

Milk Meter Tolerance Task Group

2021 NCWM Annual Meeting

July 19, 2021

Hyatt Regency

Rochester, NY

Thank you to the hard work of the members: Jim Willis (NY), Mitchell Marsalis (LA), Jeff Cambeis (CA), Diane Lee (NIST), Mike Manheim (NTEP), Luciano Burtini (Measurement Canada), Leigh Hamilton (Piper Systems), Carey McMahon (Poul-Tarp), Bob Fradette (Agri-Mark), Brandon Meiwes (Dairy Farmers of America)

The Milk Meter Tolerance Task Group thanks Jim Willis, Bob Fradette, Leigh Hamilton, Jonathan Eriksen (Piper Systems), and Sara Gillette (Upstate Niagara Cooperative) for coordinating the field trip on Friday July 16th. Thank you to John Lamb and Lamb Farms, River Ridge Dairy LLC, and Doug and Penny Bratt for allowing the group to visit their Dairy Farms. Thank you to Shawn for demonstrating the tanker mounted system along his route.

At the 2021 NCWM Interim meeting the task group proposed the following amendment to VTM 20-2:

3.31 Vehicle Tank Meters

T.2. Tolerance Values. – Tolerances shall be as shown in Table 1. Accuracy Classes and Tolerances for Vehicle-Tank Meters Other Than Vehicle-Mounted Milk Meters and Table 2. Tolerances for Vehicle-Mounted Milk Meters. (Amended 1995, 20XX)

| Table 2. Tolerances for Vehicle-Mounted Milk Meters | | |
|--|---|---|
| Indication (gallons) | Maintenance Tolerance (gallons) | Acceptance Tolerance (gallons) |
| 100 | 0.5 | 0.3 |
| 200 | 0.7 | 0.4 |
| 300 | 0.9 | 0.5 |
| 400 | 1.1 | 0.6 |
| 500 | 1.3 | 0.7 |
| Over 500 | Add 0.002 gallon per indicated gallon over 500 | Add 0.001 gallon per indicated gallon over 500 |

(Added 1989)

| Table 2. Tolerances for Vehicle-Mounted Milk Meters | | |
|--|-----------------------------|------------------------------|
| Indication (gallons) | Acceptance Tolerance | Maintenance Tolerance |
| Complete Measuring System | 0.5% | 0.5% |
| Meter Only | 0.3% | 0.3% |

(Amended 20XX)

The basis for these tolerance comes from the current tolerances in OIML R117.

The task group met on July 1, 2021 via Zoom video Conferencing to discuss the planned field trip on July 16, 2021, the amended proposal submitted in January, and briefly talk about the request to expand the scope of the task group. Some of the members attended an invitation only field trip (for proprietary protection) on July 16th to witness the operation of a Piper System Direct Load AccuStream system and a DynaStream tanker mounted system in operation.

On July 18th the task group met at the NCWM 2021 Annual Conference in a hybrid meeting setting to discuss the amended proposal submitted in January and as published in the corresponding NCWM 2021 Publication 16. The task group was joined by Loren Minnich (KS) and Allen Katalinic (NCWM) as observers and received worthy comments from these two gentlemen. The group felt the amended proposal should remain as submitted for discussion and vote by the members of the NCWM. Discussions were held on the necessity of the tolerance for the meter itself and a separate tolerance for the system as whole. The conclusion of the group that the separate tolerance for a stand-alone meter was to allow for a tolerance of the meter by itself in an NTEP testing environment. I would also give a tolerance for isolating the meter if in the future a technology is developed where a meter and the associated components are capable of being assembled from different manufacturers and suppliers. When discussing the value of the tolerance, the following points were addressed:

1. Performing an air eliminator test during a field examination is impractical due to the challenges of cycling the milk through the system multiple times. This prevents the determination of the source of an error reading during an inspection whether it's the meter, the air eliminator or another component. Hence a tolerance has to be created to evaluate the performance of the entire system.
2. At the current time, of the 4 active NTEP certificates of conformance issued to meters measuring milk, 3 are electromagnetic flow meters and 1 is a mass flow meter. The electromagnetic flow meters are submissions from 2 separate companies and have an advertised factory accuracy rate of 0.2%. The mass flow meter has an advertised factory accuracy rate of 0.25%. NIST Handbook 44 Appendix A **2. Tolerances for Commercial Equipment** states the following:

2.2. Theory of Tolerances. – Tolerance values are so fixed that the permissible errors are sufficiently small that there is no serious injury to either the buyer or the seller of commodities, yet not so small as to make manufacturing or maintenance costs of equipment disproportionately high. Obviously, the manufacturer must know what tolerances his equipment is required to meet, so that he can manufacture economically. His equipment must be good enough to satisfy commercial needs but should not be subject to such stringent tolerance values as to make it unreasonably costly, complicated, or delicate.

Even though some devices have shown the ability to meet the current Handbook 44 tolerances, the current tolerances are such that they are more restrictive than the manufacturers's claim for accuracy can be attained on a consistent basis and is in conflict with Fundamental Considerations

3. The current tolerances for vehicle tank meters measuring milk when converted to a percentage have a decreasing tolerance as the size of the test draft increases.

| Test Draft | MAINTENANCE TOLERANCE | | ACCEPTANCE TOLERANCE | |
|------------|-----------------------|------------|----------------------|------------|
| | Gallons | Percentage | Gallons | Percentage |
| 100 | 0.5 | 0.5% | 0.3 | 0.3% |
| 500 | 1.3 | 0.26% | 0.7 | 0.14% |
| 2700 | 5.7 | 0.21% | 2.9 | 0.11% |
| 5000 | 10.3 | 0.21% | 5.2 | 0.10% |
| 10000 | 20.3 | 0.2% | 10.2 | 0.1% |

The tolerances for milk meters (vehicle mounted, or stationary) are the only tolerances that are decreasing in all of the liquid measuring codes in Handbook 44.

The task group has chosen to submit a tolerance structure that has consistent tolerance at all test drafts.

The task group maintains its request that the scope of the task group be expanded. The goal will be to consolidate all of the codes pertaining to milk meters into one Handbook 44 Code. Since milk is such a unique product and there is no testing medium that is comparable, the task group feels that it is worthy of having its own section in NIST Handbook 44.

A Form 15 addressing the tolerances in Table 1 of Handbook 44 Section 3.35 Milk Meters Code will be submitted for consideration for the 2022 NCWM Annual Meeting cycle.

Respectfully Submitted
Charlie Stutesman (KS)
Chairman, Milk Meter Tolerance Task Group