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Compressive Strength Tester

#120-28: 115 Volt
#120-28-1: 230 Volt

Instruction Manual

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Ver. 1.6

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Intro

The OFITE Automated Compressive Strength Tester was designed to determine the compressive strength of a well cement. The most common means of determining the compressive strength of a cement involves applying a force to the sample at a constant rate until the sample fails. The maximum loading at which the cement fails is defined as the cement's compressive strength. Unfortunately, data obtained from this type of testing is typically inconsistent and widely varied. Manually operated hydraulic presses are normally used for testing purposes and maintaining a constant loading rate is very difficult. The OFITE Automated Compressive Strength Tester incorporates a personal computer to control the loading rate. Operator inconsistencies are significantly reduced in comparison to manually operated hydraulic presses.

Description

A cement slurry is prepared according to the guidelines outlined in API Specification 10 and placed into typical 2" x 2" x 2" cement molds. The molds are placed into a Curing Chamber (Autoclave) and allowed to cure at either simulated well conditions or at temperatures and pressures classified by a schedule within API Specification 10. The cement specimens are allowed to cure for a predetermined amount of time and then removed from the Curing Chamber. The sample is then placed onto the platen of the Curing Chamber. The hydraulic unit is turned on and the loading rate selected.

Specifications

- Maximum press capacity: 16,000 lbs
- Self-aligning hardened platens
- Microprocessor controller
- Loading rates variable from 200 to 4,000 PSI/min
- Safety head and rupture disk prevent over pressurization
- Digital-instrumentation incorporates high pressure alarms
- Proportional control valve accurately controls load rate
- Safety shield protects operator
- Control stand remotely located from hydraulic press
- Dual switch procedure ensures operator safety
- Crated Size: 56 x 50 x 32 inches (142 x 127 x 81 cm)
- Crated Weight: Approximately 1,000 lbs (454 kg)

Requirements

- 115 Volt, 50/60 Hz, requires 1 KVA
- 220 Volt, 50/60 Hz, requires 1 KVA

Installation

1. Carefully remove the instrument from the wooden crate.
2. Leveling legs are provided to level the instrument. Rotate the legs until the instrument is level.
3. Plug the unit into a suitable grounded electrical supply.

Testing



Tip

1. Turn the unit on.
2. Place the cement specimen on the lower platen of the hydraulic cylinder.
3. Adjust the upper platen so that it is touching the specimen.

To adjust the upper platen, loosen the two locking nuts above the platen, then turn the two lower nuts to adjust the height of the platen. Once the platen is in place, re-tighten the upper nuts. The surfaces of the two platens should be parallel.

4. Close the safety shield before beginning the test.
5. Open the Compressive Strength Tester software on the PC.
6. From the “Utilities” menu, select “Setup”.

“**DAQmx Device Name**” - select the device name for the DAQ card

“**Load Unit**” - select PSI, mPa, or lbft. If you select “Constant” for the loading type, this option is unavailable.

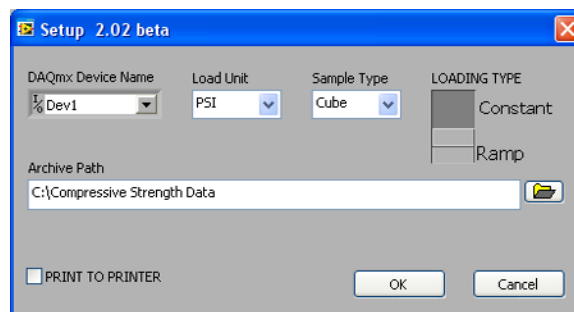
“**Sample Type**” - select cube or cylinder

“**Loading Type**” - Choose “Constant” to apply a constant amount of pressure to the sample. Choose “Ramp” to steadily increase the load on the sample until it breaks.

“**Archive Path**” - choose the folder you would like the test data to be saved in

“**Print to Printer**” - Check this box to have the graph automatically printed to the printer at the end of a test.

After a test is saved to a file, it can be recalled and printed by selecting “Open Data Archive” from the “File” menu.



Setup

7. Select "Load Sample Infos" from the "File" menu. Enter the information and click "OK". This information will display on the report at the end of the test. It will not affect the test results.

The screenshot shows a software dialog box titled "Load Cell Info 2.02 beta". It contains the following fields and controls:

- Test Name: [Text Input]
- Cube Number: [Text Input]
- Customer: [Text Input]
- Additives: [Text Input]
- Cement Mfr: [Text Input]
- Job Type: [Dropdown Menu] (Selected: Surface)
- Cement Class: [Dropdown Menu] (Selected: A)
- BHCT: [Text Input] (Value: 20.0)
- BHST: [Text Input] (Value: 20.0)
- Cement Density: [Text Input] (Value: 0.0)
- Density Units: [Dropdown Menu] (Selected: lb/gal)
- Comments: [Text Area]
- OK: [Button]
- Cancel: [Button]

8. On the main screen, input the dimensions (in inches) of the cement sample.

9. If you chose “Ramp” for the loading type on the setup screen, you will need to choose a loading rate from the “Load Rate” drop-down menu. Your choices are 4,000 lbf/min, 16,000 lbf/min, and Variable. If you choose variable, enter the rate in the field below.

If you chose “Constant” for the loading type on the setup screen, you will need to enter the load (in lbf) in the “Constant Load” field.

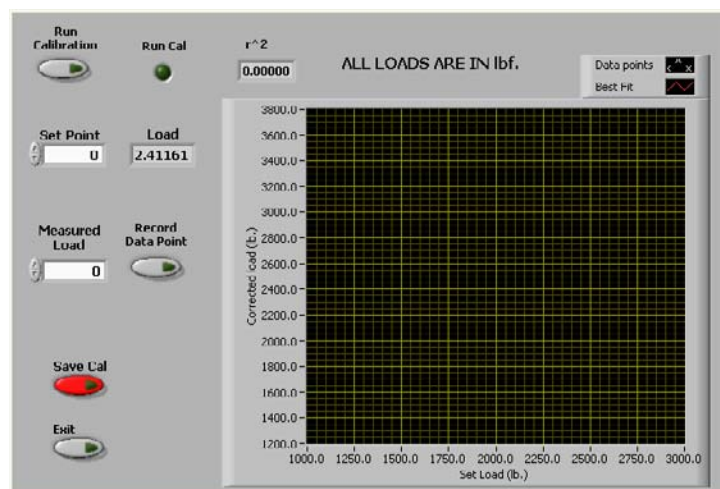


10. Click the “Pump On” button to start the pump. Fluid will now be circulating throughout the system, but the hydraulic ram will not yet be moving.
11. Click and hold the “Start Test” button to begin the test. The hydraulic ram will begin applying pressure to the specimen.
12. Hold down the “Start Test” button while observing the specimen. When the specimen fails, release the “Start Test” button to stop the test and the pump.
13. The “Max Load (PSI)” field shows the maximum load that was applied to the specimen before the test ended. This value is the compressive strength of the specimen.

Calibration

The Compressive Strength Tester can be calibrated with a specially designed load cell. To calibration the unit:

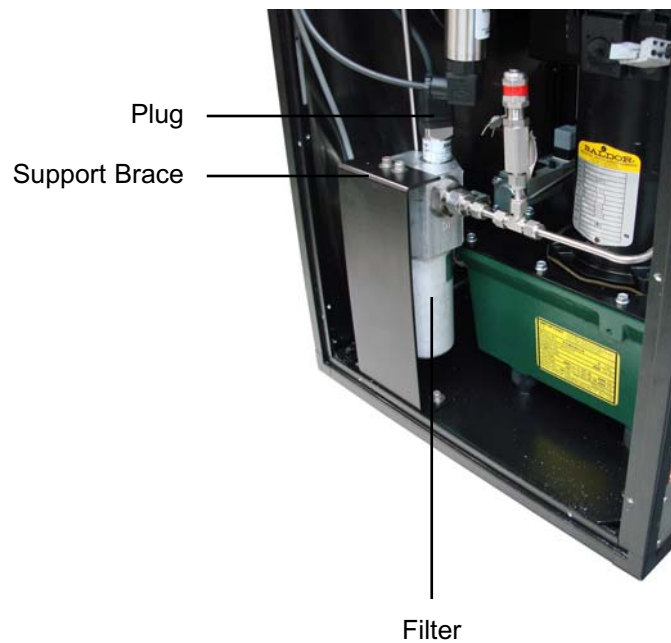
1. Place the load cell between the two platens. Make sure the upper platen is not touching the cell.
2. Zero the reading on the load cell. Refer to the documentation provided with your specific load cell for instructions.
3. Once the cell is zeroed, adjust the upper platen so that it touches the load cell. For instructions on adjusting the upper platen, see step 3 on page 4.
4. Click the “Pump On” button on the Main Screen.
5. Choose “Calibration” from the “Utilities” menu.
6. Enter 1000 in the “Set Point” field and click the “Run Calibration” button.
7. When the value in the “Load” field has stabilized, click the “Record Data Point” button. The software will plot the point on the graph.
8. Repeat step 7, increasing the value by 1000 each time, up to 8000.
9. When all point have been plotted, click the “Save Cal” button and then click “Exit”.
10. Turn off the pump.
11. To recall a calibration graph later, select “Open Calibration Archive” from the “File” menu.



Maintenance

The system incorporates a filter to keep the hydraulic fluid clean. If the filter needs to be cleaned, the "Filter" light on the front of the unit cabinet will come on to alert you. Remove the filter element from the filter housing and clean it with a mild solvent and/or ultrasonic cleaner.

1. Remove the panel on the right-hand side of the unit cabinet.
2. Unplug the filter.
3. Unscrew the connecting pipes to the filter.
4. Remove the screws from the support brace.
5. Remove the filter from the unit.
6. Thoroughly clean the filter with a mild solvent or an ultrasonic cleaner.
7. Return the filter to the unit and reattach the panel to the unit cabinet.



After cleaning the filter, replace the oil in the pump.

1. Remove the lower panel from the back of the unit cabinet.
2. Remove the red cap from the top of the pump and drain the oil from the reservoir.
3. Replace the oil with clean, hydraulic-grade oil.
4. Place the red cap back onto the pump and reattach the back panel.



Pump Reservoir Access