Dependable Products From People You Trust

HTHP Filter Press for Cement Testing

with 175-mL, Double-Capped Test Cell and N_2 Pressuring Manifold

#170-00-2: (115 V)
#170-01-2: (230 V)

Instruction Manual

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Ver. 6

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Intro

The OFITE HTHP (High Temperature, High Pressure) Filter Press is designed for testing cement under elevated temperatures and pressures. It simulates various downhole conditions and provides a reliable method for determining the effectiveness of the material being tested. The complete assembly consists of the following:

- A controlled Nitrogen pressure source (not included)
- A pressure manifold with two regulators (primary and back pressure)
- A high-pressure test cell with removable cement screens
- A heating jacket for heating the test cell
- A suitable stand

Specifications

Size:	7.5" × 11" × 23.5" (19.1 × 27.9 × 59.7 cm)
Weight:	27 lb (12.3 kg)
Shipping Size:	17" × 23.5" × 12.5" (43.2 × 59.7 × 31.8 cm)
Shipping Weight:	38 lb (17.2 kg)
Maximum Temperature (Heating Jacket):	350°F (177°C)
Maximum Pressure:	2,000 psi (10,343 kPa)
Pressure Source:	Nitrogen (at least 1,500 psi / 10,343 kPa) - Not Included
Test Cell Capacity:	175 mL
Power Requirement:	#170-00-2: 115V, #170-01-2: 230V
Heater:	400 Watt

Components

#153-14 Graduated Cylinder, 50 mL × 1 mL
#154-10 Dual-Scale Thermometer with Dial, 5" Stem, 50°–500°F (0°–260°C)

#170-00-1 Heating Jacket (115V) -OR-
#170-01-1 Heating Jacket (230V):
- #130-10-52 Jam Nut, ⅜"-24, Stainless Steel, Qty: 2
- #130-38-005 Strain Relief
- #164-32 Male Connector for Power Cable (230V Only)
- #170-05-001 Thermostat
- #170-09 Insulation Board
- #170-10 Thermostat Pilot Lot
- #170-11 Heating Element, 115V, 200W, Qty: 2
- #170-15 Base
- #170-21 Stand Support Rod, Qty: 2
- #170-25 Aluminum Well
- #170-30 Stainless Steel Thermostat Cover
- #170-30-001 Fish Paper
- #170-44 ½" Rubber Foot, Qty: 4
- #171-32 Midget Knob
- #171-82 AC Power Cord (115V Only)

#170-06-1 Back Pressure Receiver, 15-mL Stainless Steel Tube for N_2
- #144-11 ⅛" 90 Street Ell
- #144-15 Plate Brass Bushing, ¼" NPT Male to ⅛" NPT Female
- #170-07 O-ring
- #170-28 Receiver Body
- #170-32 Needle Valve, Male, ⅛" × ⅛" NPT
- #171-23-1 Safety Pin with Lanyard

#170-19 Filter Paper, 2½" (6.35 cm), Specially Hardened for Filter Presses
#170-35 6" Adjustable Wrench

#170-45 Test Cell Assembly, Double-Capped for Cement Testing, With Cement Screens, 2,000 psi
- #170-13-3 O-ring, Viton, Qty: 4
- #170-16 Valve Stem, Qty: 2
- #170-17 Valve Stem O-ring, Qty: 4
- #170-18 Detachable Screen, 325-Mesh with 60-Mesh Backup, Qty: 2
- #170-24 2,000-psi End Cap, Qty: 2
- #170-26-1 Hardened Locking Screw, Qty: 12
- #170-27 ⅝₂" Allen Wrench
- #170-45-3 Cell Body

#171-24 1350 / 750 psi (9,308 / 5,171 kPa) Nitrogen Manifold
- #142-39 Pipe Plug, ¼", Qty: 2
- #170-20 Manifold Block
- #170-32 Needle Valve, Male, ⅛" × ⅛" NPT
- #171-23-1 Safety Pin with Lanyard
- #171-24-002 Regulator, Qty: 2

#171-24-1	Chrome Nut, R.H., Reg Inlet CGA-580
#171-24-2	Nipple with Filter
#171-24-3	Fitting, ¼" Flare × ⅛" FNPT Female
#171-24-5	Fitting, ¼" NPT Street Tee, 316 Stainless Steel, Qty: 2
#171-25-1	Relief Valve set at 750 psi (5,171 kPa)
#171-25-2	Relief Valve set at 1,350 psi (9308 kPa)
#171-26	5,000# Hose, 3⁄16" × 3', Qty: 2
#171-28	Dual Manifold Body
#171-38	Gauge, 1,000 psi, 2½", ¼" NPT Bottom
#171-40	Gauge, 1,500 psi, 2½", ¼" NPT Bottom
#171-42	Gauge, 3,000 psi, 2½", ¼" NPT Bottom
#171-90-06	Reducing Bushing, ¼" MNPT × ⅛" FNPT, 316 Stainless
#171-90-07	Hex Nipple, ¼" NPT, Qty: 2
#171-90-13	Fitting, ¼" Flare × ¼" Male NPT

Optional:

#170-37	Nitrogen Cylinder, 21" × 7", Right-hand Thread

#170-00-2-SP Spare Parts for One Year:

#153-14	Glass Graduated Cylinder, 50 mL × 1 mL, Qty: 2
#154-10	Dual-Scale Thermometer with Metal Dial, 5" Stem, 50°–500°F (10°–260°C)
#170-07	O-ring for Back Pressure Receiver, Qty: 3
#170-13-3	Test Cell O-ring, Viton, Qty: 24
#170-16	Valve Stem, Qty: 4
#170-17	Valve Stem O-ring, Qty: 48
#170-18	Detachable Screen with 325 Mesh and 60 Mesh Backup, Qty: 4
#170-26-1	Hardened Locking Screw, Qty: 24
#171-23-1	Safety Pin with Lanyard, Qty: 2

Safety

Nitrogen must be supplied in an approved Nitrogen gas cylinder and secured to meet safety standards.

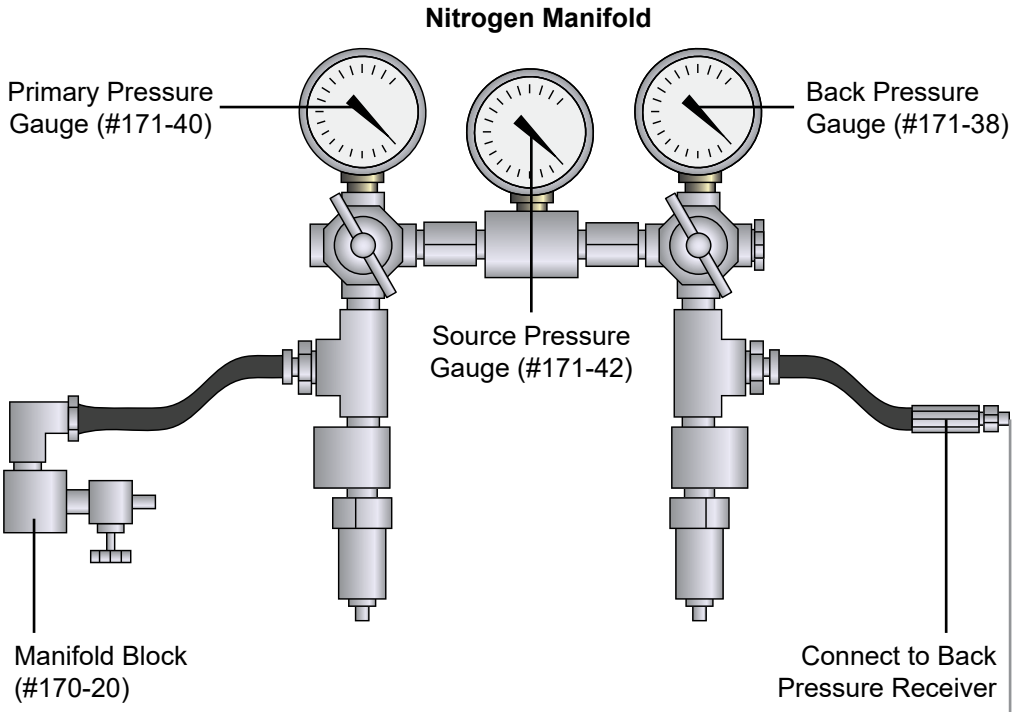
Do not use Nitrous Oxide cartridges as pressure sources for high-temperature, high-pressure (HTHP) filtration. Under high temperature and pressure, Nitrous Oxide can detonate in the presence of grease, oil, or carbonaceous materials. Nitrous Oxide cartridges are to be used only for Garrett Gas Train Carbonate Analysis.

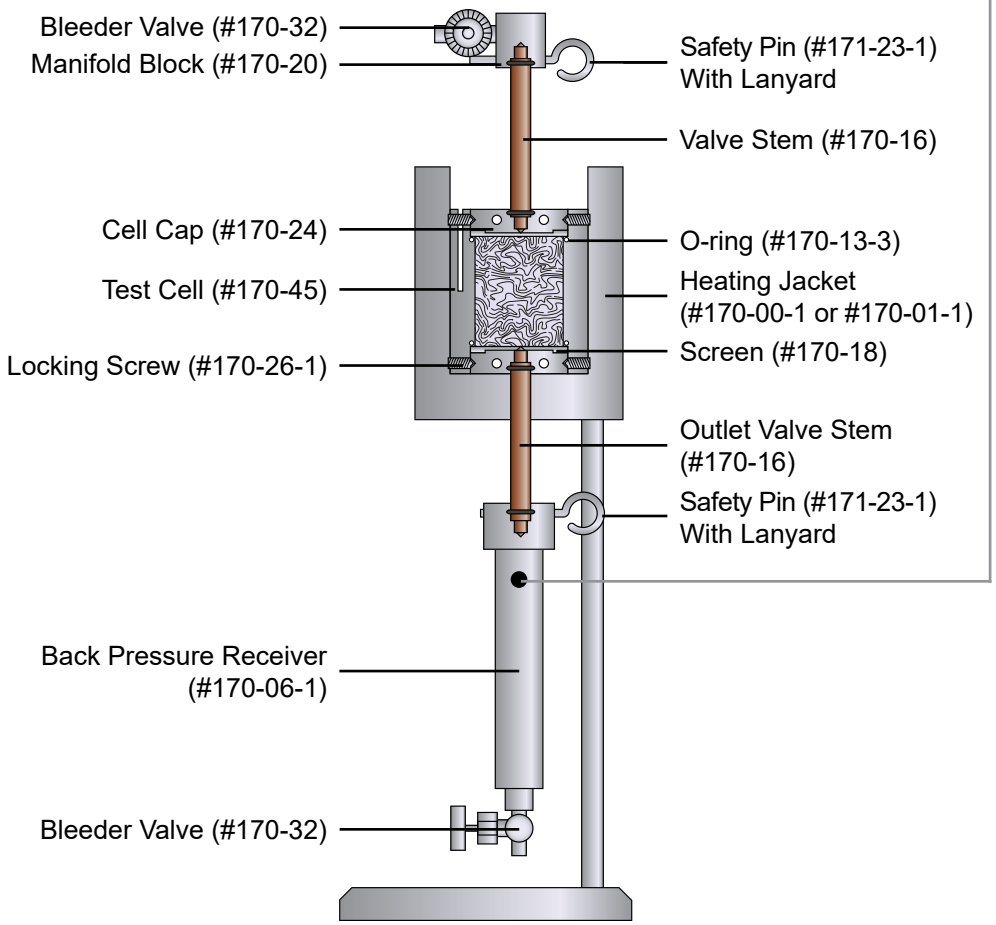
Due to the high temperatures and pressures involved in this test, extreme care must be exercised at all times. All safety precautions must be met, especially in the cell breakdown procedure after the filtration procedure has been completed.

Cell Corrosion
Test fluids under high tempreature and pressure can corrode the cell body and caps. Carefully inspect the cell body and calls for corrosion before and after each test.

Some materials are more susceptible to corrosion than other. Also, some fluids and additives are more corrosive than others. OFITE offers a variety of cell materials for different levels of corrosion resistance and cost.

Diagrams


Nitrogen Manifold
Primary Pressure Gauge (#171-40)
Source Pressure Gauge (#171-42)
Back Pressure Gauge (#171-38)
Manifold Block (#170-20)
Connect to Back Pressure Receiver


Bleeder Valve (#170-32)
Manifold Block (#170-20)
Safety Pin (#171-23-1) With Lanyard
Valve Stem (#170-16)
Cell Cap (#170-24)
O-ring (#170-13-3)
Test Cell (#170-45)
Heating Jacket (#170-00-1 or #170-01-1)
Locking Screw (#170-26-1)
Screen (#170-18)
Outlet Valve Stem (#170-16)
Safety Pin (#171-23-1) With Lanyard
Back Pressure Receiver (#170-06-1)
Bleeder Valve (#170-32)

Operation

1. Connect the heating well power cord to an appropriate power source. Place a dial-type metal thermometer into the well in the heating jacket and preheat to 10°F (6°C) above the desired test temperature. A pilot light will come on when the heating jacket is at the desired temperature as selected by the thermostat control knob.

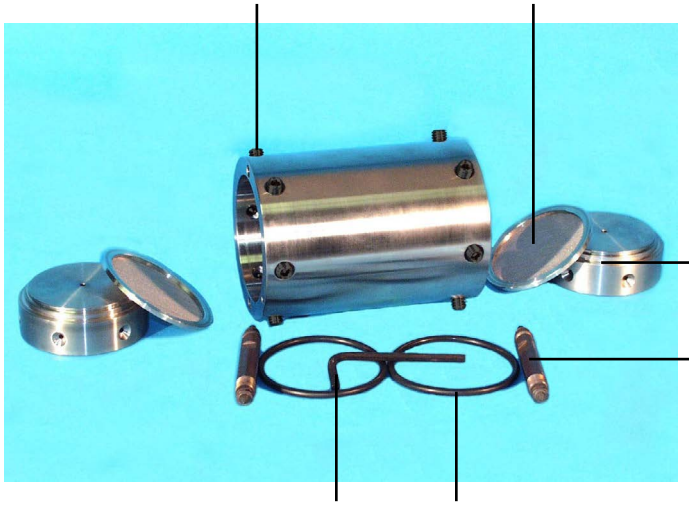
2. Be sure all of the o-rings on the valve stems are in good working condition (pliable with no nicks or cuts, etc.), and are not damaged during the assembly procedures. Place a thin film of silicone grease on all o-rings. Place an o-ring into one end of the test cell and place the screen on top of it with the flat side facing down. Slowly push one of the cell caps into the cell, making sure the arrow on the cap lines up with the arrow on the cell body. Tighten the locking screws with the supplied allen wrench. Screw a valve stem into the cell cap and tighten it completely.

Note

Standard Buna N o-rings (#170-13) should be used only for tests up to 300°F (149°C). For tests over 300°F (149°C), use Viton® o-rings (#170-13-3). After tests that come close to the maximum temperature, it will probably be necessary to replace the o-rings.

Important

If the cap locking screw seats are oval shaped and no longer round, there is a possibility of stress failure and the cap should be replaced.

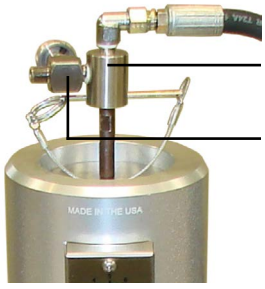


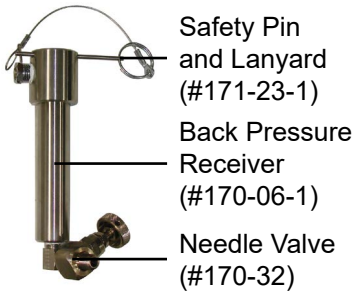
3. Prepare the test sample according to API specifications. Carefully pour the sample into the cell. Do not fill the cell closer than 0.5" (13 mm) from the o-ring groove to allow for heat expansion of the fluid. Be careful not to spill fluid on the o-ring groove inside the cell.

4. Repeat step 2 on the other end of the cell.

5. Place the cell in the heating jacket. Rotate the cell in the heating jacket so that the pin in the bottom of the heating well seats into the hole in the bottom of the cell. This will anchor the cell inside the well and prevent the cell from rotating as the valve stems are opened and closed. Transfer the thermometer from the heating jacket to the thermometer well within the cell.

6. Connect the pressuring assembly to the top valve stem and lock it in place with the retaining pin. Place the back pressure receiver on the bottom valve assembly and also lock it in place with the retaining pin.





7. Unscrew the T-screws (counter-clockwise) on the pressure manifold to make sure both regulators are completely closed. Connect a nitrogen cylinder (at least 1,500 psi) to the center inlet on the pressure manifold. Open the pressure release valve on the nitrogen bottle and note the bottle pressure as registered on the middle manifold gauge.

8. Keeping the valve stems closed, adjust the two regulators on the nitrogen manifold to the recommended back pressure for your test (refer to the chart below). Open (loosen) the top valve stem ½ turn to pressurize the sample. Maintain this pressure on the fluid until the desired temperature is stabilized as indicated by the thermometer. The heating time of the sample should never exceed one hour.

   The upper and lower limits of the test pressure differential are determined by the test temperature. As this temperature exceeds 212°F (100°C), the back pressure must be increased in order to prevent vaporization of the filtrate. The 1,000 psi differential pressure must be maintained, so the top pressure will have to be increased accordingly. The table below shows the pressures recommended for various test temperatures.

Recommended Minimum Back Pressure

Test Temperature		Vapor Pressure		Minimum Back Pressure	
°F	°C	psi	kPa	psi	kPa
200-299	95-149	12.1-67	84-462	100	700
300-374	150-189	67-184	462-1269	200	1400
375-399	190-199	184-247	1269-1704	275	1900
400-424	200-219	247-326	1704-2245	350	2500
425-450	220-230	326-422	2245-2912	450	3100

9. When the fluid sample reaches the desired test temperature, increase the primary pressure (the regulator on the left) to 1,000 psi (3,448 kPa) more than the back pressure. Open (loosen) the bottom valve stem ½ turn to initiate filtration.

10. Collect the filtrate for 30 minutes maintaining the selected test temperature within ± 5°F (± 3°C). If the back pressure rises above the recommended setting during the test, cautiously reduce the pressure by opening the valve on the receiver and drawing off some of the filtrate into the graduated cylinder.

11. At the end of the test, close (tighten) the top and bottom valve stems to seal off the cell. Turn the regulator t-screws counter-clockwise to close off the flow of pressurized gas. Open the valve on the back pressure receiver to collect all of the filtrate in the graduated cylinder. Release the remaining pressure from the nitrogen manifold by opening the bleeder valve on the manifold block.

12. Remove the top and bottom valve stem retaining pins and remove the manifold block and the back pressure receiver. Drain any residual filtrate collected in the receiver into the graduated cylinder. Remove the cell from the heating jacket after once again checking that the cell valve stems are tightly closed. Allow it to cool to room temperature or quick cool the cell by immersion in cool water.

    Pressure inside the sample cell will still be approximately 1,000 psi (3,450 kPa). Keep the cell upright and cool it to room temperature before disassembling. The cell must be cool for at least one hour at room temperature or at least 10 minutes in cool water before loosening the cap locking screws and removing the cell cap.

Important

13. Correct the total filtrate volume collected to a standard filtration test area of 7.1 in^2 (45.8 cm^2) by doubling the filtrate volume collected in 30 minutes. Record this total filtrate volume (doubled), temperature, pressure, and time.

14. Place the cooled cell upright with the outlet (cap side) or filter side down. Open (loosen) the inlet valve stem to bleed off pressure from the cell body.

    It is a good idea to open the valve stem with the cell inside a sink, or with a rag over the valve stem in order to catch any liquid that might be ejected.

Tip

15. Loosen, but do not remove, the six cap locking screws, and separate the cap from the cell with a slight rocking motion. Discard the fluid inside the cell unless it is required for further testing.

16. Clean and dry the apparatus thoroughly after each use. Inspect and, if necessary, replace all of the o-rings.

Warranty and Return Policy

Warranty:

OFI Testing Equipment, Inc. (OFITE) warrants that the products shall be free from liens and defects in title, and shall conform in all respects to the terms of the sales order and the specifications applicable to the products. All products shall be furnished subject to OFITE's standard manufacturing variations and practices. Unless the warranty period is otherwise extended in writing, the following warranty shall apply: if, at any time prior to twelve (12) months from the date of invoice, the products, or any part thereof, do not conform to these warranties or to the specifications applicable thereto, and OFITE is so notified in writing upon discovery, OFITE shall promptly repair or replace the defective products. Notwithstanding the foregoing, OFITE's warranty obligations shall not extend to any use by the buyer of the products in conditions more severe than OFITE's recommendations, nor to any defects which were visually observable by the buyer but which are not promptly brought to OFITE's attention.

In the event that the buyer has purchased installation and commissioning services on applicable products, the above warranty shall extend for an additional period of twelve (12) months from the date of the original warranty expiration for such products.

In the event that OFITE is requested to provide customized research and development for the buyer, OFITE shall use its best efforts but makes no guarantees to the buyer that any products will be provided.

OFITE makes no other warranties or guarantees to the buyer, either express or implied, and the warranties provided in this clause shall be exclusive of any other warranties including ANY IMPLIED OR STATUTORY WARRANTIES OF FITNESS FOR PURPOSE, MERCHANTABILITY, AND OTHER STATUTORY REMEDIES WHICH ARE WAIVED.

This limited warranty does not cover any losses or damages that occur as a result of:

- Improper installation or maintenance of the products
- Misuse
- Neglect
- Adjustment by non-authorized sources
- Improper environment
- Excessive or inadequate heating or air conditioning or electrical power failures, surges, or other irregularities
- Equipment, products, or material not manufactured by OFITE
- Firmware or hardware that have been modified or altered by a third party
- Consumable parts (bearings, accessories, etc.)

Returns and Repairs:

Items being returned must be carefully packaged to prevent damage in shipment and insured against possible damage or loss. OFITE will not be responsible for equipment damaged due to insufficient packaging.

Any non-defective items returned to OFITE within ninety (90) days of invoice are subject to a 15% restocking fee. Items returned must be received by OFITE in original condition for it to be accepted. Reagents and special order items will not be accepted for return or refund.

OFITE employs experienced personnel to service and repair equipment manufactured by us, as well as other companies. To help expedite the repair process, please include a repair form with all equipment sent to OFITE for repair. Be sure to include your name, company name, phone number, email address, detailed description of work to be done, purchase order number, and a shipping address for returning the equipment. All repairs performed as "repair as needed" are subject to the ninety (90) day limited warranty. All "Certified Repairs" are subject to the twelve (12) month limited warranty.

Returns and potential warranty repairs require a Return Material Authorization (RMA) number. An RMA form is available from your sales or service representative.

Please ship all equipment (with the RMA number for returns or warranty repairs) to the following address:

OFI Testing Equipment, Inc.
Attn: Repair Department
11302 Steeplecrest Dr.
Houston, TX 77065
USA

OFITE also offers competitive service contracts for repairing and/or maintaining your lab equipment, including equipment from other manufacturers. For more information about our technical support and repair services, please contact techservice@ofite.com.