2465 Piston Gauge, Setup the piston-cylinders and mass set in COMPASS for Pressure

This procedure is intended for Fluke Calibration customers trained on use of 2465 Piston Gauge and COMPASS for Pressure Calibration Software.

Purpose

This document instructs how to manually setup the metrological elements of a 2465 Piston Gauge in COMPASS for Pressure.

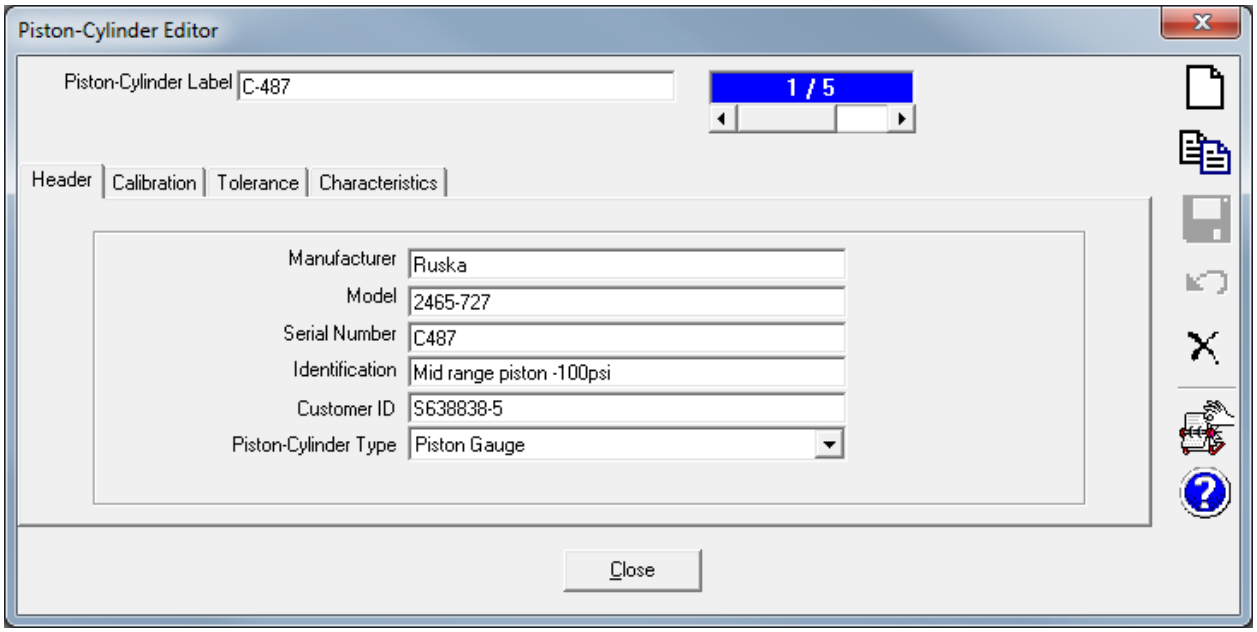
Note

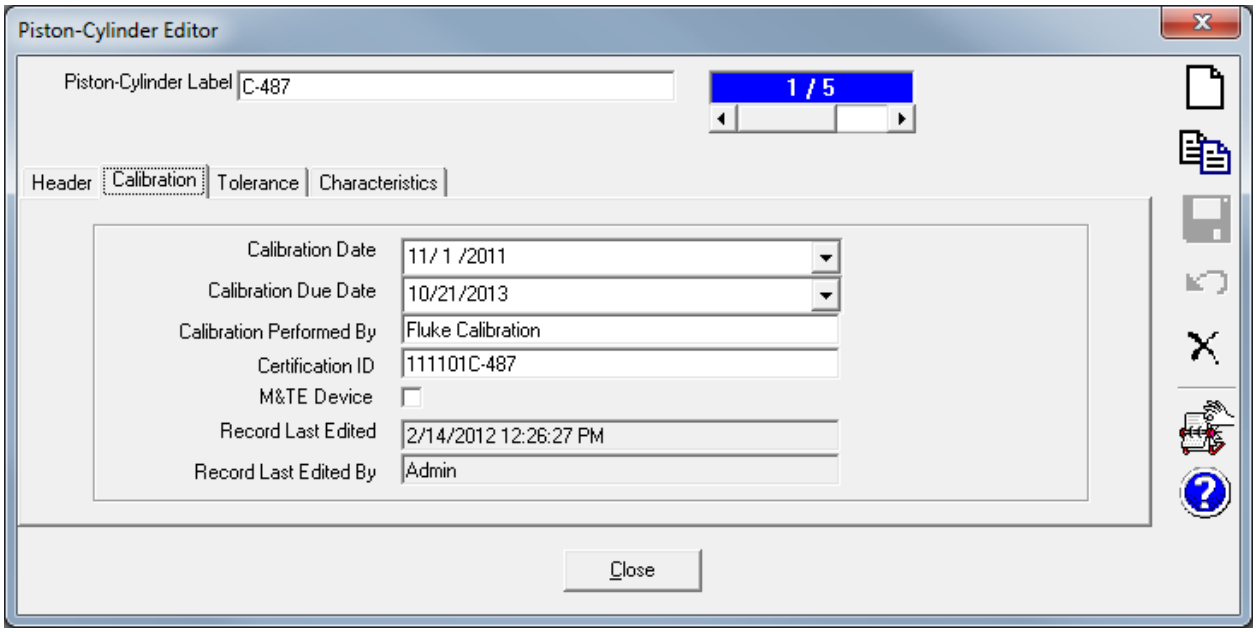
If you have a CD or electronic version of the .pc and .ms WinPrompt files use the COMPASS for Pressure import feature. See the document “Import individual Ruska PC, MS into COMPASS.pdf” and the Application Note, “How to set up COMPASS® for Pressure software for use with Ruska Model 2400 piston gauges”

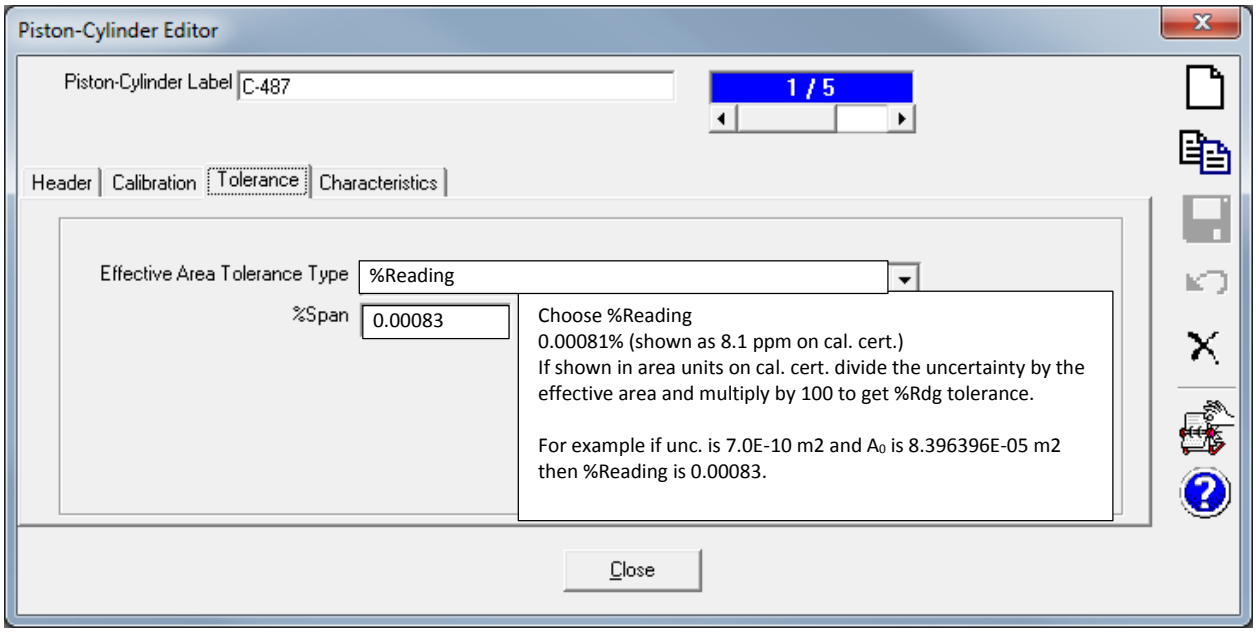
Instructions

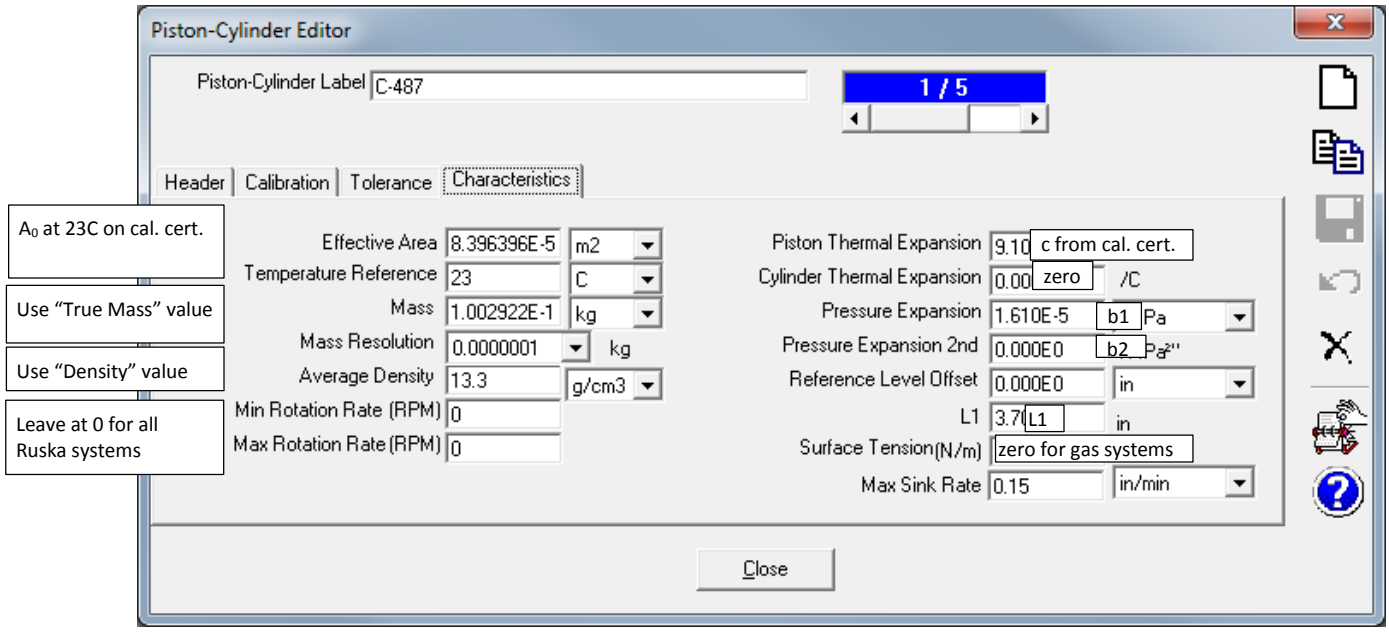
Setup the piston-cylinder, mass set and trim mass set (if applicable) setup files so they can be chosen in the PG Base, Autofloat controller, or PG Monitor setup in COMPASS for Pressure.

Piston-Cylinder Unit C-487 example




Piston-Cylinder Editor
Piston-Cylinder Label
C-487
1 / 5
Header
Calibration
Tolerance
Characteristics
Calibration Date
11/ 1 /2011
Calibration Due Date
10/21/2013
Calibration Performed By
Fluke Calibration
Certification ID
111101C-487
M&TE Device
Record Last Edited
2/14/2012 12:26:27 PM
Record Last Edited By
Admin
Close


Piston-Cylinder Editor
Piston-Cylinder Label
C-487
1 / 5
Header
Calibration
Tolerance
Characteristics
Effective Area Tolerance Type
%Reading
%Span
0.00083
Choose %Reading
0.00081% (shown as 8.1 ppm on cal. cert.)
If shown in area units on cal. cert. divide the uncertainty by the effective area and multiply by 100 to get %Rdg tolerance.
For example if unc. is 7.0E-10 m2 and A0 is 8.396396E-05 m2 then %Reading is 0.00083.
Close



A_0 = Effective Area (note this also contains the reference temp value for COMPASS)

c = Piston Thermal Expansion (actually a combination of both piston and cylinder expansion so thus cylinder is generally 0, or can split the value between the two fields to avoid confusion … either way - these two fields are added together in the pressure formula)

b1 = Pressure Expansion

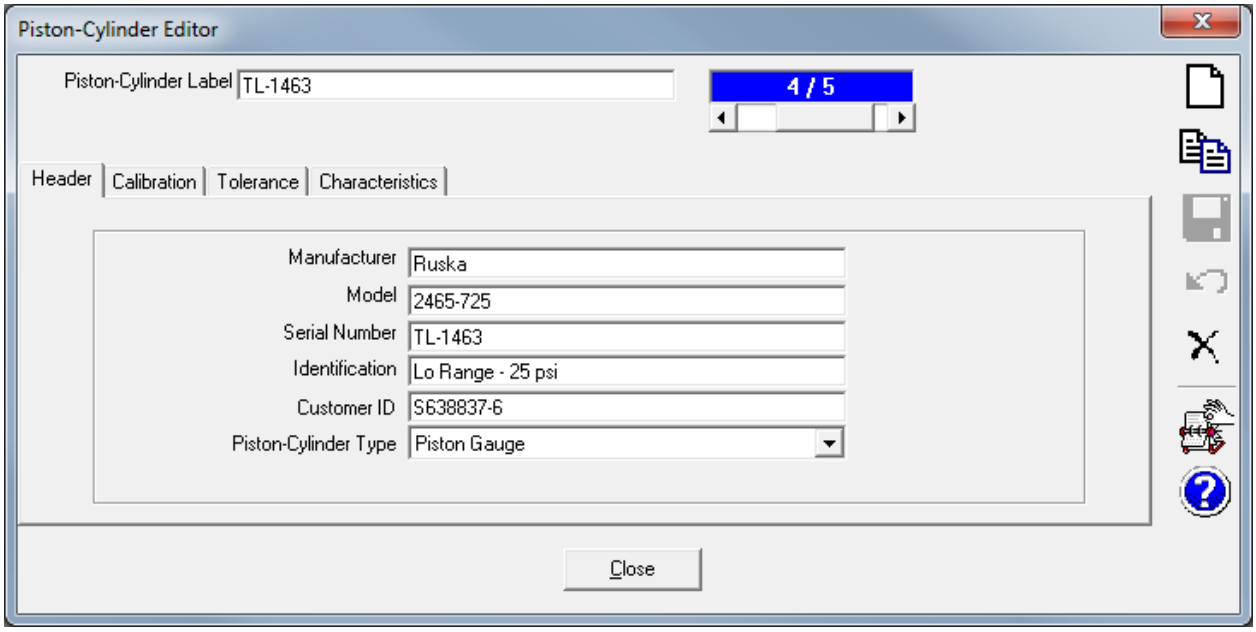
b2 = Pressure Expansion 2nd (Second order relationship … generally 0)

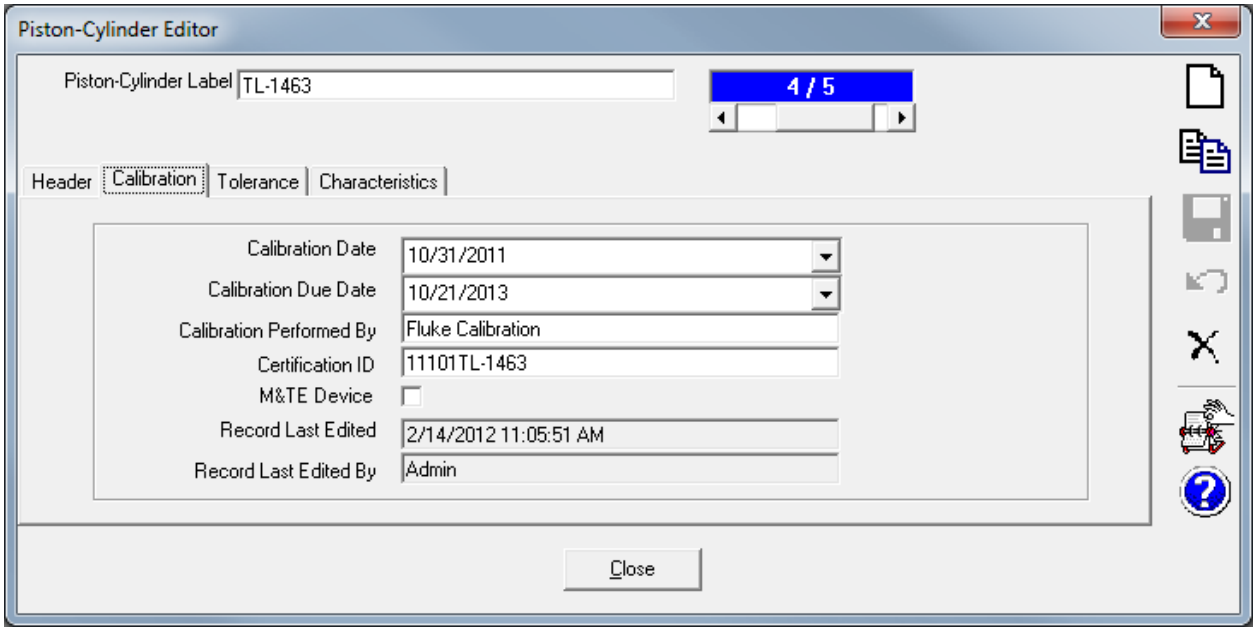
Reference Level Offset = In COMPASS, this field is only used on some DH Instruments/Fluke pistons, and would be noted on the calibration report. Surface Tension field is 0 unless oil is being used in the system. For Rotation Rates I am not sure if you have the hardware to monitor this and/or what its limits are or if these even apply to a 2465 so I just put what is generally acceptable. Basically if the piston is spinning it is centered so ok to take data as long as it does spin too fast <~50 RPM to where it might actually create lift.

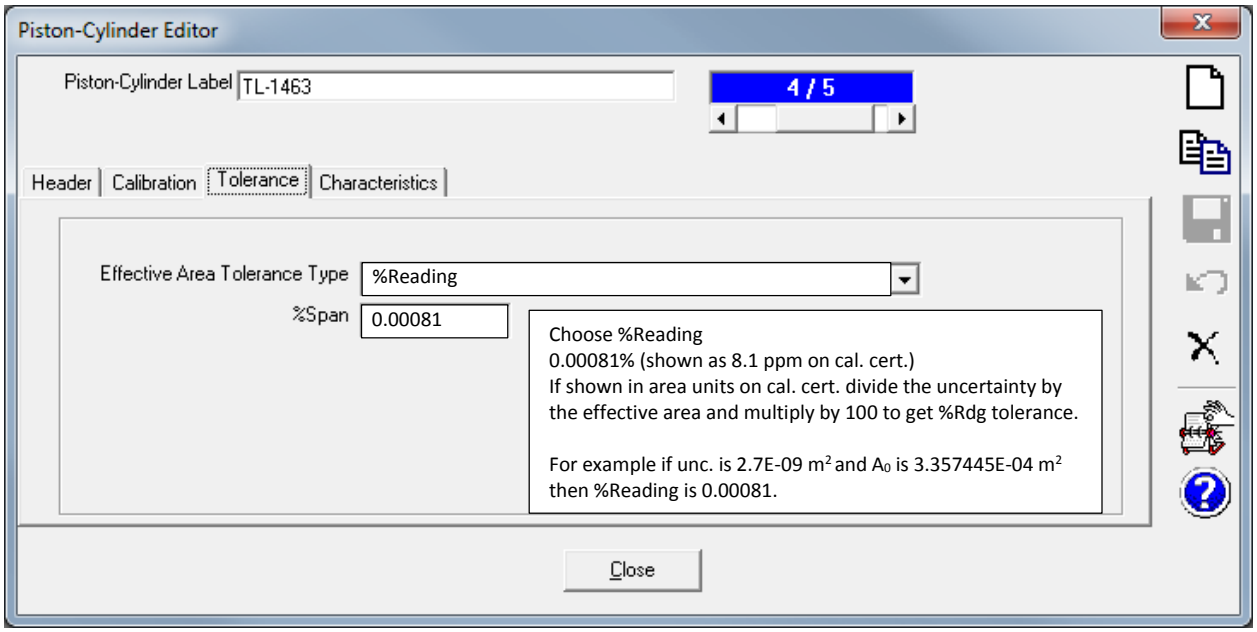
L1 = Same label in the calibration report. The effective length of the piston, from top of mass loading surface to the location where changes in test fluid density have no impact on the pressure calculation. The L1 value is used only with Ruska piston gauges. It is used with the Hanger Depth ("D") dimension of the sleeve weight in determining fluid head pressure relative to the float position line on the mounting post or indicator. The unit of measure is the same as what is selected in "Reference Level Offset" field.

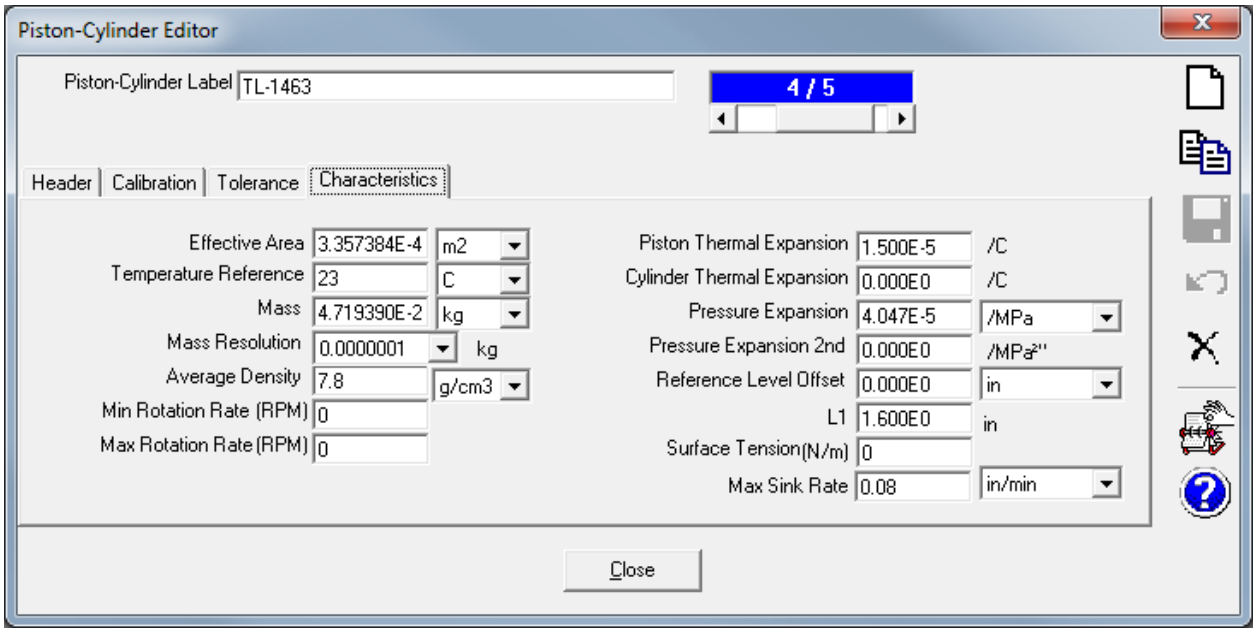
Max Sink Rate = Same label in the calibration report. Fall rate limit that this piston might see as it naturally sinks through its float zone. Used to determine Ready/Not Ready with some systems.

Piston-Cylinder Unit TL-1463 example

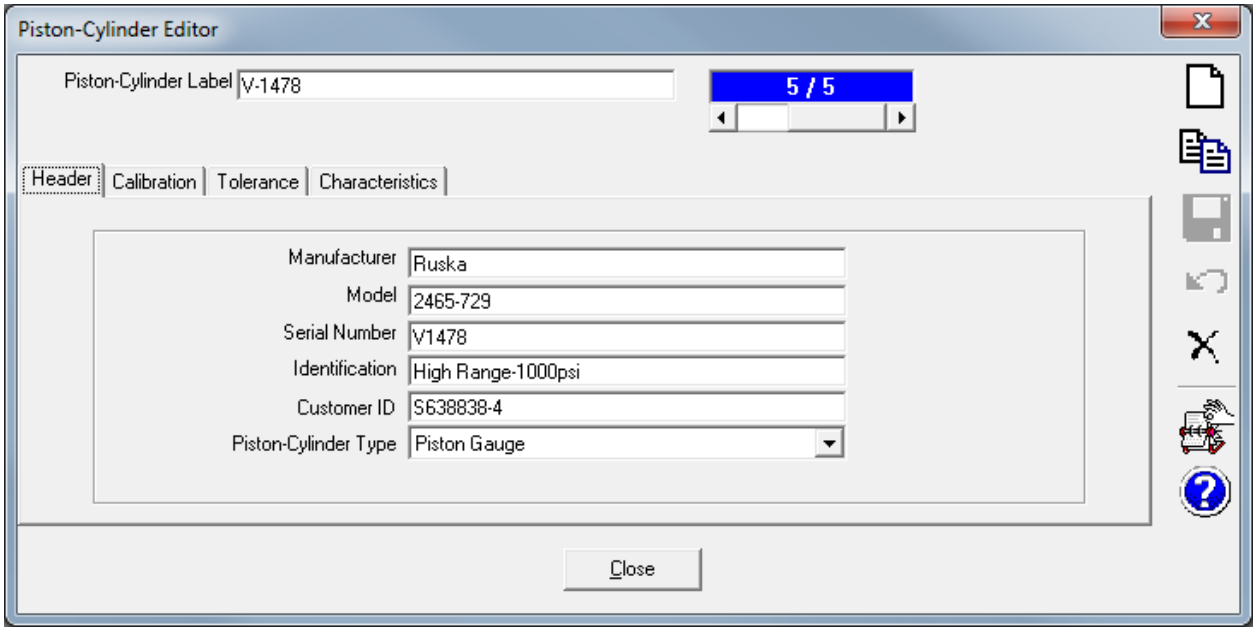


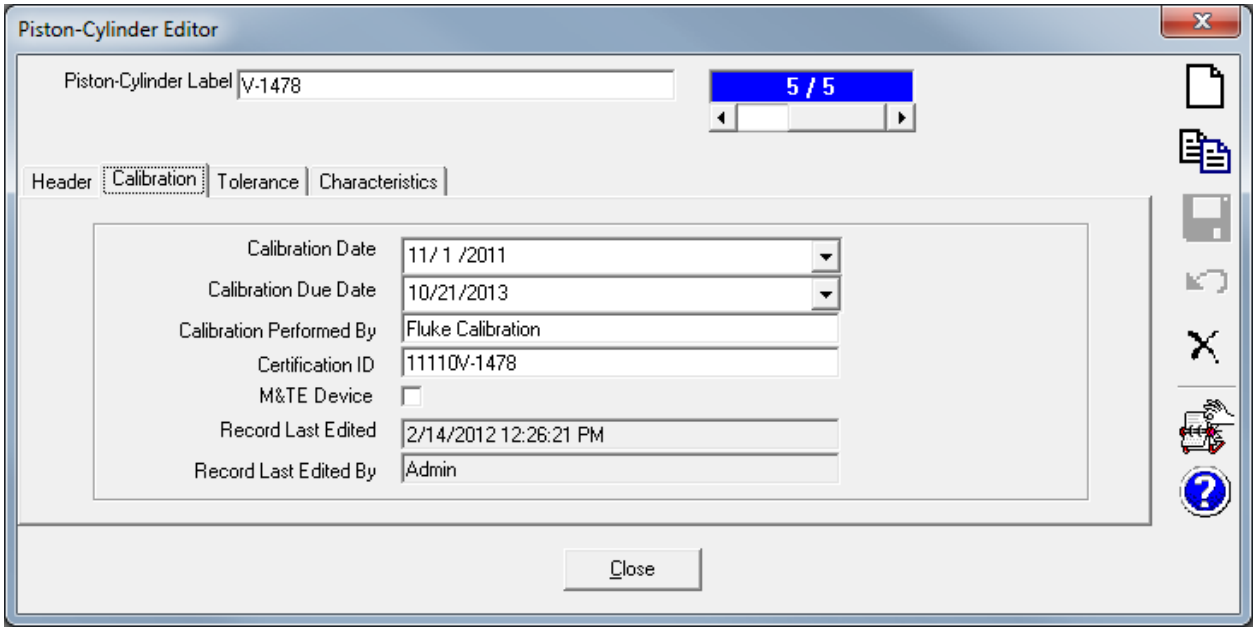


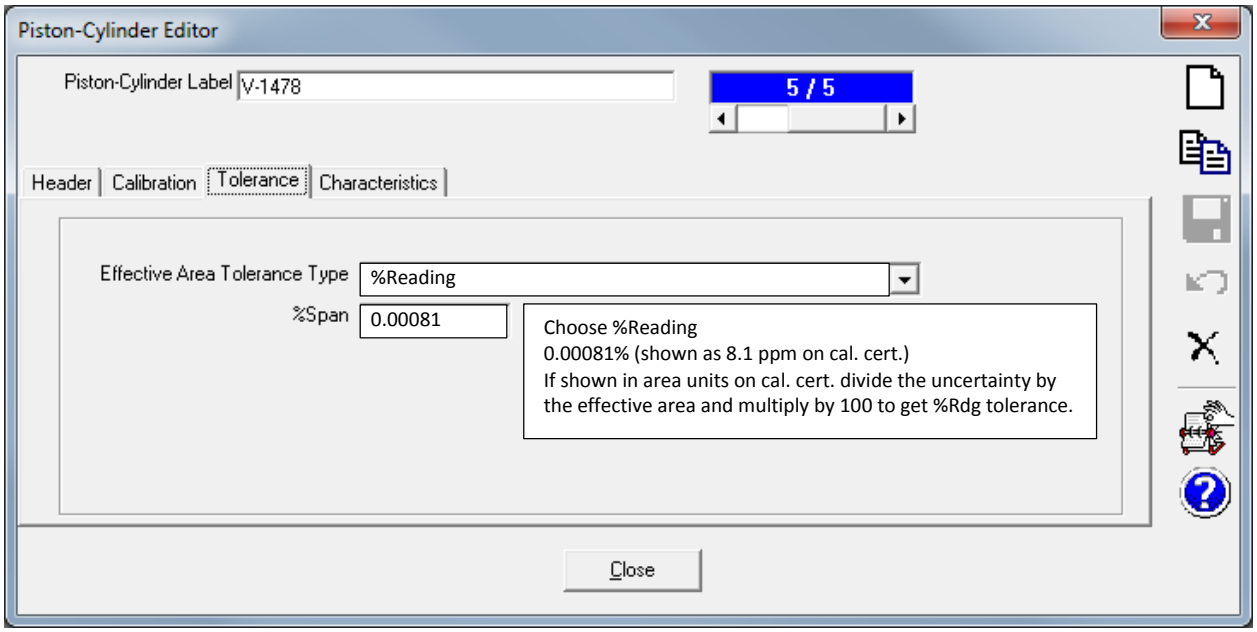

Piston-Cylinder Editor
Piston-Cylinder Label
TL-1463
4 / 5
Header
Calibration
Tolerance
Characteristics
Effective Area Tolerance Type
%Reading
%Span
0.00081
Choose %Reading
0.00081% (shown as 8.1 ppm on cal. cert.)
If shown in area units on cal. cert. divide the uncertainty by the effective area and multiply by 100 to get %Rdg tolerance.
For example if unc. is 2.7E-09 m² and A0 is 3.357445E-04 m² then %Reading is 0.00081.
Close

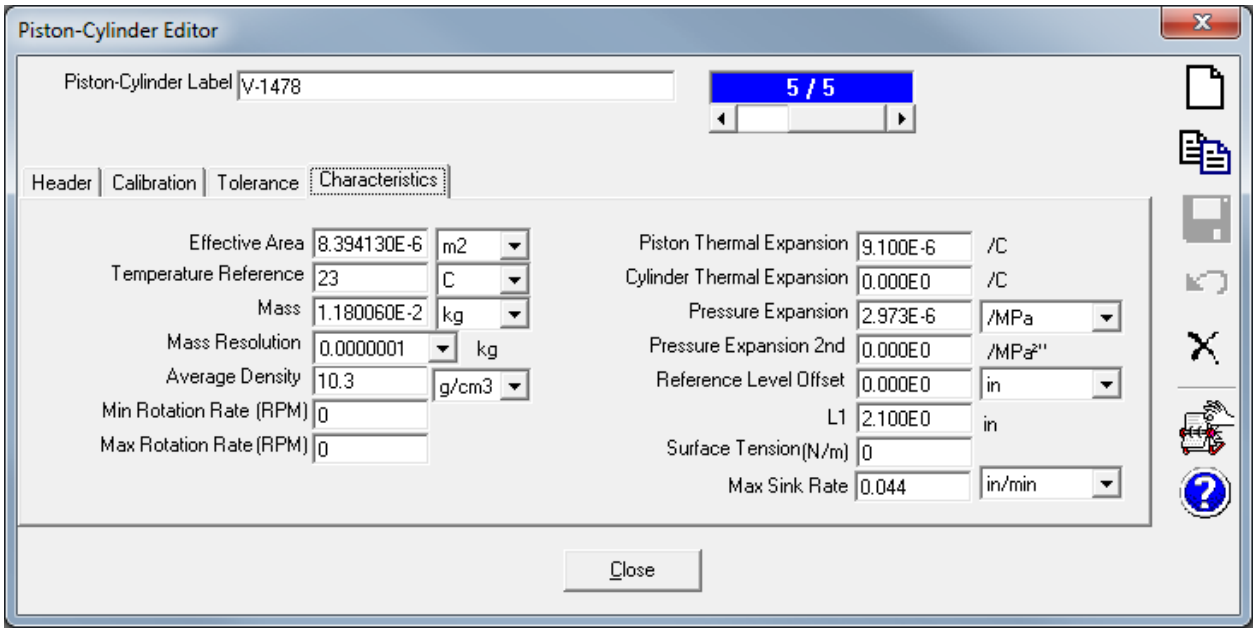

Piston-Cylinder Editor
Piston-Cylinder Label
TL-1463
4 / 5
Header
Calibration
Tolerance
Characteristics
Effective Area
3.357384E-4
m2
Temperature Reference
23
C
Mass
4.719390E-2
kg
Mass Resolution
0.0000001
kg
Average Density
7.8
g/cm3
Min Rotation Rate (RPM)
0
Max Rotation Rate (RPM)
0
Piston Thermal Expansion
1.500E-5
/C
Cylinder Thermal Expansion
0.000E0
/C
Pressure Expansion
4.047E-5
/MPa
Pressure Expansion 2nd
0.000E0
/MPa²''
Reference Level Offset
0.000E0
in
L1
1.600E0
in
Surface Tension(N/m)
0
Max Sink Rate
0.08
in/min
Close

Piston-Cylinder Unit V-1478 example

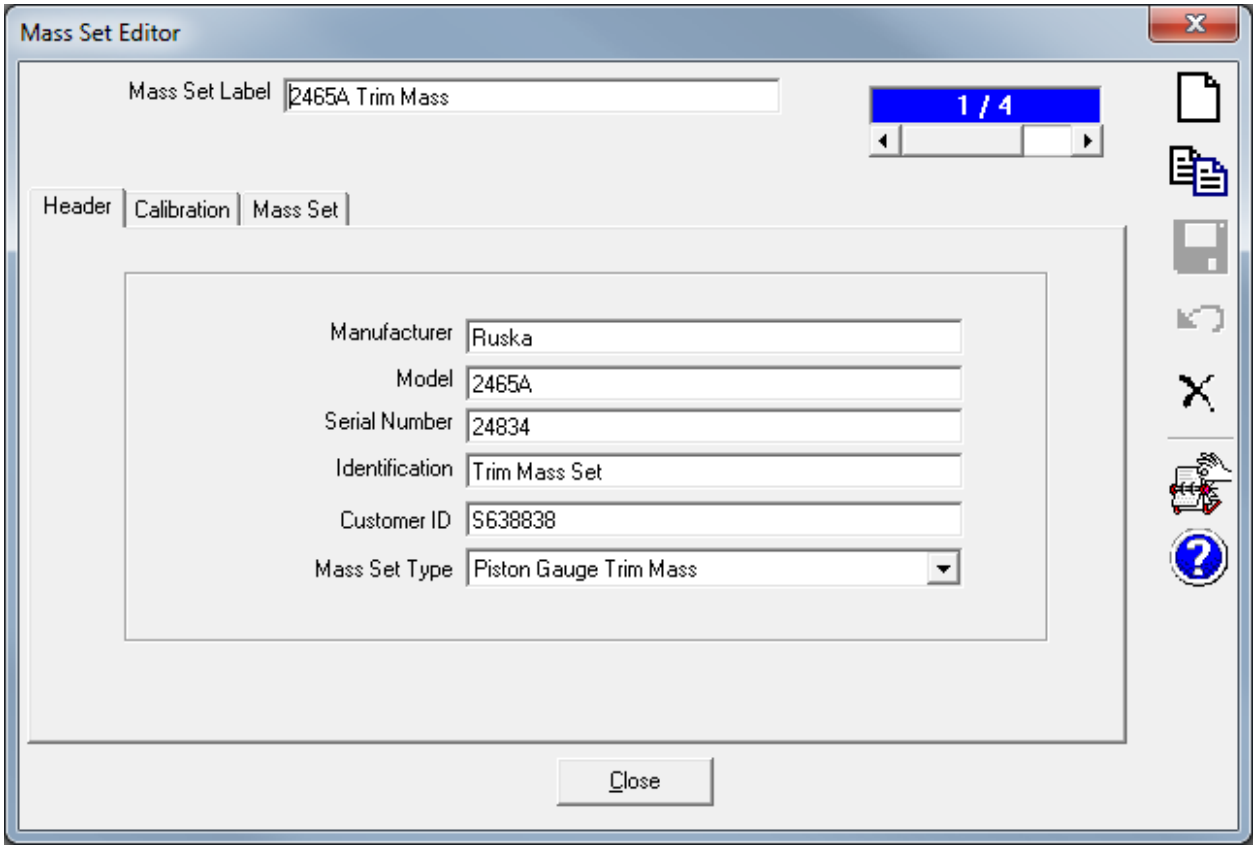


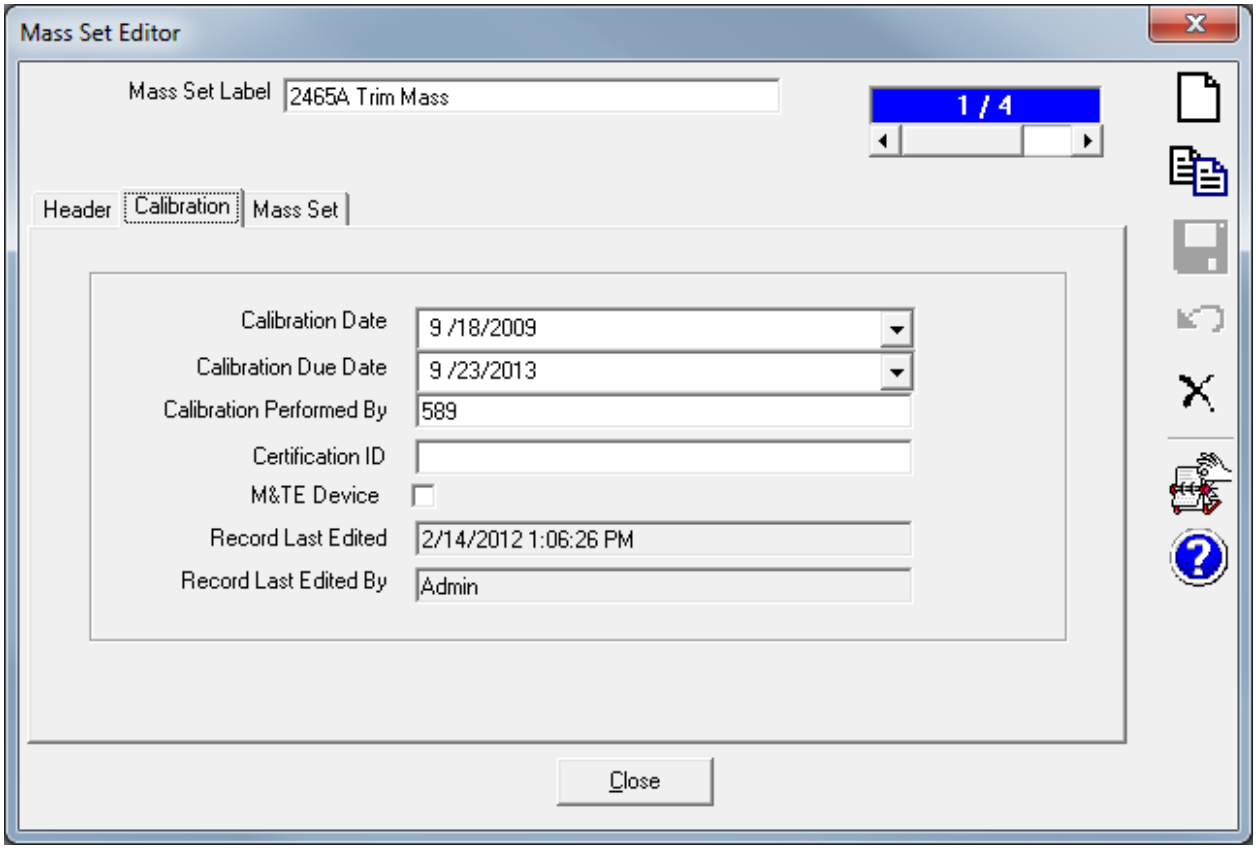


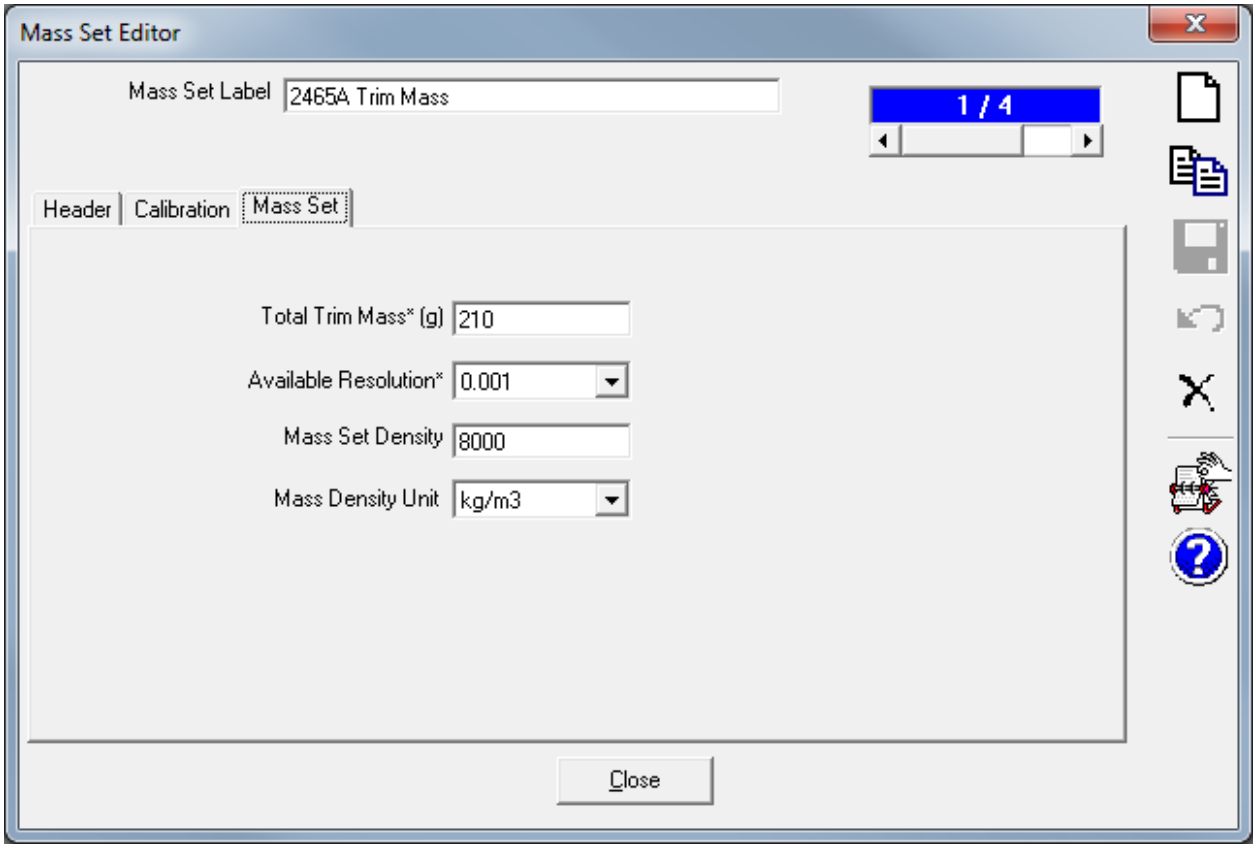

Piston-Cylinder Editor
Piston-Cylinder Label
V-1478
5 / 5
Header
Calibration
Tolerance
Characteristics
Effective Area Tolerance Type
%Reading
%Span
0.00081
Choose %Reading
0.00081% (shown as 8.1 ppm on cal. cert.)
If shown in area units on cal. cert. divide the uncertainty by the effective area and multiply by 100 to get %Rdg tolerance.
Close


Piston-Cylinder Editor
Piston-Cylinder Label
V-1478
5 / 5
Header
Calibration
Tolerance
Characteristics
Effective Area
8.394130E-6
m2
Temperature Reference
23
C
Mass
1.180060E-2
kg
Mass Resolution
0.0000001
kg
Average Density
10.3
g/cm3
Min Rotation Rate (RPM)
0
Max Rotation Rate (RPM)
0
Piston Thermal Expansion
9.100E-6
/C
Cylinder Thermal Expansion
0.000E0
/C
Pressure Expansion
2.973E-6
/MPa
Pressure Expansion 2nd
0.000E0
/MPa²''
Reference Level Offset
0.000E0
in
L1
2.100E0
in
Surface Tension(N/m)
0
Max Sink Rate
0.044
in/min
Close

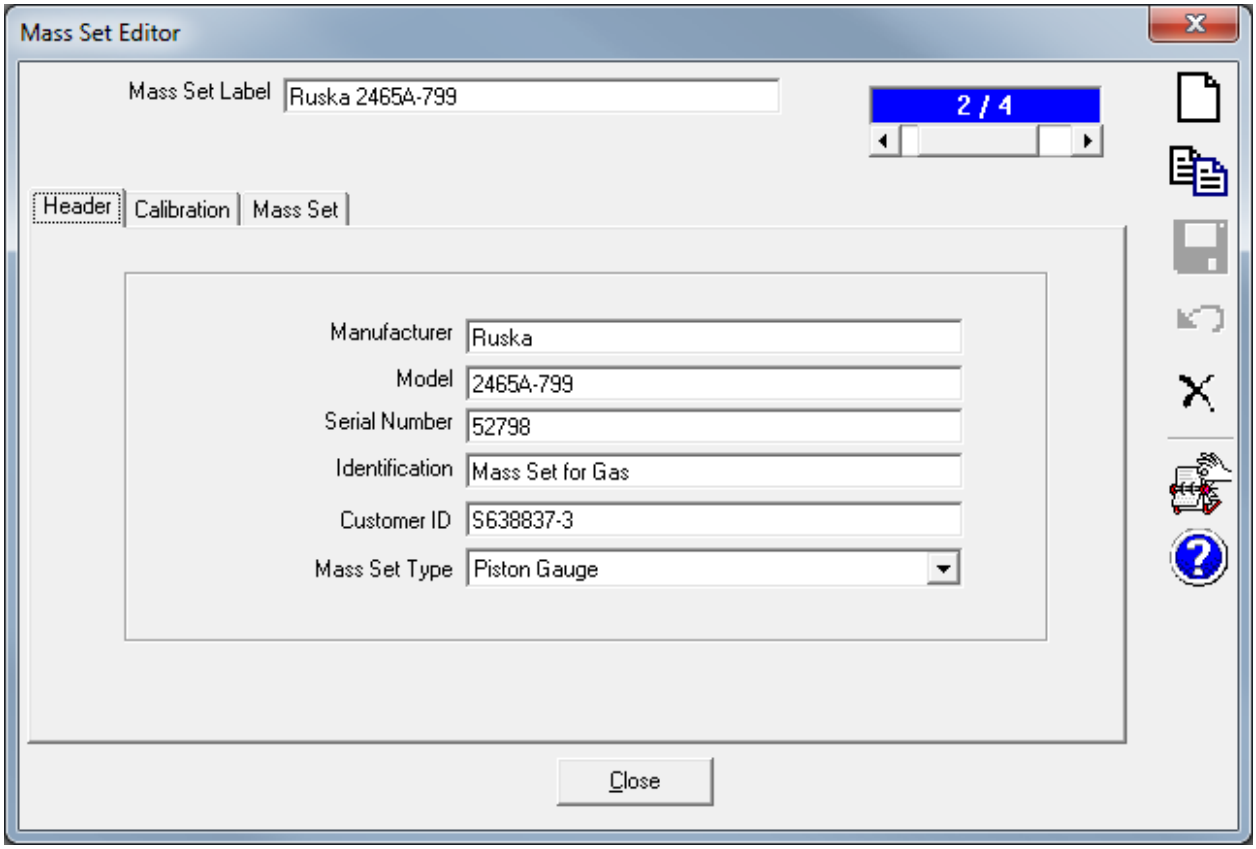
2465A Trim Mass Set example

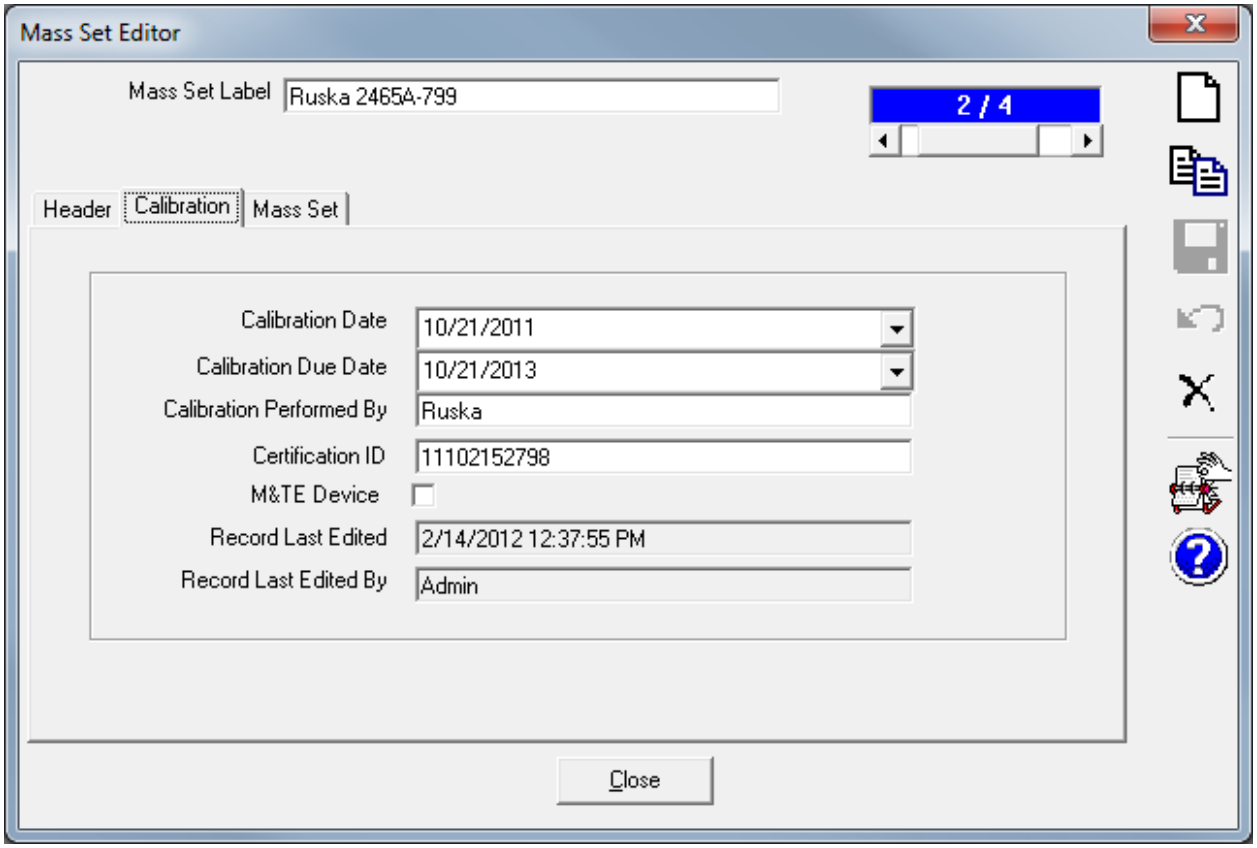


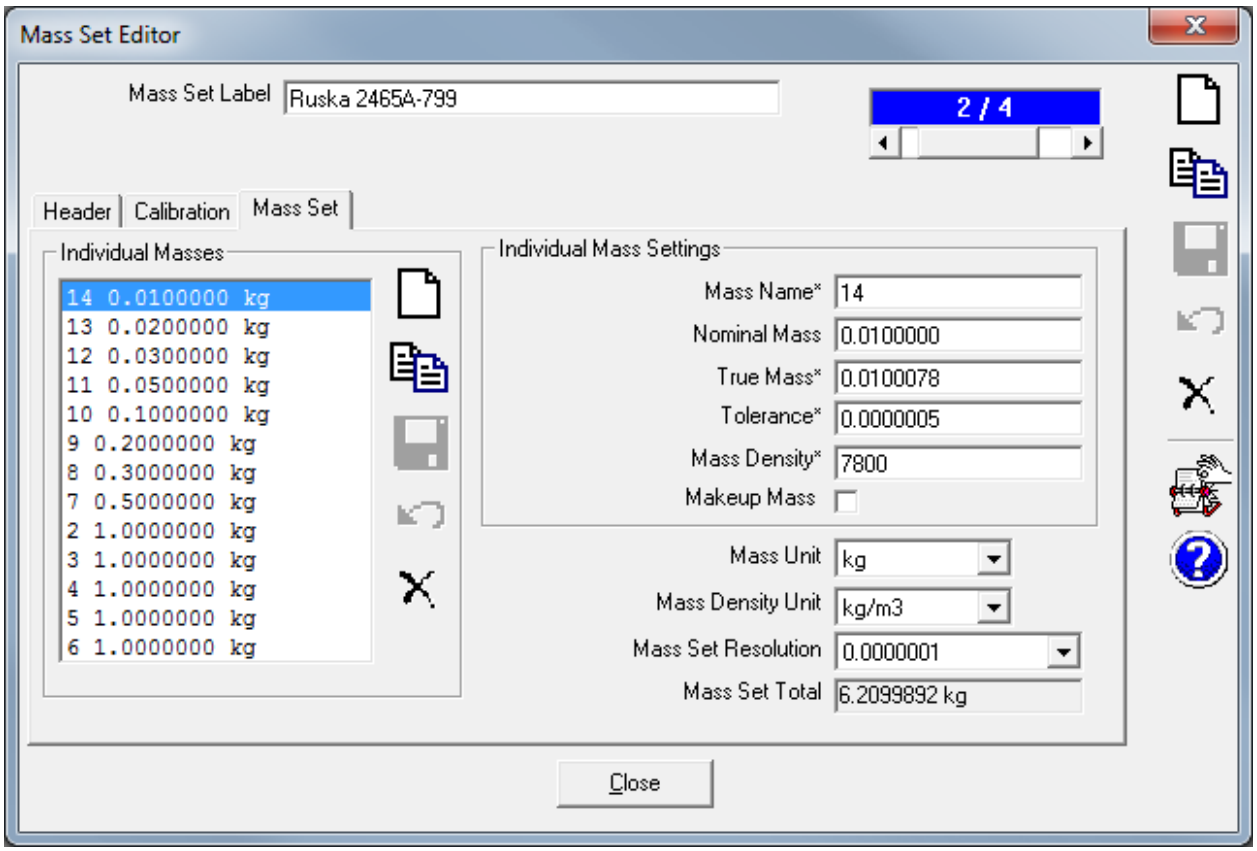




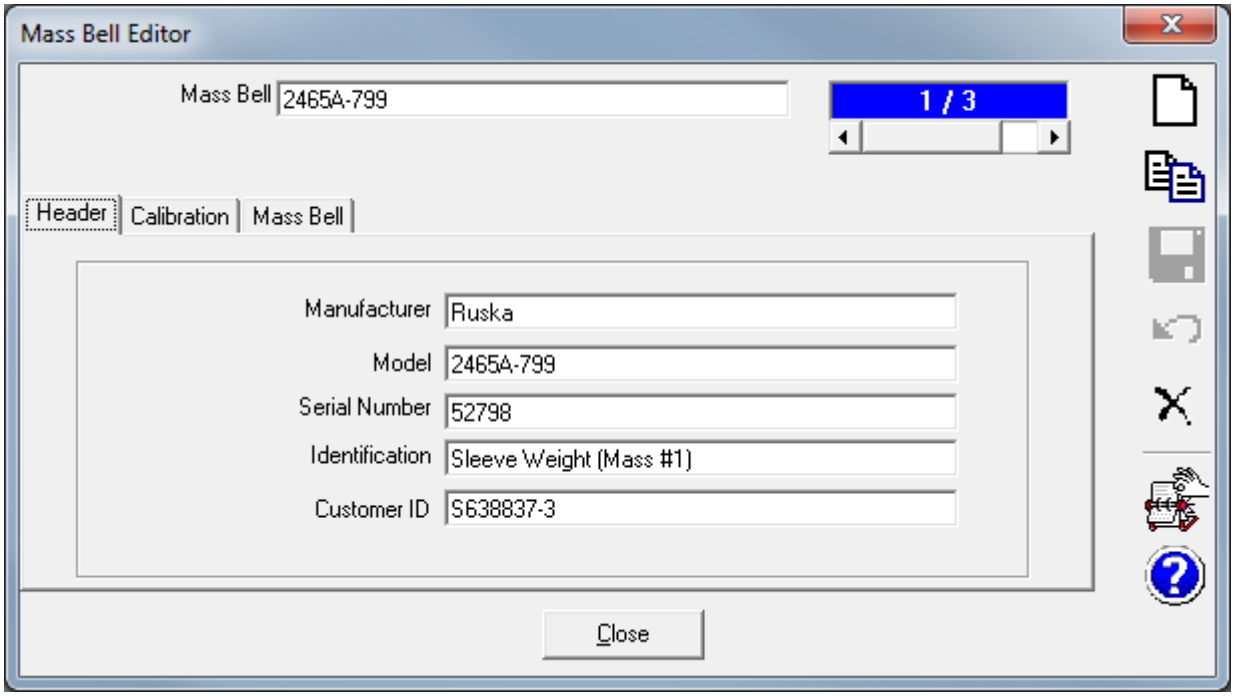
2465A Mass Set example

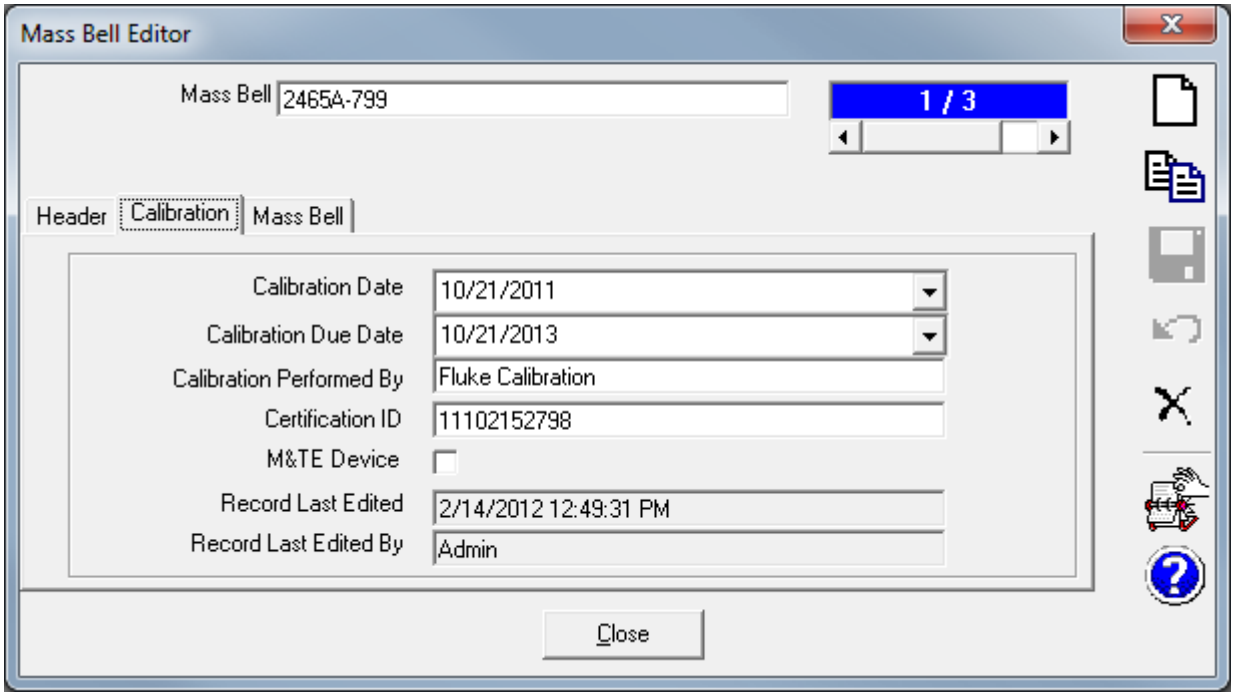


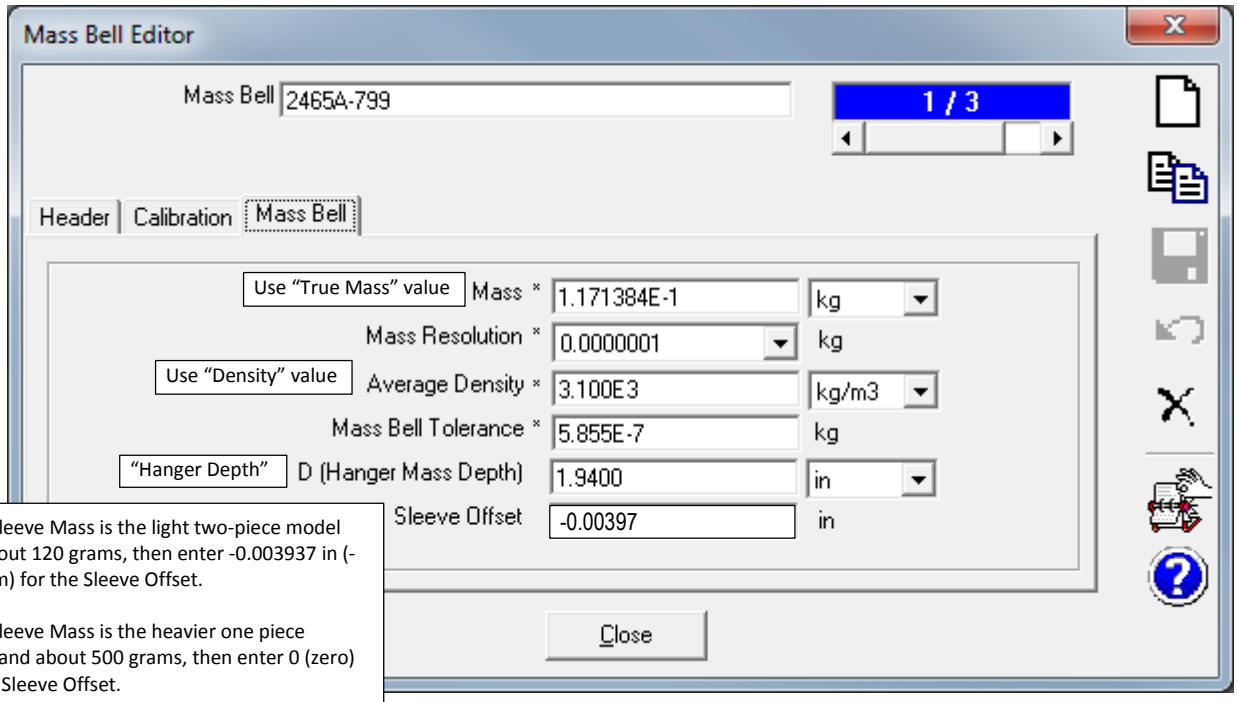

Mass Set Editor
Mass Set Label
Ruska 2465A-799
2 / 4
Header
Calibration
Mass Set
Calibration Date
10/21/2011
Calibration Due Date
10/21/2013
Calibration Performed By
Ruska
Certification ID
11102152798
M&TE Device
Record Last Edited
2/14/2012 12:37:55 PM
Record Last Edited By
Admin
Close


Mass Set Editor
Mass Set Label
Ruska 2465A-799
2 / 4
Header
Calibration
Mass Set
Individual Masses
14 0.0100000 kg
13 0.0200000 kg
12 0.0300000 kg
11 0.0500000 kg
10 0.1000000 kg
9 0.2000000 kg
8 0.3000000 kg
7 0.5000000 kg
2 1.0000000 kg
3 1.0000000 kg
4 1.0000000 kg
5 1.0000000 kg
6 1.0000000 kg
Individual Mass Settings
Mass Name*
14
Nominal Mass
0.0100000
True Mass*
0.0100078
Tolerance*
0.0000005
Mass Density*
7800
Makeup Mass
Mass Unit
kg
Mass Density Unit
kg/m3
Mass Set Resolution
0.0000001
Mass Set Total
6.2099892 kg
Close

2465 Mass Bell example







If the Sleeve Mass is the light two-piece model and about 120 grams, then enter -0.003937 in (-0.001 m) for the Sleeve Offset.

If the Sleeve Mass is the heavier one piece model and about 500 grams, then enter 0 (zero) for the Sleeve Offset.

End of Procedure

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