

Standards Used:

Asset	Description	Cal-Date	Due-Date
16670	RUSKA M/S MASS SET OIL XFLOAT	03-Feb-2014	03-Feb-2017
3	RUSKA 2485 MASS SET XFLOAT	30-Aug-2013	30-Aug-2016
3/1	DH INSTRUMENTS WORKING REFERENCE MASS SET	18-Jun-2013	18-Jun-2014
J258	RUSKA 2485-983 PISTON OIL	07-Jan-2011	07-Jan-2015
55865	RUSKA 2455-11-006 PRT	28-Jun-2013	28-Jun-2014
57685	RUSKA 2455-11-006 PRT	04-Dec-2013	04-Dec-2014

Test Description

This Piston-cylinder's effective area was determined by crossfloat comparison with a Fluke Calibration standard at no less than seven pressures in its range. The range tested was from a pressure that is close to its minimum mass load to the approximately expected full scale mass load for that piston-cylinder. The method used for determining effective area is the Direct Ratio method that is explained in the NCSLI RIDSP4 and the Fluke Calibration publication "The Design and Implementation of a Fully Automated Crossfloat System for the Comparison of Piston Gauges in Both Gauge and Absolute Measurement Modes", July 2008.

Uncertainty in the reference effective area was 32.8 ppm.

Uncertainty in reference mass was no worse than ± 3 ppm or 0.5 mg, whichever is greater.

Four hours were allowed for the test instrument temperature to stabilize before commencing the test.

Certificate Number: 1500165434

Date of Calibration: 27 May 2014

<u>PARAMETER</u>	<u>VALUE</u>	<u>UNCERTAINTY</u>
A₀ at 23 °C	2.604375E-02 in ²	9.31E-07 in ² 35.74 ppm
b1	-1.70E-08 /psi	
b2	0.00E+00 /psi ²	
c	9.10E-06 /°C	
Piston Material	WC	
Cylinder Material	WC	
Max Sink Rate	UNOBSERVED in/min	
L1	7.96 in	
Calibration Medium	ST55	
Maximum Pressure Tested:	12019.3 psi	
SN of Weight Table Used:	HC-749 (02)	

<u>Component</u>	<u>Density (lb/in³)</u>	<u>Apparent Mass (8.4) (pound)</u>	<u>Apparent Mass (8.0) (pound)</u>	<u>True Mass (pound)</u>	<u>Uncertainty (pound)</u>
Piston	0.535	0.0577941	0.0577945	0.0577905	
Weight Table	0.282	0.7233819	0.7233870	0.7233898	
Surface Tension	0.031	0.0001501	0.0001501	0.0001503	
Total Tare	0.292	0.7813261	0.7813317	0.7813306	1.10E-06

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<u>PARAMETER</u>	<u>VALUE</u>	<u>UNCERTAINTY</u>
A₀ at 23 °C	1.680239E-05 m ²	6.01E-10 m ² 35.74 ppm
b1	-2.47E-06 /MPa	
b2	0.00E+00 /MPa ²	
c	9.10E-06 /°C	
Piston Material	WC	
Cylinder Material	WC	
Max Sink Rate	UNOBSERVED m/min	
L1	0.2021 m	
Calibration Medium	ST55	
Maximum Pressure Tested:	82.87 MPa	
SN of Weight Table Used:	HC-749 (02)	

<u>Component</u>	<u>Density (g/cc)</u>	<u>Apparent Mass (8.4) (kilogram)</u>	<u>Apparent Mass (8.0) (kilogram)</u>	<u>True Mass (kilogram)</u>	<u>Uncertainty (kilogram)</u>
Piston	14.8	0.0262149	0.0262151	0.0262133	
Weight Table	7.8	0.3281205	0.3281229	0.3281241	
Surface Tension	0.9	0.0000681	0.0000681	0.0000682	
Total Tare	8.1	0.3544036	0.3544061	0.3544056	5.00E-07

	<u>Previous Ae</u>	<u>Difference</u>
	1.680274E-05 m ²	Zero Pressure -20.9 ppm
B1	-2.61E-06 /MPa	Full Scale -8.9 ppm
B2	0.00E+00 /MPa ²	

<u>Previous Mass (8.0)</u>	
0.3544041 kilogram	0.0000020 kilogram