

Spinesstic 22 Deadweight Gauge Fluid

Application Note

Spinesstic 22 (part number 55-500), the operating fluid utilized for years in Ruska laboratory deadweight gauges, is now obsolete. This fluid was utilized in the Model's 2400, 2450, 2451, 2452, 2453, 2480, 2481, 2492, 5000 and was one of two fluids available for the Model 2485. With the removal of this fluid from the market by Exxon, a series of tests have been conducted to assist users in selecting a compatible replacement fluid. In addition to DOS (Dioctyl Sebacate) which is the second fluid utilized in the Model 2485, we evaluated Shell Spindle Oil 22 as possible replacement fluids. Shell Spindle Oil 22 (also known as ST55) has similar physical properties to Spinesstic 22 and is utilized in other deadweight gauges operated in similar applications.

We first calibrated piston/cylinders in the traditional Spinesstic 22 fluid and then calibrated the same assemblies in ST55. The evaluation was conducted to determine the impact on the sink rate and effective area of the assemblies. This evaluation was separated into two piston/cylinder design types. The first was for the design utilized in the model number's 2400, 2450, 2451, 2452, 2453, 2480, 2481, 2492 and 5000. The second was for the 2485 style piston/cylinders, which have significantly slower sink rate characteristics than the other design assemblies.

Converting a 2400, 2450, 2451, 2452, 2453, 2480, 2481, 2492 or 5000 system operating in Spinesstic 22 to ST55

On the above models, the instruments operated very similarly in ST55 compared to Spinesstic 22. The sink rates were comparable and the results of the crossfloat calibrations performed in both fluids were within the standard deviation of the measurement process. This fluid also mixed well with Spinesstic, therefore, the user of this type of piston gauge could add ST55 to the reservoir holding the existing Spinesstic 22 fluid without impacting their system. ST55 (part number 55-655) is a recommended replacement fluid for these deadweight gauges.

The Model 2485 piston/cylinder assemblies have a very slow sink rate. To maintain the lowest uncertainty, it is recommended to calibrate the piston/cylinder operating in the fluid the instrument will operate. Until the assembly can be calibrated in the new operating fluid, it can operate in either DOS or ST55 using the existing calibration report. An additional 5 ppm uncertainty should be added to the piston/cylinder to account for the different operating fluid.

Converting a 2485 system operating in Spinesstic 22 to DOS

The Model 2485 can also be converted to operate in the DOS fluid. The 2485 operating in DOS provides the highest performance and is the preferred fluid for the 2485. The 2485 exhibits very good sink rate properties operating in DOS. Further, there is minimum impact on the effective area of the piston when operating in DOS. To convert an existing system, the Spinesstic 22 must be completely removed from the base and various seals must be replaced. The base can then be filled with DOS.



Converting a 2485 system operating in Spinesstic 22 to ST55

As a general statement, the 2485 operated acceptably in ST55; however, the sink rate was significantly reduced. On one assembly, the sink rate was approximately six to eight times slower than when it operated in Spinesstic 22. The result was that the performance was slightly degraded when operating at very low pressures. The crossfloat calibration resulted in overall agreement between the two fluids. However, performance at the lower pressure ranges was degraded compared to when the instrument was operated in either DOS or Spinesstic 22.

A primary reason to select ST55 over DOS for a 2485 application would be if the 2485 was primarily used to crossfloat other deadweight gauges that currently operate in Spinesstic 22. The other deadweight gauges will convert to ST55 and it is easier to perform crossfloat calibrations when both deadweight gauges are operated in the same fluid.

The 2485 can easily be converted to operate in the ST55 fluid. Although the ST55 mixes well with the Spinesstic, it would be recommended to replace the Spinesstic 22 in the base with ST55 when converting to the new fluid. Again, the part number of the new ST55 fluid is 55-655.

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