FLUKE®

Calibration

Accounting for gravity when using a deadweight tester or piston gauge

Application Note

To establish pressures using a deadweight tester (DWT) or piston gauge, the user must account for the acceleration of gravity at the location where the instrument is operated. It is important to note that the acceleration of gravity varies substantially around the world. With a range of approximately 0.5%, the local gravity correction is typically the largest environmental influence acting on the deadweight tester.

The most accurate method for the user to determine the acceleration of gravity at the laboratory or other site where the deadweight tester will be used is to have a site survey performed. There are various companies that can provide this type of service. Although this is the most accurate method, it can also be expensive.

To determine the acceleration of local gravity value when a survey or site measurement is unavailable, the resources listed below are available on the Internet.

1. Use one of the following options to determine the latitude, longitude, and elevation at the site the deadweight tester will be used:
   - Obtain latitude and longitude coordinates using a GPS receiver, or
   - Use an Internet-based geo-coding program
     - http://maps.google.com (use "link" button to show Lat-Lon)
     - http://www.getlatlon.com
     - http://mapper.acme.com
     - http://itouchmap.com/latlong.html
2. Enter latitude and longitude coordinates into one of the following internet-based programs:
   - NOAA/NGS web site (limited to the contiguous 48 United States)
     - http://www.ngs.noaa.gov/cgi-bin/grav_pdx.prl
   - PTB (National Metrology Laboratory of Germany) web site (global)
     - http://www.ptb.de/cartoweb3/SISproject.php

For the P3XXX Series Deadweight Testers, customers have two choices. The deadweight tester can be provided matched to standard gravity (9.80665 m/s^2) and the customer can utilize software (such as Fluke Calibration PressCal) to account for the acceleration of local gravity. Or, the deadweight tester can be provided matched to the local gravity value supplied by the customer. This is a service Fluke Calibration offers at no additional charge. In the latter case, customers must provide their local gravity on the purchase order.

For piston gauges, such as the 2400 Series and PG7000 Series, the local gravity must be entered into either the terminal (PG7000 series) or software that will be used for the piston gauge calculation (WinPrompt or COMPASS® for Pressure software).

For customers who do not have a site survey, the methods available on the Internet provide a possible resource for determining the gravity at their location. The uncertainties estimated using this method range from about 0.0002 % up to 0.002 %. Customers should use these at their own discretion to determine if the local gravity provided is suitable for the intended use.

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