

## Consolidation Loading Devices

**ASTM\* D 2435 D 4546      AASHTO\* T 216**

\* See Standards Buyer's Guide at [www.DGSI.info/3000](http://www.DGSI.info/3000).

We offer both the pneumatic consolidometer S-450 Terraload and the S-449 lever-type dead weight loading device. The following may help in choosing between a pneumatic or lever-type consolidation frame:

The S-450 Terraload Pneumatic Loading Device:

- requires less space in the lab than a dead weight device.
- has a lesser chance of being bumped compared to the lever-type.
- is easier to operate when it comes to adding loads to the sample. Operators tend to prefer turning a valve rather than carefully adding a weight by hand. The weight on the dead weight device can be added too fast or too slow and affect results. Therefore loading weight may require some operator experience.
- requires a source of compressed air. This is an additional expense. There is also a chance that the power will fail, thus a chance of "losing the sample." The lever-type requires no external source of air, and is independent of electrical power or air compressor failures.

The S-449 Dead Weight Loading Device:

- may be more appropriate for soils that swell at low stresses.
- slightly less costly to set up, but the pneumatic frame costs less when multiple units are purchased, because one S-45040 Digital Readout and pressure transducer can be used with multiple S-450 units.

### S-450 Options

Consolidation Set (part #)	Consolidometer Type		Deflection Measurement		Load Display
	Fixed	Floating	Dial	LDT	
S-45001	X		X		S-45040
S-45002		X	X		S-45040
S-45003	X			X	S-45040
S-45004		X		X	S-45040

### Specifications for Terraload Consolidation Device

Load (Max.):	32 tons/ft <sup>2</sup> (3064 kPa) on a 2.5 in (6.4 cm) dia. sample
Air Pressure:	100 psi (689 kPa) maximum
Air Regulators:	Low range: 0 - 10 psi (0 - 69 kPa) High range: 2 - 150 psi (14 - 1034 kPa)
Platen:	Aluminum, 7 in (17.8 cm) diameter
Piston Travel:	1 in (2.54 cm)

## Terraload Consolidation Load Frame



Terraload consolidation device, Model S-45002. Shown with accessories (S-45040, S-453 Floating Ring and E-805 Dial Indicator). The dial indicator can be replaced by a transducer. The fixed ring consolidometer, S-455, (left) is additional.

Load is applied by compressed air via a piston coupled to a rolling diaphragm. This unique design virtually eliminates friction over the maximum 1 in (2.5 cm) of piston travel. Precision air regulators provide the needed accuracy and stability at low and high loads. Ball valves are used to allow for instant application of loads.

Model S-450 is housed in a high impact case with an anodized cross beam, supports and platen. The Terraload is supplied as a basic machine without the dial gauge, digital readout with transducer and the consolidometer shown in the picture.

S-450	Terraload Consolidation Device	35 lb
<b>Accessories</b>		
E-805	Dial Indicator, 0.40 in range, 0.0001 in divisions	
S-453	Floating Ring Consolidometer	
S-455	Fixed Ring Consolidometer	
S-45040	Smart Digital Indicator (E-405) matched with 150 psi Pressure Transducer (E-114) with quick-connect	
E-332	Digital Dial Indicator, 1 in x 0.0001 resol. Battery or 110-220 V (ac) Operation, (SI / Eng).	
E-333	A/C Adaptor for E-332 Digital Dial Indicator	
E-310	Linear Displacement Transducer, 0.5 in (1.3 cm) range, 0.001 in readability	
S-454	Calibration Disc, 2.46 in dia. x 1 in	
E-405	Smart Digital Indicator for E-130	
E-40504	RS-485 Output Board	
E-40508	RS-485 to RS-232 Converter	
E-40521	WinSAS Collection Software	
S-45070	2.5 in Tapered Stone with Screw, top	
S-45075	2.5 in Porous Stone, bottom	
<b>Related Items</b>		
S-240	Sample Extruder	
E-8000E	EZ-Daq 8-Channel Data Acquisition System (US units)	
E-8000M	EZ-Daq 8-Channel Data Acquisition System (SI units)	

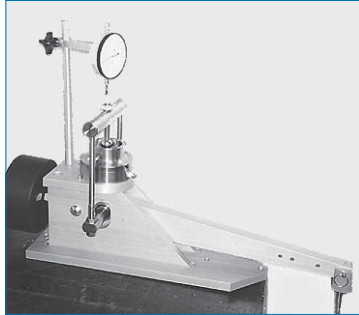
## Dead Weight Loading Device

**ASTM\* D 2435, D 4546      AASHTO\* T 216**

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Load is applied by adding weights to a beam. Adjustable ratios of 9:1, 10:1 and 11:1.

Designed for mounting on a table top. Constructed of anodized aluminum to ensure minimum frame distortion in use and provide corrosion resistance. Vertical rods, cross arms and the beam support rods are made from stainless steel. The beam is fitted with a counter weight and an adjustable beam position screw.



S-449, shown with E-805 Dial Indicator (optional) and S-455 Fixed Ring Consolidometer.

The loading platform will accept any of the DGSI consolidometer cells. Settlement may be measured with a dial indicator as shown, or by using a displacement transducer and digital readout.

S-449	Dead Weight Consolidation Frame							62 lb
Weights used to make up weight sets:								
kg Set	1 kg		4 kg		8 kg		Total Cap.	
S-44902	4		3		2			32 kg
S-44903	4		5		5			64 kg
S-44905	4		5		8			88 kg
TSF Set	1/8	1/4	1/2	1	2	3	4	
S-44901	2	1	1	1	1	1	3	16 TSF*
S-44904	2	1	1	1	1	1	7	32 TSF*

\*16 and 32 TSF for 10:1 ratio and 2.5 in diameter test specimen

### Related Items

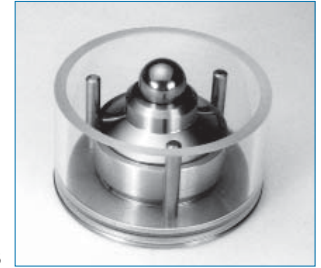
S-453	Floating Ring Consolidometer, 2.5 in
S-454	Calibration Disc, 2.46 in dia. x 1 in
S-455	Fixed Ring Consolidometer, 2.5 in
E-332	Digital Dial Indicator
E-805	Mechanical Dial Indicator
E-310	Linear Displacement Transducer
E-405	Digital Readout
E-8000E	EZ-Daq 8-Channel Data Acquisition System (English units)
E-8000M	EZ-Daq 8-Channel Data Acquisition System (Metric units)

### Specifications for Dead Weight Consolidation Frame

Load Capacity:	48 TSF
Height:	19.5 in (49.5 cm)
Width:	7.75 in (19.7 cm)
Depth:	32 in (81.2 cm)
Vertical Clearance:	5.25 in (13.3 cm)
Horizontal Clearance:	6.375 in (16.1 cm)

## Floating Ring Consolidometer

The Floating Ring Consolidometer allows the sample to be loaded from both ends. The Consolidometer Cutting Ring is 1 in (2.54 cm) high with a 2.5-in (6.4 cm) ID, made from stainless steel, the S-453 has an acrylic outer cylinder for water containment. It comes with upper and lower porous stones.



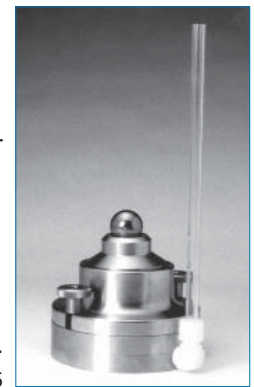
S-453

S-453	Floating Ring Consolidometer, 2.5 in	5.0 lb
S-4531	Floating Ring Consolidometer, 50 mm	5.0 lb
S-4532	Floating Ring Consolidometer, 70 mm	5.0 lb

## Fixed Ring Consolidometer

The Fixed Ring Consolidometer is normally used with the S-450 Consolidometer and is supplied with a burette that allows for simultaneous permeability testing.

The Consolidometer Cutting Ring is 1-in (2.54 cm) high, with a 2.5-in (6.4 cm) ID and is made from stainless steel. Supplied with upper and lower porous stones and stainless steel 1/8-in NPT connections.



S-455

S-455	Fixed Ring Consolidometer, 2.5 in diameter	6.5 lb
S-4551	Fixed Ring Consolidometer, 50 mm diameter	6.5 lb
S-4552	Fixed Ring Consolidometer, 70 mm diameter	6.5 lb

### Related Items

S-45510	Back pressure saturation adaptor kit to allow saturation of the consolidation test specimen prior to one-dimensional consolidation
S-45070	2.5 in Tapered Stone with Screw, top
S-45075	2.5 in Porous Stone, bottom

## Calibration Disc

**ASTM D 2435**

Stainless steel calibration disc, 2.46-in dia. by 1-in high as described in ASTM D 2435. It is used to determine the load frame deformation at various applied loads.

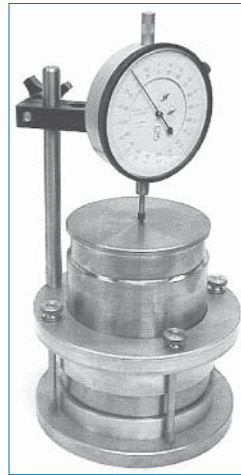
S-454	Calibration Disc, 2.46 in dia. x 1 in	3.5 lb
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## Expansion Index Consolidometer

**ASTM D 4829**  
**California UBC 29-2**

This consolidometer is used to test remolded specimens for expansion. The sample is first compacted in a 4 x 1 in (10.1 x 2.54 cm) ring and then placed in the consolidometer with dried porous stones. The supplied 12.6 lb (5.7 kg) weight is placed on the assembled specimen which is allowed to consolidate for 10 minutes. It is then immersed in distilled water for up to 24 hours. During this time, the sample height is monitored with the dial gauge for determining the maximum swell.

The Expansion Index Consolidometer is made from anodized aluminum with stainless steel hold down rods, specimen ring and weight. It is supplied with ring, porous stones and weight. Dial indicator not included.



S-441 with S-44150  
(sold separately)

S-441	Expansion Index Consolidometer	22.0 lb
<b>Related Items</b>		
S-44150	Dial Indicator, 0.5 in x 0.0001 in, CW	
S-44101	Porous Stones, 4 in dia., 1/2 in thick, set of 2	

## Data Collecting Software for Consolidation Testing

The hardware and software required to add data collection to your existing consolidometer, new S-450 or new S-449 are listed below.

E-405	Smart Digital Indicator
E-40504	RS-485 Output Board
E-40508	RS-485 to RS-232 Converter
E-310	Linear Displacement Transducer
E-40521	WinSAS Data Collection Software
E-344	LDT Mounting Bracket for S-449 Dead Weight Consolidation Frame
301142	Indicator Support Bar for older S-450 Terraload

The readings are collected in a .txt file which can then be imported into spreadsheet programs (such as Excel).

E-40521	WinSAS™ Data Collection Software
<b>Related Items</b>	
E-8000E	EZ-Daq 8-Channel Data Acquisition System (US units)
E-8000M	EZ-Daq 8-Channel Data Acquisition System (SI units)


## Constant Rate of Strain Consolidometer

This DGSI Consolidometer uses the S-510 Triaxial Cell to apply vertical load and allow pore pressure measurement. Saturation back-pressure may be applied when the cell is attached to the S-500 Triaxial/Permeability Control Panel. Designed for a 2½-in dia. by 1-in thick sample. The sample ring is sealed at both ends. Porous stones permit saturation.



S-457

S-457	Constant Rate of Strain Consolidometer w/ S-510 Triaxial Cell	26 lb
<b>Related Items</b>		
S-500	Triaxial Permeability Panel	
S-510	Triaxial Cell for samples up to 3 in (76 mm) dia.	
E-124	Pore Pressure Transducer, 0 - 150 psi	
E-405	Digital Transducer Readout	
S-600	Triaxial Load Frame	
E-8000E	EZ-Daq 8-Channel Data Acquisition System (US units)	
E-8000M	EZ-Daq 8-Channel Data Acquisition System (SI units)	

 Download data sheets, manuals, and technical notes from [www.durhamgeo.com](http://www.durhamgeo.com)