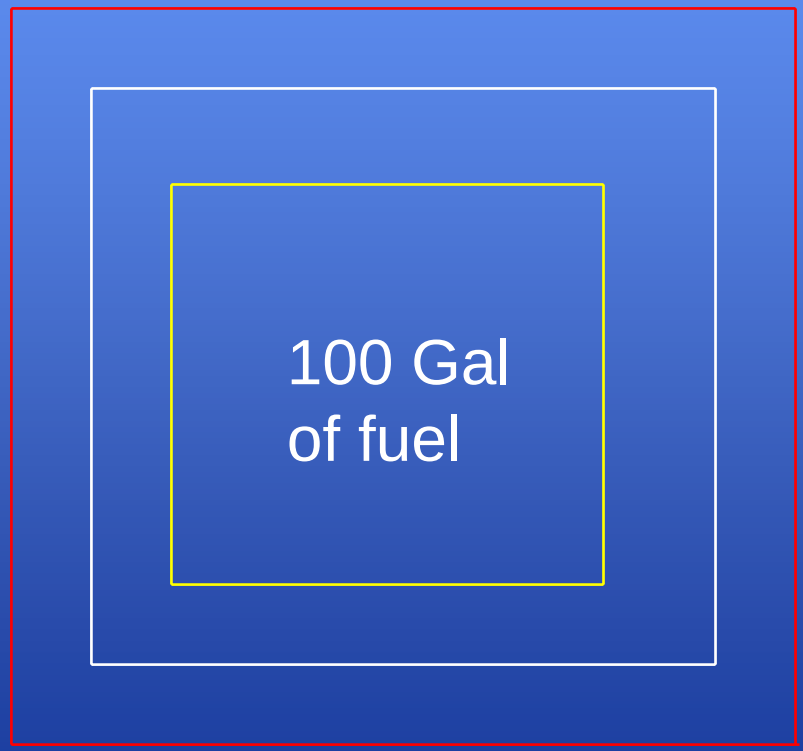
Temperature Compensation

Vehicle-Tank Meters

NIST Short Course

Effect of Temperature Change on Product



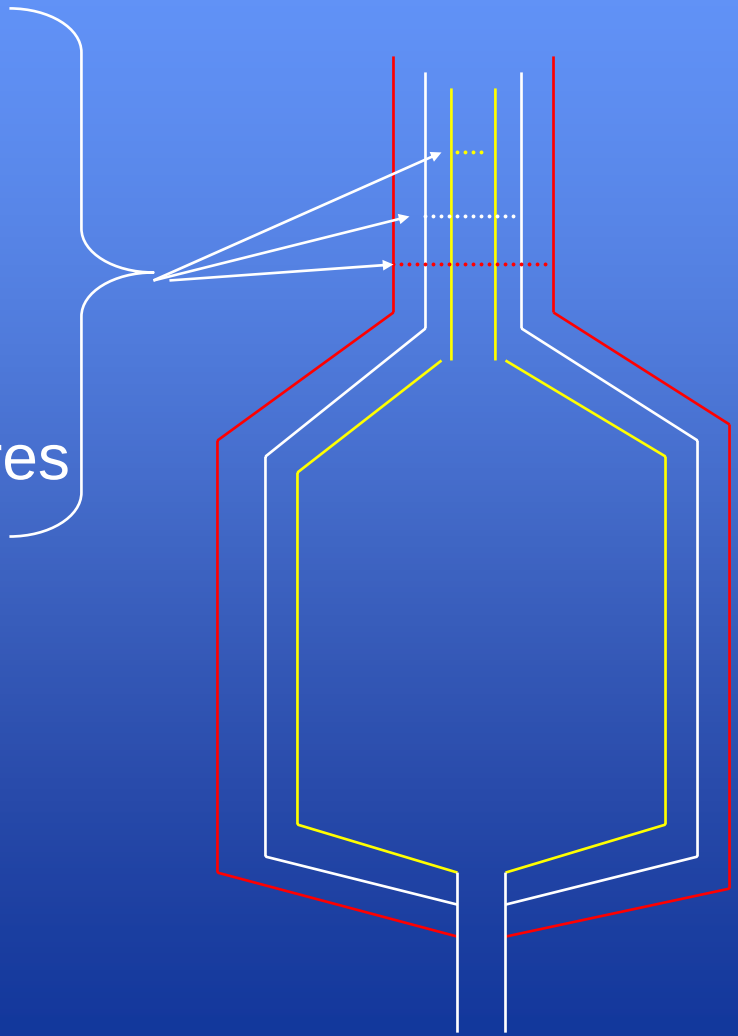
60 °F

40 °F

80 °F

Effect of Temperature Change on Prover

Level of same delivered quantity at different temperatures



60 °F

40 °F

80 °F

Prover Expansion

- Mild Steel Coefficient
  - 0.0000186 / °F
    - Example 80 °F (80 – 60 x 0.0000186 x 100 gal = 8.6 in^3)
- Stainless Steel Coefficient
  - 0.0000265 / °F
    - Example 80 °F (80 – 60 x 0.0000265 x 100 gal = 12 in^3)

N.4.1.1. Automatic Temperature Compensation

N.4.1.1. Automatic Temperature Compensation. - On devices equipped with automatic temperature compensating systems, normal tests shall be conducted as follows:

a) by comparing the compensated volume indicated or recorded to the actual delivered volume corrected to 60°F; and,

b) with the temperature compensating system deactivated, comparing the uncompensated volume indicated or recorded to the actual delivered volume.

The first test shall be performed with the automatic temperature-compensating system operating in the "as found" condition. On devices that indicate or record both the compensated and uncompensated volume for each delivery, the tests in (a) and (b) may be performed as a single test.

(Amended 1987)

T.2.3.5. Auto Temp Comp Systems

T.2.3.5. Automatic Temperature Compensating Systems. - The difference between the meter error (expressed as a percentage) for results determined with and without the automatic temperature-compensating system activated shall not exceed:

a) 0.2 percent for mechanical automatic temperature compensating systems; and

b) 0.1 percent for electronic automatic temperature-compensating systems.

The delivered quantities for each test shall be approximately the same size. The results of each test shall be within applicable acceptance or maintenance tolerance. [Nonretroactive as of Jan , 1988]

(Added 1992) (Amended 1992 and 1996)

ATC Tolerances -- Sample Calculation

Run a 100-gallon test draft with ATC, fast flow

Run a 100-gallon test draft without ATC, fast flow

Electronic ATC; Maintenance Tolerance

Maintenance Tolerance (75 in^3):

ATC Tolerance (Electronic):

max difference is 0.1%

ATC Tolerances -- Sample Calculation (cont.)

Sample Results:

with ATC activated: -46 in^3

without ATC activated: +18 in^3

Difference: -46 in^3 to +18 in^3 = range of 64 in^3

64 in^3 /231 = 0.28 gal

0.28 gal/100 gal = 0.28%

Meets Maintenance Tolerance But…

Exceeds Electronic ATC Tolerance of 0.1%