



Tri-Flex 2 Five-Cell Permeability Test System

ASTM D-5084.

For high volume commercial laboratory testing, the Tri-Flex 2 Five-Cell Permeability Test System offers the user the capabilities to test up to five samples at a time, each with its own individual pressure settings.

Ordering Information

- Set includes:**
- 1 Tri-Flex 2 Master Control Panel (25-0696/0x or 25-0697/0x).
 - 2 Tri-Flex 2 Auxiliary Control Panel (25-0699).
 - 1 Tri-Flex 2 Water De-airing Tank System (25-0698).
 - 5 Tri-Flex 2 Permeability Test Cell (25-0690).
 - 5 2.8" or 70 mm Acrylic Cap and Base Set (25-0690/15 or 25-0690/10).
 - 5 2.8" or 70 mm Porous Stones, pack of 2 (25-6721 or 25-6561).
 - 5 2.8" or 70 mm Membrane Sealing Rings, pack of 10 (25-6641 or 25-6461).
 - 5 2.8" (70 mm) Membranes, pack of 10 (25-6441).
 - 1 2.8" (70 mm) O-ring Placing Tool (25-6470).
 - 1 2.8" (70 mm) Membrane Tester (25-6443).
 - 1 2.8" or 70 mm Suction Membrane Device (25-6660 or 25-6480).

EI25-0688/02. 110vAC, 50/60 Hz, I ø, English.

EI25-0688/01. 220vAC, 50/60 Hz, I ø, English.

EI25-0689/02. 110vAC, 50/60 Hz, I ø, Metric.

EI25-0689/01. 220vAC, 50/60 Hz, I ø, Metric.

Special Note:

For test applications involving toxic permeants, stainless steel Cap and Base Sets and two Pressure Interface Chambers are required for each test cell.

Tri-Flex 2 Three-Cell Permeability Test System

ASTM D-5084.

Similar to the five-cell system, the Tri-Flex 2 Three-Cell Permeability Test System includes three additional test cells and our Tri-Flex 2 Auxiliary Control Panel. Using this configuration, users can test up to three samples at a time, each with its own individual pressure settings.

Ordering Information

- Set includes:**
- 1 Tri-Flex 2 Master Control Panel (25-0696/0x or 25-0697/0x).
 - 1 Tri-Flex 2 Auxiliary Control Panel (25-0699).
 - 1 Tri-Flex 2 Water De-airing Tank System (25-0698).
 - 3 Tri-Flex 2 Permeability Test Cell (25-0690).
 - 3 2.8" or 70 mm Acrylic Cap and Base Set (25-0690/15 or 25-0690/10).
 - 3 2.8" or 70 mm Porous Stones, pack of (25-6721 or 25-6561).
 - 3 2.8" or 70 mm Membrane Sealing Rings, pack of 10 (25-6641 or 25-6461).
 - 3 2.8" (70 mm) Membranes, pack of 10 (25-6441).
 - 1 2.8" (70 mm) O-ring Placing Tool (25-6470).
 - 1 2.8" (70 mm) Membrane Tester (25-6443).
 - 1 2.8" or 70 mm Suction Membrane Device (25-6660 or 25-6480).

EI25-0686/02. 110vAC, 50/60 Hz, I ø, English.

EI25-0686/01. 220vAC, 50/60 Hz, I ø, English.

EI25-0687/02. 110vAC, 50/60 Hz, I ø, Metric.

EI25-0687/01. 220vAC, 50/60 Hz, I ø, Metric.

Special Note:

For test applications involving toxic permeants, stainless steel Cap and Base Sets and two Pressure Interface Chambers are required for each test cell.



Tri-Flex 2 One-Cell Permeability Test System

ASTM D-5084.

With the Tri-Flex 2 One-Cell Permeability Test System, efficient and accurate permeability testing of a wide range of construction materials can easily be conducted.

The complete one-cell system consists of the Tri-Flex 2 Master Control Panel with water de-airing system, one Tri-Flex 2 Permeability Test Cell complete with platens for testing either 2.8" or 70 mm diameter specimens, and a complete range of sample preparation tools.

Ordering Information

- Set includes:**
- | Tri-Flex 2 Master Control Panel (25-0696/0x or 25-0697/0x).
 - | Tri-Flex 2 Water De-airing Tank System (25-0698).
 - | Tri-Flex 2 Permeability Test Cell (25-0690).
 - | 2.8" or 70 mm Acrylic Cap and Base Set (25-0690/15 or 25-0690/10).
 - | 2.8" or 70 mm Porous Stones, pack of 2 (25-6721 or 25-6561).
 - | 2.8" or 70 mm Membrane Sealing Rings, pack of 10 (25-6641 or 25-6461).
 - | 2.8" (70 mm) Membranes, pack of 10 (25-6441).
 - | 2.8" (70 mm) O-ring Placing Tool (25-6470).
 - | 2.8" (70 mm) Membrane Tester (25-6443).
 - | 2.8" or 70 mm Suction Membrane Device (25-6660 or 25-6480).

EI25-0684/02. 110vAC, 50/60 Hz, Iø, English.

EI25-0684/01. 220vAC, 50/60 Hz, Iø, English.

EI25-0685/02. 110vAC, 50/60 Hz, Iø, Metric.

EI25-0685/01. 220vAC, 50/60 Hz, Iø, Metric.

Special Note:

For test applications involving toxic permeants, stainless steel Cap and Base Sets and two Pressure Interface Chambers are required for each test cell.



Pressure Interface Chamber

- **Stainless steel lower chamber and base construction with Viton® diaphragm and O-rings.**
- **Supplied with all necessary valves and tubing.**

Specifications

Construction.	Stainless steel base and lower chamber; clear acrylic upper chamber and top; Viton® diaphragm and O-rings.
Weight.	Net 12 lbs. (5.5 kg).

The Pressure Interface Chamber (PIC) is used during permeability test application involving toxic permeants. The chambers provide a closed system for toxic liquids entering and exiting the test cell.

Ordering Information

Note: Two Pressure Interface Chambers are required for use with each test cell.
EI25-0695.

Sample Preparation Tools

Please refer to page 13 for a complete listing of available tools used to properly prepare specimens for testing.



Tri-Flex 2 Master Control Panel

Please refer to page 14 for complete specifications on the Tri-Flex 2 Master Control Panel and accessories.

- **Three independent channels of pressure control.**
- **Digital pressure display system to an accuracy of $\pm 0.25\%$ of reading within range.**
- **User friendly burette system.**
- **Easy removal of burette/annulus assembly for cleaning.**
- **Bridging feature to set multiple burette pressures with one regulator.**
- **Quick disconnects for easy system setup.**
- **Easily expands for multi-cell test.**

Ordering Information

EI25-0696/02. English. 110vAC, 50/60 Hz, 1ø.
EI25-0696/01. English. 220vAC, 50/60 Hz, 1ø.
EI25-0697/02. Metric. 110vAC, 50/60 Hz, 1ø.
EI25-0697/01. Metric. 220vAC, 50/60 Hz, 1ø.

Accessories

EI25-0697/10. 10 ml Burette Assembly for manual pore pressure measurements.
EI25-0698. Water De-Airing Tank System.
EI25-0699. Auxiliary Control Panel.

Special Note:

Compressed air, water and vacuum source required for panel operation.



Tri-Flex 2 Permeability Test Cell

ASTM D-5084.

- **Corrosion resistant construction.**
- **Double drainage lines.**
- **Accepts a wide range of samples.**

The Tri-Flex 2 Permeability Test Cell incorporates many new features that promote ease in specimen preparation and installation. The cell consists of an aluminum alloy head assembly and a stainless steel base for corrosion resistance and long service life. Stainless steel no-volume change type valves at all specimen inflow and outflow ports provide additional corrosion resistance and prevention of pressure changes during permeability test procedures.

Through the use of the cell's optional Platen Sets, the Tri-Flex 2 Permeability Test Cell can accept specimens ranging in size from 1.4" (35 mm) to as large as 4" (102 mm) in diameter. Depending on test requirements, all Platen Sets are available in either acrylic or stainless steel construction.

Specifications

Specimen Size.	1.4" (35 mm) to 4" (102 mm) diam. using optional Cap and Base Sets, not included.
Head Assembly.	Anodized aluminum with quick-disconnect fill/vent port and three clamping rods.
Base Assembly.	Stainless steel with four stainless steel no-volume change ball valves for inflow and outflow ports and one brass no-volume change ball valve for lateral port.
Cylinder.	Clear acrylic.
Max. Pressure.	150 psi (1,034 kPa).
Tubing.	Teflon and stainless steel.
Dimensions.	Approx. 8" diam. x 15" h. (203 x 381 mm). Excluding valves.
Weight.	Net 23 lbs. (10.4 kg).

Ordering Information

EI25-0690.

Accessories

EI25-0695. Pressure Interface Chamber: Two required per cell.

Permeability Cell Accessories

Cap & Base Sets:	Acrylic	Stainless Steel
1.4" (35 mm)	EI25-0690/13	EI25-0695/13
2.416"	EI25-0690/14	EI25-0695/14
2.8"	EI25-0690/15	EI25-0695/15
70 mm	EI25-0690/10	EI25-0695/10
4.0"	EI25-0690/17	EI25-0695/17
100 mm	EI25-0690/12	EI25-0695/12

Porous Stones (Pack of 2):

1.4" (35 mm)	EI25-4461
2.416"	EI25-5661
70 mm	EI25-6561
2.8"	EI25-6721
100 mm	EI25-7661
4.0"	EI25-7761

Sealing Rings (Pack of 10):

1.4" (35 mm)	EI25-4281
2.416"	EI25-5663
70 mm	EI25-6461
2.8"	EI25-6641
4.0" (100 mm)	EI25-7631

Rubber Membranes (Pack of 10):

1.4" (35 mm)	EI25-4261
2.416"	EI25-5665
2.8" (70 mm)	EI25-6441
4.0" (100 mm)	EI25-7621



Guelph Permeameter

ASTM D-5126.

- **Lightweight and portable for easy transportation.**
- **Test time of two hours or less.**
- **Requires only 2.5 liters of water.**

The Guelph Permeameter is a constant head permeameter that measures in-situ hydraulic conductivity. It is a simple to operate, portable unit that requires very little training to use. Only one person is needed to perform the test.

The method involves measuring the steady-state rate of water recharge into unsaturated soil from a cylindrical well hole, in which a constant head of water is maintained. Calculations are made to determine the hydraulic conductivity, soil sorptivity and soil matrix flux potential. Depending on the soil type, tests can take between 1/2 hour and 2 hours using only 2.5 liters of water.

Specifications

Permeameter.	High impact polycarbonate, molded elastomers.
Auger.	2" (50.8 mm) diam.; machined steel.
Carrying Case.	Die-cut foam for parts storage.
Test Time.	1/2 – 2 hours.
Test Depth.	15 to 75 cm (0.5 to 2.5 ft).
Hydraulic Conductivity Range.	10 ⁻⁵ to 10 ⁻¹ m/sec (10 ⁻⁵ to 10 ⁻¹ cm/sec).
Weight.	Net 30 lbs. (13.6 kg).

Ordering Information

EI25-0650.

Accessories

EI25-0655. Permeameter Extension Kit. 31-1/2" (800 mm) long. Increases test depth to 155 cm (5.16 ft).



Double Ring Infiltrometer

ASTM D-3385.

- **Determines infiltration rate of various soils.**
- **Heavy-duty aluminum rings for rust resistance and long life.**
- **Graduated Mariotte tubes for inner and outer rings.**

The Double-Ring Infiltrometer provides comparative information that is useful for determining erosion rates, leaching and drainage efficiencies, irrigation patterns, rainfall and evaluation of potential septic tank disposal fields.

The instrument consists of two concentric rings, driving cap, two graduated Mariotte tubes, square neoprene splash guards and complete instructions. The two rings are driven into the ground and filled with water. The outer ring acts as a barrier to encourage only vertical flow from the inner ring.

Specifications

Rings.	Aluminum; two included, 12" i.d. x 20" h. (305 x 508 mm) and 24" i.d. x 20" h. (610 x 508 mm).
Driving Cap.	Aluminum; 1/2" (12.7 mm) thick; with centering pins.
Splash Guards.	Neoprene; two included; 6" (152 mm) square.
Mariotte Tubes.	Graduated; two included; 3,000 ml and 10,000 ml capacities.
Weight.	Net 70 lbs. (31.7 kg); Shpg. 90 lbs. (40.8 kg).

Ordering Information

EI25-0660.

Constant Head Sand/Gravel Permeameters

ASTM D-2434.

- **Meets ASTM D-2434 Test Specifications.**
- **Available in a wide range of sizes.**
- **Supplied complete with tubing and hardware.**
- **Accessory Manometer Panel and Constant Head Tank Assemblies.**

The Sand/Gravel Permeameter is used specifically for testing the permeability of granular soils. Manufactured in accordance with ASTM D-2434 test specifications, the permeameter is designed to provide accurate results when performing the constant head test method for the laminar flow of water through granular materials. A range of models to accommodate different particle sizes of specimens is available.

Each Permeameter comes equipped with valves, porous stones and tubing for connection to a water source, vacuum, and manometer tubes. To prevent soil density changes during the test, a spring is incorporated in the top cap to apply 5 to 10 lbf. (2.2 to 4.5 kg) against the top porous stone.

Two manometer ports are grooved and screened on the inside of the chamber. The screens prevent material from migrating through the valves and tubing during testing. The acrylic chamber permits viewing of the sample during testing. The end caps and clamping ring are constructed of anodized aluminum for rust resistance and long service life.

Specifications

Construction.	Anodized aluminum end caps and clamping ring acrylic chamber.
Manometer Ports.	Two. Located on the acrylic chambers side wall. The distances between ports are equal to the diameter.
Clamping Rods.	Three; quick release type.
Weights.	Net 7-12 lbs. (3.2-5.4 kg).

Ordering Information

Note: Manometer Panel and Constant Head Tank System; not included, order separately.

EI25-0562.	3.0" (76 mm) i.d.
EI25-0563.	4.5" (114 mm) i.d.
EI25-0564.	6.0" (152 mm) i.d.

Accessories

EI25-0567.	Wall Mounted Manometer Panel.
EI25-0568.	Constant Head Tank System.

Manometer Panel

ASTM D-2434.

The Manometer Panel features two acrylic tubes and valving mounted on an aluminum rail with a 100 cm long dual-graduated scale. Each tube has its own valve, making it possible to run two independent permeability tests.

Specifications

Scale.	100 cm long with cm and mm graduations.
Rail.	Aluminum construction with holes for wall mounting.
Flow Tubes.	Acrylic; each with its own flow control valve.
Weight.	Net 7 lbs. (3.2 kg).

Ordering Information

EI25-0567.



Constant Head Tank System

ASTM D-2434.

The system consists of an acrylic tank with regulating valve for flow control of water. A porous media is used at the bottom of the tank to filter out air bubbles.

The unit maintains a constant water head by utilizing an overflow port. It also allows for connection to a tap water or de-aired water source. A wall mounting support, consisting of two rails with adjustable height brackets and tubing for connection between the tank and permeameter is included.

Specifications

Tank.	1000 cc. capacity, Clear acrylic with regulating valve.
Other Components.	Wall mount, tubing and saddle valve.
Weight.	Net 8 lbs. (3.6 kg).

Ordering Information

EI25-0568.



Compaction Permeameters

- Available in either 4" (101.6 mm) or 6" (152.4 mm) diameter models.
- Sturdy construction for testing all types of materials.
- Overflow valve assembly permits easy air removal before testing.

Compaction Permeameters are designed for performing either constant head or falling head permeability tests on undisturbed, remolded or compacted soils.

Specifications

Mold.	Machined seamless steel tubing; plated.
Capacity.	EI25-0618: 1/30 cu. ft.; 4" i.d. x 4.584" h. (101.6 x 116.4 mm). EI25-0619: 0.1145 cu. ft.; 6" i.d. x 7" h. (152.4 x 177.8 mm).
Collar.	2" h. (50.8 mm); machined seamless steel tubing; fits either end of mold; plated.
Top.	Cast aluminum; with overflow valve assembly and water connection.
Base.	Cast aluminum; with inlet/outlet fitting.
Porous Stone.	EI25-0618: 4" diam. x 1/2" thick (101.6 x 12.7 mm). EI25-0619: 5-15/16" diam. x 1/2" thick (150.8 x 12.7 mm). 50-70 permeability rating; 225 micron, average pore size.
Weights.	EI25-0618: Net 12 lbs. (5.4 kg). EI25-0619: Net 24 lbs. (10.9 kg).

Ordering Information

- EI25-0618.** Compaction Permeameter; 4" (101.6 mm).
EI25-0619. Compaction Permeameter; 6" (152.4 mm).

Accessories

- EI25-0620.** Constant and Falling Head Accessory Kit. Includes a burette and meter stick for falling head tests and a constant head funnel both mounted on a support stand.



Combination Permeameter Constant or Falling Head

- Plated steel chamber head assembly.
- Rust-resistant cast aluminum base assembly.
- Includes accessories for conducting both constant and falling head permeability studies.

The Combination Permeameter is designed for laboratory determinations of permeability of either fine-grained or coarse-grained soils. Generally, soils containing 10 percent or more particles passing a no. 200 sieve are tested using the falling head assembly. More granular soils, containing 90 percent or more particles retained on the no. 200 sieve, are tested using the constant head assembly.

In constant head permeability testing, a plastic funnel reservoir with overflow port is mounted on an upright attached to the chamber head. A maximum head of up to 55 cm is possible by placement of the reservoir on the upright.

Falling head permeability studies are possible using the graduated pipette falling head reservoir which has a volume of 100 cc. Maximum head is 100 cm. Clear plastic chamber accepts 2-1/2" (63.5 mm) diameter specimens, ranging from 2-1/2" (63.5 mm) to 5-1/2" (140 mm) long.

Specifications

Specimen Size.	2-1/2" diam. x 2-1/2" l. max. (63.5 x 63.5 mm) when using lower chamber only; 2-1/2" diam. x 5-1/2" l. max. (63.5 x 140 mm) when using both lower and extension chambers.
Chamber.	Clear lucite; 1/4" (6.3 mm) wall; two sections.
Base.	Cast aluminum.
Top Seal.	Plated steel with gaskets.
Porous Stones.	Mounts at top and bottom; 2.47" diam. x 1/2" thick (62.7 x 12.7 mm); 105-120 permeability rating; 300 micron, average pore size.
Constant Head.	Plastic; funnel reservoir; 55 cm maximum head.
Falling Head.	Graduated pipette; 100 cc x 0.2 cc; 100 cm. maximum head.
Weight.	Net 11 lbs. (5 kg).

Ordering Information

EI25-0623.