

P3800 deadweight tester - Piston drop rate evaluation

(includes P3830, P3840 and P3860 deadweight testers)

Measuring the piston drop rate of a deadweight tester is a better way to evaluate performance rather than trying to do a leak check and measuring a pressure decay rate. Leak checks can be difficult to do because the piston is typically floating and dropping slowly, and some oil leaks from the piston-cylinder interface.

Use a dial gauge (or similar) to measure the drop rate of the piston at full pressure of the deadweight tester. From [DWT Uncertainty Analysis \(Technical Note 2170TN13\)](#), the drop rate specification for P3800 deadweight testers at full pressure is -1.5 mm/min (-0.059 in/min).



P3800 piston is about 2 mm diameter (3.14 mm² area).

As the piston drops, oil leaks from the piston-cylinder interface. The volume of this oil is the area times the drop rate and is 4.7 mm³/min (0.0047 cm³/min or 0.0003 in³/min). Over one hour this is 280 mm³/min (0.3 cm³/min or 0.017 in³/min). This oil collects on “piston nut B” (see Figure 4-1 in the P3800 manual) and will run down the sides of the mounting post and eventually end up on the base plate.

