

## HAND VANE

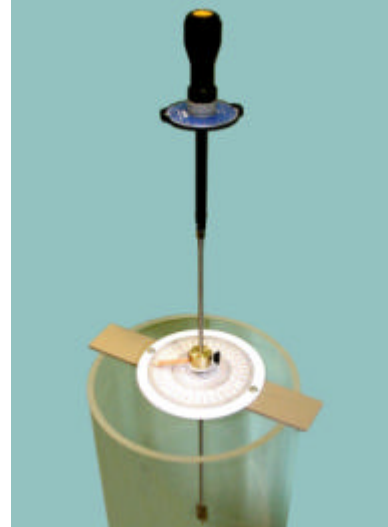
Model No. DO-1018



Hand Vane

Hand vane & Bearing guide (DO-1018G)

In this case, the bearing guide keeps vane.



### OUTLINE

This is used for measuring hardening time, etc. of soft soil, hard soil comparatively and improved (reinforced) soil at laboratory or at site easily. And, if you use Bearing guide together with hand vane, you can do strength test with any size container. (Regarding to select a suitable torque meter & vane, please do it with calculation shown in the next page, which is quoted from Soil investigation method.) Here, Extension rod "L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub>" are suitable for Torque meter No.1 to 6, Extension rod "L<sub>4</sub>, L<sub>5</sub>, L<sub>6</sub>" are suitable for Torque No. 7, 8. In addition to, we can accept other length of Extension rod.

Torque meter Model	Torque measuring range		Dimension	Weight	Vane (Select your suitable one)	Extension Rod (Select your suitable rod.)	Order
	Min. - Max. Capacity (cN·m)	A scale (cN·m)	Overall length				
1 FTD2CN-S	0.3 - 2	0.05	152 mm	0.14 kg	A. 10×20mm	L <sub>1</sub> 6×200	For example, 1 + A + L <sub>1</sub> ×2 1: Torque meter A : Vane L1: Extension Rod 2: Quantity
2 FTD5CN-S	0.5 - 5	0.1				L <sub>2</sub> 6×400	
3 FTD10CN-S	1 - 10	0.2				L <sub>3</sub> 6×500	
4 FTD20CN-S	3 - 20	0.5					
5 FTD50CN2-S	5 - 50	1	272 mm	0.37 kg	C. 20×40mm		
6 FTD100CN2-S	10 - 100	2				L <sub>4</sub> 8×200	
7 FTD200CN2-S	30 - 200	5				L <sub>5</sub> 8×400	
8 FTD400CN2-S	50 - 400	10				L <sub>6</sub> 8×500	

Comparing of Torque meter: N·m (S-I unit) and kgf·cm (Former unit)

10cN·m=1kgf·cm      For example,  
 100cN·m=10kg·cm      In case of Combination Torque meter No.4 and Vane “C”, “D”  
 “Torque meter No + Vane : Shearing strength  
    4 + C = 6.8 kN/m<sup>2</sup>  
    4 + D = 2 kN/m<sup>2</sup>  
 In case of Combination Torque meter No.6 and Vane “C”, “D”  
    6 + C = 34.1 kN/m<sup>2</sup>  
    6 + D = 10.1 kN/m<sup>2</sup>

Please refer to above when you select suitable Hand vane's torque meter and vane with shearing strength.

Calculation of Shearing strength

The following numerical expression is quoted from “Soil Investigation Method”.

$$M_{max} = \tau \left\{ \pi DH \cdot \frac{D}{2} + 2\pi \left( \frac{D}{2} \right)^2 \frac{2}{3} \cdot \frac{D}{2} \right\}$$

$$\therefore \tau = \frac{M_{max}}{\pi \left( \frac{D^2 H}{2} + \frac{D^3}{6} \right)}$$

- τ : Shearing strength (N/m<sup>2</sup>)
- Mmax : Maximum revolving moment(N·m)
- D : Width of Vane (Diameter) (m)
- H : Height of Vane (m)

For example, It takes Torque meter “FTD20CN-S (20cN·m)”and  
 it shows 15cN·m(= 15 X 1/100(N·m)=0.15)

Mmax : 0.15  
 D : 0.02m  
 H : 0.04m

$$\begin{aligned} \tau &= 0.15 / \pi (0.0004 \times 0.04/2 + 0.000008/6) \\ &= 0.15 / \pi (0.000008 + 0.000001333) \\ &= 0.15 / \pi \times 0.000009333 \\ &= 0.15 / 0.00002932 \end{aligned}$$

$$\tau = 5115.9 \text{ N/m}^2 = 5.116 \text{ kN/cm}^2$$

Therefore, supposing that Vane D=0.02m, H=0.04m is used,  
 in case of FTD20CN-S(20cN-m), it can measure the shearing strength until 6.821kN/m<sup>2</sup> ,  
 in case of taking FTD100CN-S(100cN-m), it can measure the shearing strength until 34.106kN/m<sup>2</sup>.