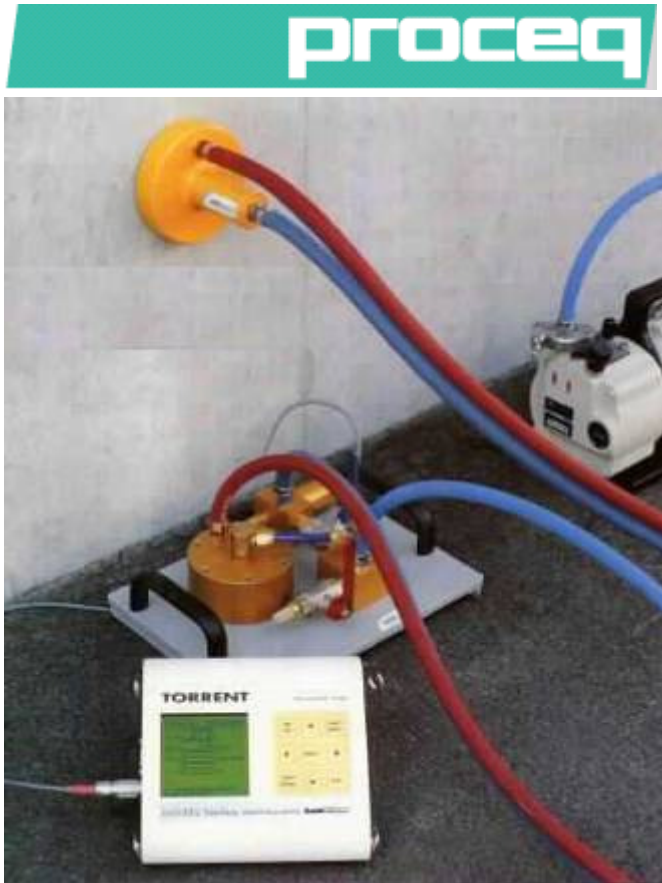


## TORRENT – Water Permeability

### TORRENT



TORRENT is manufactured by Proceq, a Swiss company certified under ISO9001. Proceq have over 50 years experience in manufacture of testing equipment.

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  $p$  ( $\rho$ ) and the

quality class is determined from a nomogram.

The TORRENT permeability tester is based on investigations which were carried out by the research center 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.

### TORRENT Kit

- ◆ **Display Unit**  
With non-volatile memory for up to 200 measured objects.  
Display on 128x128 graphic LCD.  
Interface RS 232.  
Print out of measured objects and transfer to PC with MS Hyperterminal.  
Battery operation with six 1.5 V, LR 6 batteries for 60 hours. Temperature range  $-10^{\circ}$  to  $+60^{\circ}\text{C}$ .
- ◆ **Transfer cable 9/9-poles, 1.5 m**
- ◆ **Printer cable 9/9+25-poles, 1.5/0.3 m for printer with serial interface**
- ◆ **Carrying strap**
- ◆ **Carrying case 325 x 295 x 105 mm.**
- ◆ **Control unit**  
With membrane pressure regulator, pressure sensor and two-chamber vacuum cell.  
Vacuum connection: small flange 16 KF.  
Carrying case 520 x 370 x 125 mm

### Vacuum Pump

The unit is operated with a commercial vacuum pump. This is not included in the basic unit.

Technical data according to DIN 28400:

Suction capacity 1.5 m<sup>3</sup>/h, final total pressure 10 mbar, suction-side connection: small flange 10 KF/16 KF, high water vapour toleration.

This pump can be ordered from the local agencies of LEYBOLD Vacuum ([www.leyboldvac.de](http://www.leyboldvac.de)).

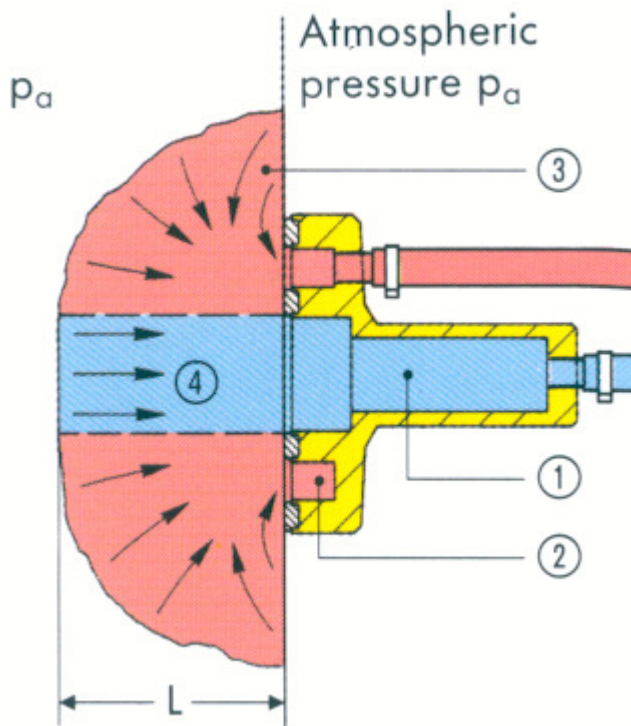


**Melbourne Office**  
Niddrie  
(03) 9938 3830  
[r.barnes@pcte.com.au](mailto:r.barnes@pcte.com.au)

**Perth Office**  
Nowergup  
(08) 9407 5363

**Website**  
[www.pcte.com.au](http://www.pcte.com.au)

**Sydney Office**  
Brookvale  
(02) 9939 7177

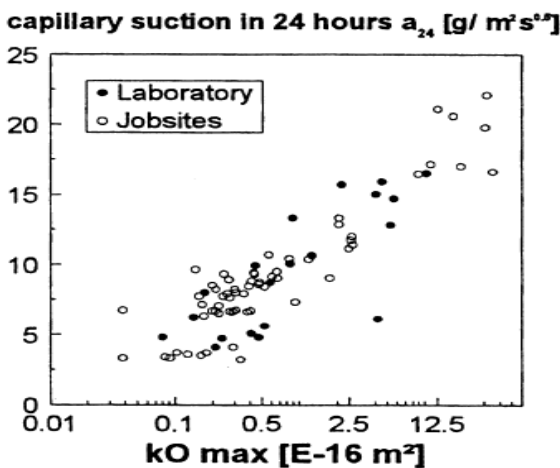


### Two Chamber Test

Two-chamber vacuum cell and pressure regulator ensure airflow at right angles to the surface into inner chamber

### Capillary Suction

Capillary suction is known to be related to permeability if the surface tension effects are not disturbed by water repellents.



**Fig. 6 : Relation between kO max and rate of capillary suction**

### Carbonation depth

Carbonation is related in one way to the penetrability of gas.

### About PCTE

PCTE have over 30years experience in the measurement and testing of concrete. With experience in research, consulting and construction they are able to assist you in reviewing the issues and developing solutions. PCTE can provide more than just the equipment. They can provide leading technical support for your business.

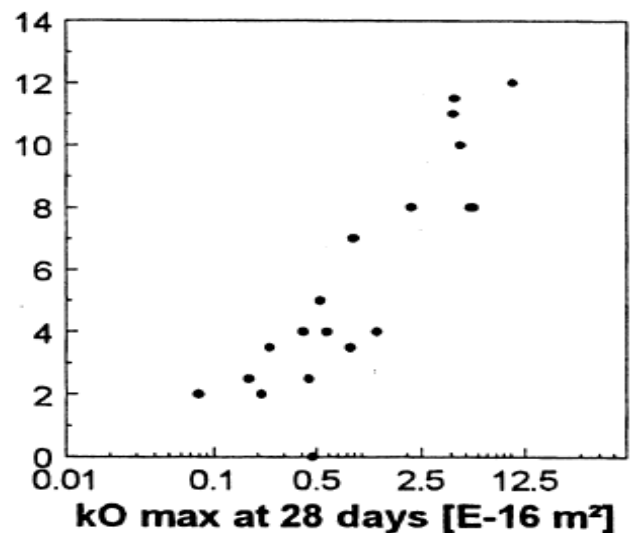
### Other Equipment

The full Proceq range of equipment is available for insitu non destructive concrete measurement

- Profometer Covermeter
- Schmidt rebound hammers
- Ultrasonic testing
- Electrical potentials
- Concrete resistivity
- Permeability
- Absorption

We also supply maturity measurement equipment,

### Carbonation depth after 500 days [mm]



**Fig 7 : Relation between kO max and carbonation depth**

corrosion rate monitoring equipment, GPR, Impact Echo and many other advanced concrete NDT's