TORRENT

Permeability Tester

Fast, reliable and non-destructive measurement of the permeability of concrete structures

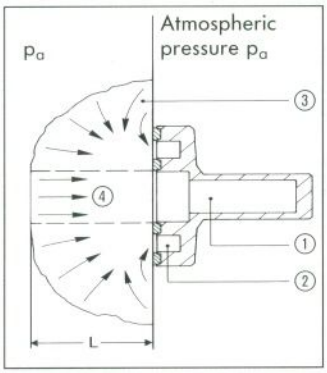
The permeability of concrete at the surface (cover concrete) has been recognized as a major factor determining the durability of concrete structures. Many specialists emphasize the importance of this property and the possibility of measuring it reliably – not only in the laboratory but also at the building site or at components.

Permeability Measurement

The particular features of the TORRENT method are a two-chamber vacuum cell and a pressure regulator, which ensure that an air flow at right angles to the surface is directed towards the inner chamber. This permits the calculation of the permeability coefficient kT on the basis of a simple theoretical model.

The unit has a user-friendly menu technique and measures the pressure increase as a function of time according to a specific sequence. The associated data is automatically collected by the display unit and the permeability coefficient kT and the depth of penetration L of the vacuum are calculated. The measurement takes 2-12 minutes, depending on the permeability of the concrete. In the case of dry concrete, the quality class of the concrete cover can be read from a table using the kT value. In the case of moist concrete, kT is combined with the electrical concrete resistance ρ (rho) and the quality class is determined from a nomogram.

Air flow to the two chambers of the vacuum cell



① Inner chamber
Pressure p_i
② Outer chamber
Pressure p_o
$p_o = p_i$
③ Air flow to the outer chamber
④ Air flow to the inner chamber
L = Depth of penetration of the vacuum

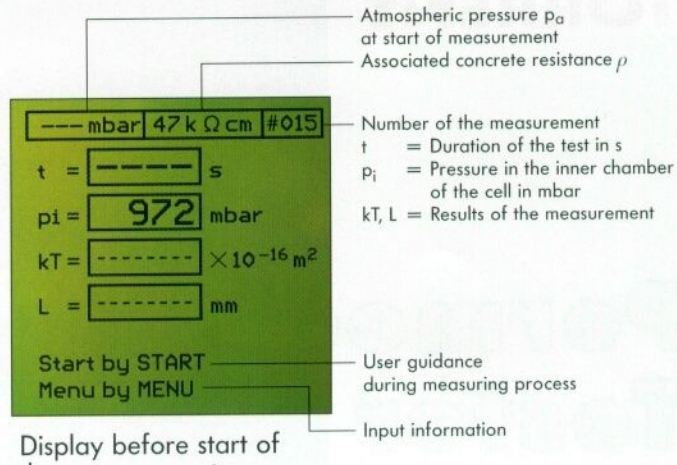
The TORRENT permeability tester is based on investigations which were carried out by the research centre of "Holderbank Management and Consulting Ltd.", Switzerland. The results of these measurements, which were made in the laboratory and on the building site, are in good agreement with laboratory methods, such as oxygen permeability, capillary suction, chloride penetration, etc.

ISO 9001

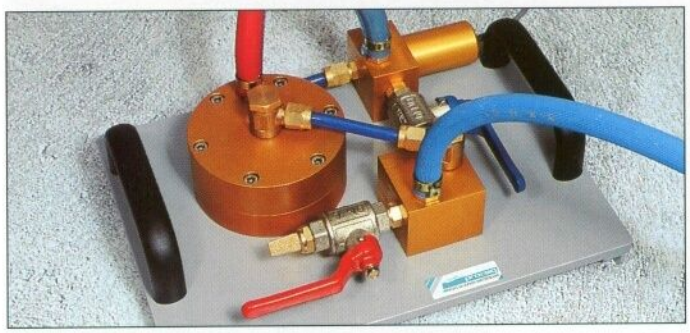
proceq

Basic Equipment

Display unit with nonvolatile 1 MB memory for up to 200 measured objects.
Display on 128 x 128 graphic LCD.
Interface RS 232 C.
Integrated software for printing out measured objects and transmission to PC.
Operation with batteries for 60 h or commercial 9 VDC / 0.2 A power unit
Temperature range –10° to +60 °C.
Carrying case 320 / 285 / 105 mm, total weight 2.1 kg.



Display before start of the measurement



Control unit with membrane pressure regulator and pressure sensor. Vacuum connection: small flange 16 KF.
Carrying case 520 / 370 / 125 mm, total weight 6.3 kg.

Two-chamber vacuum cell with sealing rings

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          #015
Rho   =    39    kOhmcm
pa    =  965.3  mbar
tmax  =  450    s
dpmax =   20.4  mbar
                      -16 2
kT    =  0.873*10     m
L     =   50.3  mm
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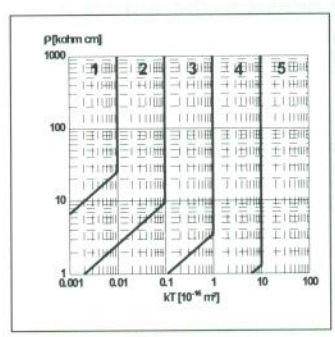
Printout of an object

The unit is operated with a commercial vacuum pump.
Technical data according to DIN 28400:
Suction capacity 1.5 m^3 / h, final total pressure 10 mbar, suction-side connection: small flange 10 KF / 16 KF, high water vapour toleration.

Accessory

WENNER - PROCEQ
Resistance probe

Active probe for determination of the concrete resistance ρ according to Wenner. The measured values are stored in the display unit for the respective object.



Nomogram
for concrete quality class

In the case of moist concrete, the measured permeability is lower, i.e. the concrete quality appears to be too good. This effect can be corrected using the electrical resistance ρ of the concrete. The concrete quality class is determined from kT and ρ in a nomogram.

Subject to changes

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