tube and be no more than 7 mm (¼ in) from the tube.

S.3.6.4. Scale Graduations. – The graduation lines shall be clear and easily readable and shall comply with the requirements of paragraphs included under S.3.7. Graduations.

S.3.6.5. Venting. – An external gauge tube shall be adequately vented at the top, open to the atmosphere. Any attachment to the gauge tube shall not adversely affect the operation of this vent.

(Added 1984)

(Added 1977)

S.3.7. Graduations.

S.3.7.1. Spacing and Width of Graduations. – On a gauge rod or surface gauge, the spacing of the graduations, center to center, shall be not more than 1.6 mm (0.0625 in or $\frac{1}{16}$ in) and shall not be less than 0.8 mm (0.03125 in or $\frac{1}{32}$ in). The graduations shall not be less than 0.12 mm (0.005 in) in width, and the clear interval between adjacent edges of successive graduations shall be not less than 0.4 mm (0.015625 in or $\frac{1}{64}$ in).

S.3.7.2. Values of Graduations. – On a gauge rod or surface gauge, the graduations may be designated in inches or in centimeters and fractions thereof, or may be identified in a numerical series without reference to inches or centimeters or fractions thereof. In either case, a volume chart shall be provided for each such rod or gauge and each tank with which it is associated, showing values in terms of the graduation on the rod or gauge. If a rod or gauge is associated with but one tank, in lieu of linear or numerical series graduations and volume chart, values in terms of volume of liquid in the tank may be shown directly on the rod or gauge.

S.3.7.3. Value of Graduated Interval. – The value of a graduated interval on a gauge rod or surface gauge (exclusive on the interval from the bottom of the tank to the lowest graduation) shall not exceed:

- (a) 2 L for a tank of a nominal capacity of 1000 L or less; $\frac{1}{2}$ gal for a tank of a nominal capacity of 250 gal or less;
- (b) 4 L for a tank of a nominal capacity of 1001 L to 2000 L, inclusive; 1 gal for a tank of a nominal capacity of 251 gal to 500 gal, inclusive;
- (c) 6 L for a tank of a nominal capacity of 2001 L to 6000 L, inclusive; $1\frac{1}{2}$ gal for a tank of a nominal capacity of 501 gal to 1500 gal, inclusive;
- (d) 8 L for a tank of a nominal capacity of 6001 L to 10 000 L, inclusive; 2 gal for a tank of a nominal capacity of 1501 gal to 2500 gal, inclusive; or
- (e) 8 L plus 4 L for each additional 10 000 L or fraction thereof, for tanks of nominal capacity above 10 000 L or 2 gal plus 1 gal for each additional 2500 gal or fraction thereof, for tanks with nominal capacity above 2500 gal.

(Amended 1980)

S.3.8. Design of Indicating Means on Tanks with a Capacity Greater than 8000 Liters or 2000 Gallons. – Any farm milk tank with a capacity greater than 8000 L, or 2000 gal, shall be equipped with an external gauge assembly.

[Nonretroactive and applicable only to tanks manufactured after January 1, 1981]

(Added 1980)

S.4. Design of Volume Chart.

S.4.1. General. – A volume chart shall show volume values only, *over the entire range of the volume of the tank from 5 % of capacity or 2 m³ (500 gal) whichever is less, to its maximum capacity.** All letters and figures on the chart shall be distinct and easily readable. The chart shall be substantially constructed, and the face of the chart shall be so protected that its lettering and figures will not tend easily to become obliterated or illegible.

*[*Nonretroactive as of January 1, 1986]*

(Amended 1985)

S.4.2. For a Tank of 1 000 Liters, or 250 Gallons, or Less. – The volume chart for a tank of nominal capacity of 1000 L, or 250 gal, or less shall show values at least to the nearest 1 L, or ¼ gal.

S.4.3. For a Tank of 1 001 Liters to 2000 Liters, or 251 to 500 Gallons. – The volume chart for a tank of nominal capacity of 1001 L to 2000 L, or 251 gal to 500 gal, inclusive, shall show values at least to the nearest 2 L, or ½ gal.

S.4.4. For a Tank of Greater than 2000 Liters, or 500 Gallons. – The volume chart for a tank of nominal capacity of greater than 2000 L, or 500 gal, shall show values at least to the nearest gallon, or 4 L.

(Amended 1980)

S.5. Gauging.

S.5.1. Level. – A farm milk tank shall be level, as shown by the level-indicating means, during the original gauging operation.

S.5.2. To Deliver. – A farm milk tank shall be originally gauged “to deliver.” If the tank is gauged by measuring the test liquid into the tank, the inside tank walls shall first be thoroughly wetted and the tank shall then be drained for 30 seconds after the main drainage flow has ceased.

S.5.3. Preparation of Volume Chart. – When a tank is gauged for the purposes of preparing a volume chart, tolerances are not applicable, and the chart shall be prepared as accurately as practicable.

S.6. Identification. – A tank and any gauge rod, surface gauge, spirit level, and volume chart intended to be used therewith shall be mutually identified, as by a common serial number, in a prominent and permanent manner.

N. Notes

N.1. Test Liquid. – Water shall be used as the test liquid for a farm milk tank.

N.2. Evaporation and Volume Change. – Care shall be exercised to reduce to a minimum, evaporation losses and volume changes resulting from changes in temperature of the test liquid.

N.3. To Deliver. – A farm milk tank shall be tested “to deliver.” If the tank is gauged by measuring the test liquid delivered into the tank, the inside tank walls shall first be thoroughly wetted and the tank then shall be drained for 30 seconds after the main drainage flow has ceased.

N.4. Level. – A farm milk tank shall be level, as shown by the level-indicating means, during gauging and testing.

N.5. Test Methods. – Acceptance tests of milk tanks may be of either the prover method or the master meter method provided that the master metering system is capable of operating within 25 % of the applicable tolerance found in T.3. Basic Tolerance Values. Subsequent tests may be of either the prover method or the master meter method provided that the master metering system is capable of operating within 25 % of the applicable tolerance found in T.4. Basic Tolerance Values, Master Meter Method.

N.5.1. Verification of Master Metering Systems. – A master metering system used to gauge a milk tank shall be verified before and after the gauging process. A master metering system used to calibrate a milk tank shall be verified before starting the calibration and re-verified at least every quarter of the tank capacity, or every 2000 L (500 gal), whichever is greater. The above process of re-verifying the master metering system may be waived if

the system is verified using a NIST traceable prover with a minimum of two tests immediately before and one test immediately after the gauging process and that each test result is within 25 % of T.3. Basic Tolerance Values. (Added 2001) (Amended 2012)

N.5.2. Temperature Changes in Water Supply. – When using a master metering system to gauge or calibrate a milk tank, the official shall monitor the temperature of the water before and after changing sources of supply. If the water temperature of the new source changes by more than 2.8 °C (5 °F) from the previous supply, the official shall re-verify the accuracy of the master metering system as soon as possible after the system reaches temperature equilibrium with the new supply source. (Added 2001)

N.6. Reading the Meniscus. – When a reading or setting is to be obtained from a meniscus formed by milk or other opaque liquid, the index or reading line is the position of the highest point of the center of the meniscus. When calibrating a device with water and the device is to be used with an opaque liquid, the reading should be obtained accordingly; that is, the position of the highest point of the center of the meniscus. (Added 1984)

T. Tolerances

T.1. Application. – The tolerances hereinafter prescribed shall be applied equally to errors in excess and errors in deficiency.

T.2. Minimum Tolerance Values. – On a particular tank, the maintenance and acceptance tolerance applied shall be not smaller than the volume corresponding to the graduated interval at the point of test draft on the indicating means or 2 L (½ gal), whichever is greater. (Amended 1980)

T.3. Basic Tolerance Values. – The basic maintenance and acceptance tolerance shall be 0.2 % of the volume of test liquid in the tank at each test draft. (Amended 1975)

T.4. Basic Tolerance Values, Master Meter Method. – The basic maintenance and acceptance tolerance for tanks tested by the master meter method shall be 0.4 % of the volume of test liquid in the tank at each test draft. (Added 1975)

UR. User Requirements

UR.1. Installation. – A stationary tank shall be rigidly installed in level without the use of removable blocks or shims under the legs. If such tank is not mounted permanently in position, the correct position on the floor for each leg shall be clearly and permanently defined.

UR.2. Level Condition.

UR.2.1. Stationary Tank. – A stationary farm milk tank shall be maintained in level.

UR.2.1.1. Leveling Lugs. – If leveling lugs are provided on a stationary tank, such lugs shall not be hammered or filed to establish or change a level condition of the tank.

UR.2.2. Portable Tank. – On a portable tank, measurement readings shall be made only when the tank is approximately level; that is, when it is not out of level by more than 5 % or approximately three degrees in any direction.

UR.3. Weight Chart. – An auxiliary weight chart may be provided, on which shall be prominently displayed the weight per unit volume value used to derive the weight values from the official volume chart.

UR.4. Use. – A farm milk tank shall not be used to measure quantities greater than an amount that can be agitated without overflowing.