Field Vane Undrained Shear Strength

Undrained shear strength of clay from the peak torque on a vane of given height and diameter, with uniform shear on sides and ends, and a plasticity correction.

Method: Field vane test interpretation

Input parameters

Unit system: SI

Parameter	Value	Unit
Maximum torque	60.000	N·m
Vane diameter	65.000	mm
Vane height	130.00	mm
Correction factor (from plasticity, user's chart)	0.85000	

Calculated results

Parameter	Value	Unit
Vane constant	1,006.6	cm³
Vane shear strength	59.609	kPa
Corrected undrained strength	50.668	kPa

Notes for this case

• Torque resisted by the cylinder sides (πD²H/2·s_u) and both ends (πD³/6·s_u): T = s_uπD²(H/2 + D/6). Vane strengths in plastic clays are corrected by Bjerrum's factor μ (falling with plasticity index); enter μ from the chart the user's practice follows.

Formula and method

$$T = s_u \pi D^2 \left(\frac{H}{2} + \frac{D}{6} \right), \quad s_{u,corr} = \mu s_u$$

Variables

T	Maximum torque	N·m
D	Vane diameter	m
H	Vane height	m
μ	Correction factor (from plasticity, user's chart)	-
K_v	Vane constant	m³
$s_{u,v}$	Vane shear strength	Pa
s_u	Corrected undrained strength	Pa

Method and standards

Vane strength.

Assumptions and limits

- Uniform shear stress on sides and ends; undrained.

References

Field vane test interpretation

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/geotechnical/vane-shear-strength

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.