



## The James Poroscope-Plus

**The field test for air and water permeability of concrete using the Figg technique.**

### ***Features and Benefits***

- Both air and water permeability are measured by the same instrument.
- Permeability both at the concrete surface as well as within the concrete mass can be determined.
- Porosity in sealants and surface mortars can be checked.
- The test is non-destructive (only a small plugged hole required) and can be completely carried out on site.
- Each test can be completed in only a few minutes and gives reliable reproducible results.
- The test enables meaningful concrete durability predictions to be made.

# The James Poroscope-Plus



**Air Permeability**



**Water Permeability**

## **Internal Test**

A hole 10 mm diameter x 40 mm deep is drilled and plugged leaving a cylindrical test void 10 mm diameter x 20 mm high situated 20 mm below the concrete surface. The time required for air and water to permeate through the test material to the void is used as an index to determine the quality of the concrete under test.

## **Air Permeability**

The air permeability test is always done first since moisture has a large effect on permeability. Connect the air outlet tube on the instrument to the Luer connector on the top of the hypodermic needle. Connect the hand operated vacuum pump to the air connection on the top of the instrument and evacuate to greater than 55 kPa. The instrument timer and manometer will automatically show the time in seconds for the vacuum to fall from a - 55 kPa to a - 50 kPa. This time is the Figg number and is a measure of the air permeability of the concrete.

## **Water Permeability**

Connect the water outlet tube to the Luer socket on the top of the hypodermic and ensure that the fine plastic inner tube is of sufficient length to reach the bottom of the test cavity. After filling the syringe with distilled water connect it to the water inlet on top of the instrument. The water is then forced into the cavity and the air displaced out through the outer tube through the overflow tube which is 4 inches (100 mm) above the surface of the concrete. The cavity is filled when water starts to flow out the overflow tube. The instrument flow sensor and timer then automatically measures the time taken for the water meniscus to travel a distance of 50 mm and this time in seconds is displayed on the LCD display of the instrument. The time in seconds is the Figg number for water permeability.

## Surface Permeability Test

Measurements are carried out at the surface by clamping a stainless steel chamber on the smooth surface of the concrete. An exactly dimensioned cup grinding wheel is used to smooth the sealing surface of the concrete if necessary. A measurement of the time required for related amounts of air and water to permeate through the concrete is used as an index of the surface conditions. This time can then be used to determine the condition of any concrete sealant or surface mortar.

## Surface Test Details

A stainless steel surface chamber with the same surface area and exactly twice the volume of the hole used in the internal test is now used as the void for this test.

The method of sealing the surface chamber to the concrete eliminates the possibility of variation in the test due to sealants seeping into the chamber, or voids along the sealing surface. The surface chamber is sealed to the concrete by grinding a smooth donut in the surface with the cup wheel provided. This cup wheel is sized to exactly match the dimensions of the surface chamber. A pair of o-rings mounted concentrically in the surface testers' flange is then used to seal the chamber to the surface. The two o-rings eliminate the possibility of a surface void in the material being tested defeating the test. After clamping the surface chamber to the surface a strong seal is now provided with no variation in volume.

This surface chamber is now used as the void for testing porosity of the surface. Rather than the walls of the hole being the tested surface the surface that the chamber is sealed against is now the surface tested. This provides a check for water and air penetration through concrete sealants, surface mortars and any other methods used to seal construction material surfaces.

The surface chamber has been designed to easily accommodate attachment to the instrumentation. By first performing the air test as outlined in the internal test and then the water test the instrumentation will provide the time required for the chamber to lose 5 kPa vacuum or once filled with water, 0.01 ml water. With the surface tester attached to the instrument both a Figg number and direct indices for air and water surface permeability can be established.



**Surface Air Permeability Test**

# The James Poroscope-Plus

## Technical Specifications



**Poroscope Plus Complete System**



**Poroscope Molded Hole Plug**

## Technical

The ingress of air and moisture into the concrete can cause corrosion of the steel reinforcement and lead to a deterioration in concrete strength. Therefore, a measure of the ease of movement of liquids and gases through the surface layer of the concrete is a better method of assessing the soundness and expected life of concrete than strength alone. Permeability is recognized as being the most important parameter in assessing concrete durability.

The air permeability test involves measuring the time taken for air to flow into a known volume of a sealed, evacuated chamber in the concrete, reducing the vacuum from—55 kPa to—50 kPa. This time is a measure of the air permeability of the concrete.

The water permeability test utilizes the same sealed chamber in the concrete which is completely filled with water and the total time in seconds for a volume of 0.01 ml of water to escape is taken as a measure of the water permeability of the concrete.

The moisture content of the concrete has a major effect on permeability. For example, fully saturated concrete is almost impermeable to air and results in extremely long times in the water permeability test. For effective testing the concrete should be dry and the near surface moisture content measured.

Permeability test results have shown that there is a good correlation with both water/cement ratio and compressive strength of the concrete.

## Specifications

<b>Weight, complete in carrying case</b>	12.0 lbs. (5.4kg)
<b>Dimensions</b>	17 x 12 x 6 inches 43 x 30 x 15 cm
<b>Power Supply</b>	Standard 9V Battery
<b>Grinding Wheel Rpm</b>	12000 max

## Sales Numbers

<b>C-P-6000</b>	Poroscope original system for internal permeability
<b>C-P-6060</b>	Pack of twenty-five test plugs
<b>C-P-6040</b>	Surface Chamber Kit for Poroscope Plus
<b>C-P-6050</b>	Poroscope Plus complete system

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