

# SERVICE BULLETIN

## Meter Calibration

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Test the flowmeter using a volumetric prover large enough to permit the flowmeter to operate for at least one minute at normal flow rate. Slip tube and rotary gauge reading are not sufficiently accurate for proving flowmeters. A detailed description of an LP-Gas test procedure may be found in the National Bureau of Standards Handbook 99, "Testing Liquefied Petroleum Gas Liquid-Measuring Devices". Specifications and Tolerances are contained in NBS Handbook H-44.

A thermometer well is provided for taking temperature readings while calibrating. It is covered by a snap plug to keep dirt from entering the well. When temperature readings are to be obtained, the well must be filled with permanent type antifreeze, or with a light oil.

If a gravimetric test method is used, the conversion to gallons must be on the basis of: (1) specific gravity determined at the time of the test (not an assumed value), and (2) the temperature of the product as it is passed through the flowmeter. The volumetric test method, however, is considered to yield more accurate results and is preferred.

### Procedure for Uncompensated Flowmeters

Test the flowmeter to determine any error in percentage in registration. If error is found, proceed as follows:

1. Determine the percentage of over- or under-delivery for each test conducted.
2. Remove the register screws and take off the register.
3. Note the numbers stamped on the register change gear (on register spindle marked "R" on the adapter plate) and on the stuffing box change gear (or flowmeter spindle marked "S" on the adapter plate). Locate the gear tooth combination on the Change Gear Chart.
4. Add the step-wise increments of change in registration until the desired amount is reached. If the flowmeter is under-registering (delivering too much), select a new pair of gears farther down the chart. If the flowmeter is over-registering (delivering too little), select a new pair of gears farther up the chart.
5. Remove the old change gears and replace them with the new pair. Always place the change gear with the smaller number of teeth on the "R" shaft and the gear with the greater number of teeth on the "S" shaft as indicated on the adapter plate. To remove change gears, close the split end of the spindle slightly with a pair of pliers to permit removal of the change gear. After slipping on the new gear, spread the ends of the spindle slightly.
6. Reinstall the register, run several gallons (liters) through the flowmeter, and retest.

### Procedure for Compensated Flowmeters

1. Remove the two seal screws and cover from the temperature compensator. Do not remove sealing wax at top of lever arm.
2. Move the anchor pin from "Compensated Anchor" to "Uncompensated Anchor". (Flowmeter reading will now be uncompensated.)
3. Test the flowmeter to determine any error in percentage in registration. If necessary to change flowmeter calibration, proceed as follows:
  - a. Determine the percentage of over- or under-delivery for each test conducted.
  - b. Remove the register screws and take off the register.
  - c. Note the numbers stamped on the register change gear (on register spindle marked "R" on the adapter plate) and on the stuffing box change gear (or flowmeter spindle marked "S" on the adapter plate). Locate the gear tooth combination on the Change Gear Chart.
  - d. Add the step-wise increments of change in registration until the desired amount is reached. If the flowmeter is under-registering (delivering too much), select a new pair of gears farther down the chart. If the flowmeter is over-registering (delivering too little), select a new pair of gears farther up the chart.
  - e. Remove the old change gears and replace them with the new pair. Always place the change gear with the smaller number of teeth on the "R" shaft and the gear with the greater number of teeth on the "S" shaft as indicated on the adapter plate. To remove change gears, close the split end of the spindle slightly with a pair of pliers to permit removal of the change gear. After slipping on the new gear, spread the ends of the spindle slightly.
  - f. Reinstall the register, run several gallons (liters) through the flowmeter, and retest.
4. Move anchor pin to "Compensated Anchor", and operate flowmeter at maximum flow rate for at least one minute before proceeding with calibration tests. (Flowmeter readings will now be temperature compensated.)
5. Perform same flowmeter test procedure used for uncompensated flowmeter. Temperature reading must be taken at the prover only. (Temperature at flowmeter is assumed to be 60°F)
6. If necessary to adjust compensated registration, turn calibration dial located on the right side of the lever arm (to turn adjustment, use wrench on hex hub of dial). Turn clockwise "To Give More" or counterclockwise to "To Give Less". Each dial graduation will change compensated delivery approximately 0.15%

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## Change Gear Chart

Gear calibration will be determined by adjusting the high flow result (averaged) to the closest corresponding set of change gears. If possible, adjustment should be made by bracketing the high and low flow tests.

### Example

Meter is under registering (pumping more LPG than is registered). The amount indicated on the register needs to be increased. Starting gears are R=33, S=35. By changing these gears to R=32, S=34, an increase in registration of +.19% is achieved (Difference between -.80% and -.99% is .19%)

Change Gear Combination		% Change in LPG Passed							
"R" Shaft Gear	"S" Shaft Gear	3/4"		1 1/4"		1 1/2"		2"	
		Gallons (43.5)	Liters (11.6 & 116.875)	Gallons	Liters	Gallons	Liters	Gallons	Liters
Decreases Amount Registered (Indicated)									
34	35	2.32%	3.95%			1.06%			
33	34	2.23%	3.86%			0.97%			
32	33	2.14%	3.77%			0.88%			
31	32	2.04%	3.67%			0.77%			
30	31	1.93%	3.56%			0.67%			
29	30	1.81%	3.44%			0.55%			
28	29	1.69%	3.32%			0.43%			
27	28	1.56%	3.19%			0.30%			
26	27	1.42%	3.05%			0.15%			
25	26	1.26%	2.89%			<b>0.00%</b>			
24	25	1.10%	2.73%			-0.17%			
23	24	0.92%	2.55%			-0.35%			
22	23	0.72%	2.35%		1.01%	-0.55%			
21	22	0.50%	2.13%		0.79%	-0.76%		1.12%	
20	21	0.26%	1.89%		0.55%	-1.00%		0.88%	
19	20	<b>0.00%</b>	1.63%		0.29%	-1.26%		0.62%	
18	19	-0.29%	1.34%	2.14%	<b>0.00%</b>			0.33%	
34	36	-0.62%	1.01%	1.81%	-0.33%			<b>0.00%</b>	
33	35	-0.80%	0.83%	1.63%	-0.51%			-0.18%	
32	34	-0.99%	0.64%	1.44%	-0.70%			-0.37%	<b>0.00%</b>
31	33	-1.19%	0.44%	1.24%	-0.90%			-0.57%	
30	32	-1.40%	0.23%	1.03%	-1.11%			-0.78%	
29	31	-1.63%	<b>0.00%</b>	0.80%	-1.34%		<b>0.00%</b>	-1.01%	
28	30	-1.88%	-0.25%	0.55%	-1.59%			-1.26%	
27	29	-2.14%	-0.51%	0.28%	-1.86%				
26	28	-2.43%	-0.80%	<b>0.00%</b>	-2.14%				
25	27	-2.74%	-1.11%	-0.31%					
24	26	-3.07%	-1.44%	-0.64%					
23	25	-3.43%	-1.80%	-1.00%					
22	24	-3.83%	-2.20%	-1.40%					
21	23	-4.26%	-2.63%	-1.83%					
20	22	-4.74%	-3.11%	2.31%					
19	21	-5.26%	-3.63%						
Increases Amount Registered (Indicated)									

