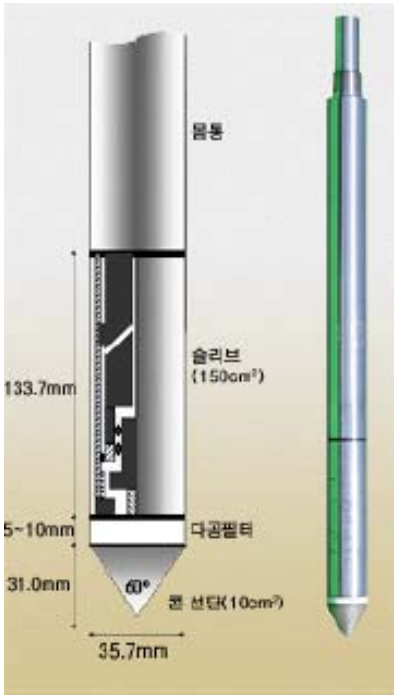
3.3 Cone Penetration Test (CPT)

(1) General



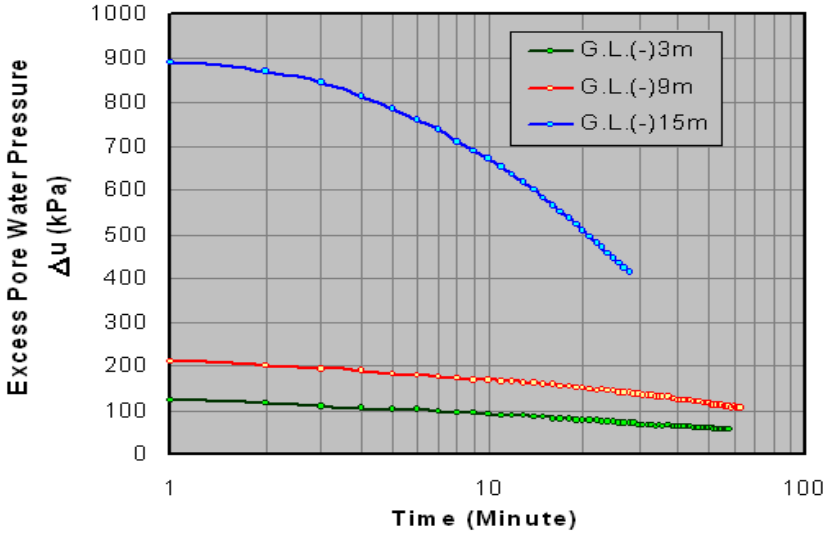
The CPT is carried out by pushing a 60°cone with a face area of 10 cm^2 into the ground at a constant speed (2±0.5cm/s), whilst measuring the force to do so. The shear force on a 150 cm^2 'friction sleeve' and pore pressure are then also measured.

- Type of cone

  - Piezocone
  - Environmental cone
  - Seismic cone
  - Visual cone

- Dissipation test with piezocone

  In clays, the horizontal coefficient of consolidation Cv can be determined by stopping the cone, and measuring pore pressure dissipation as a function of time.



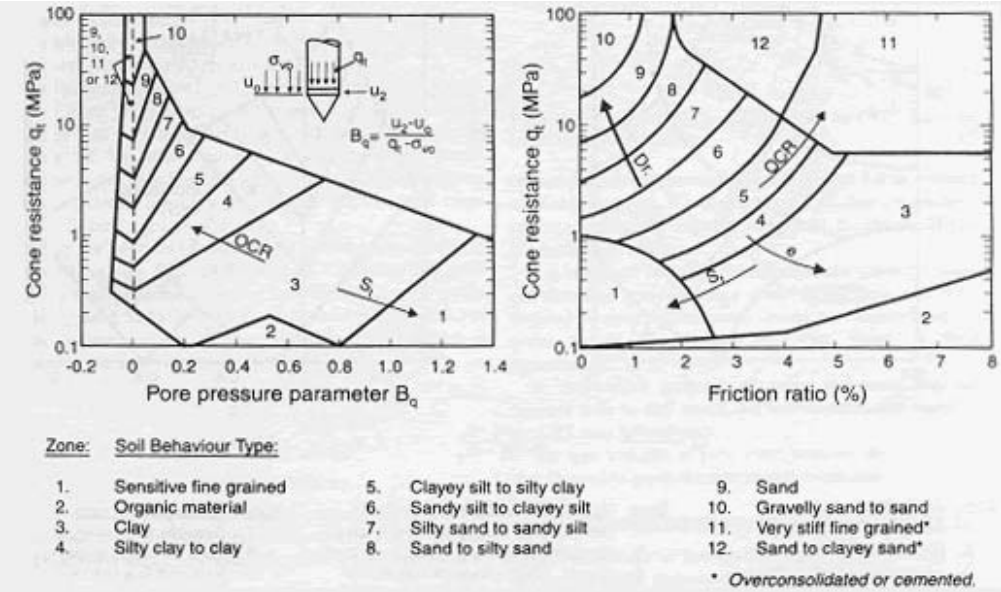
(2) Interpretation and use

i) soil classification

- Robertson and Campanella (1986)

$$B_q = \frac{\Delta u}{q_t - \sigma_{vo}} \quad \text{vs} \quad q_t$$

$$F_r = \frac{f_s}{q_t - \sigma_{vo}} \quad \text{vs} \quad q_t$$



ii) Undrained strength

- S_u is evaluated with cone factors (N_{kt} , N_{ke} , $N_{\Delta u}$)

- Schmertmann(1978), Lunne et al(1985) $s_u = \frac{q_T - \sigma_{v0}}{N_{kt}}$
- Senneset et al (1982), Campanella et al (1982) $s_u = \frac{q_T - u}{N_{ke}}$
- Lunne et al (1985) $s_u = \frac{\Delta u}{N_{\Delta u}}$

regions	The test to evaluate cone factor	Cone factor
England	CIUC	N_{kt} =12~20
Norway	FVT	N_{kt} =12~19
Italy	FVT	N_{kt} =8~16
	CK0UC	N_{kt} =8~10
Vancouver, Canada	FVT	N_{kt} =8~10
	SBPT	
Japan	UCT	N_{kt} =8~16
	FVT	N_{kt} =9~14
Taiwan	CIUC	N_{qu} =5.0~6.8
	CAUC	N_{qu} =6.0~7.2
Canada	FVT	N_{Du} =6.2~7.0

- Cone factor are very site –specific.

iii) Other usages

- The horizontal coefficient of consolidation(c_h)
- Friction angle(ϕ') and D_r in sandy soil
- OCR, E_s , Sensitivity, …