

# DIN EN ISO 22476-1:2023-04 (E)

## Geotechnical investigation and testing - Field testing - Part 1: Electrical cone and piezocone penetration test (ISO 22476-1:2022)

---

<b>Contents</b>		<b>Page</b>
European foreword .....		4
Foreword.....		5
Introduction .....		6
<b>1</b>	<b>Scope</b> .....	<b>7</b>
<b>2</b>	<b>Normative references</b> .....	<b>7</b>
<b>3</b>	<b>Terms, definitions and symbols</b> .....	<b>7</b>
3.1	Terms and definitions .....	8
3.2	Symbols.....	14
<b>4</b>	<b>Equipment</b> .....	<b>17</b>
4.1	General.....	17
4.1.1	Tolerances.....	17
4.1.2	Gaps and soil seals.....	17
4.2	Cone penetrometer.....	17
4.3	Surface roughness and hardness.....	17
4.4	Cone.....	18
4.5	Friction sleeve.....	19
4.6	Filter element.....	20
4.6.1	General filter location.....	20
4.6.2	Pore pressure $u_1$ .....	20
4.6.3	Pore pressure $u_2$ .....	21
4.6.4	Pore pressure $u_3$ .....	21
4.7	Pushrods.....	21
4.8	Measuring system.....	21
4.8.1	Accuracy.....	21
4.8.2	Sensors for cone resistance and sleeve friction.....	22
4.8.3	Sensor for pore pressure.....	22
4.8.4	Sensor for inclination.....	22
4.8.5	Sensor for temperature.....	22
4.8.6	Measuring of penetration length.....	22
4.8.7	Raw data.....	22
4.9	Thrust machine.....	23
<b>5</b>	<b>Test procedures</b> .....	<b>23</b>
5.1	Selection of equipment, procedures and evaluation of results.....	23
5.1.1	General.....	23
5.1.2	Calibration and verification requirements.....	23
5.1.3	Cone penetrometer class conformity assessment.....	24
5.2	Position and verticality of thrust machine.....	26
5.3	Preparation of the test.....	26
5.4	Pushing of the cone penetrometer.....	27
5.5	Use of friction-reducing techniques.....	27
5.6	Frequency of test data recording.....	27
5.7	Registration of penetration length.....	27
5.8	Pore pressure dissipation test (PPDT).....	28
5.9	Test completion.....	28
5.10	Evaluation of CPT/CPTU in relation to test category.....	29
5.11	Equipment checks and calibrations.....	30
5.12	Safety requirements.....	30

<b>6</b>	<b>Test results</b> .....	<b>30</b>
6.1	Measured parameters.....	30
6.2	Correction of parameters.....	31
6.3	Calculated parameters.....	33
<b>7</b>	<b>Reporting</b> .....	<b>33</b>
7.1	General.....	33
7.2	Reporting of test results.....	33
7.2.1	General information.....	33
7.2.2	Location of the test.....	34
7.2.3	Test equipment.....	34
7.2.4	Test results.....	35
7.3	Presentation of test results.....	36
	<b>Annex A (informative) Suitability of test methods</b> .....	<b>37</b>
	<b>Annex B (normative) Maintenance, checks and calibration</b> .....	<b>40</b>
	<b>Annex C (informative) Calibration report example</b> .....	<b>58</b>
	<b>Annex D (normative) Calculation of penetration depth</b> .....	<b>68</b>
	<b>Annex E (informative) Correction of sleeve friction for water pressure</b> .....	<b>69</b>
	<b>Annex F (informative) Preparation of the piezocone</b> .....	<b>70</b>
	<b>Annex G (informative) Friction reduction techniques</b> .....	<b>71</b>
	<b>Bibliography</b> .....	<b>72</b>