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Ground. METHODS field testing Dynamic probing

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NATIONAL STANDARD OF UKRAINE
Ground. METHODS field testing Dynamic probing

HRUNTЫ. Methods POLEVЫH trials STATYCHESKYM
And Dynamic ZONDYROVANYEM

SOILS.
FIELD TEST METHODS BY STATIC AND DYNAMIC SOUNDING
 Effective as of \_\_\_\_\_\_\_\_.\_\_\_.\_\_\_
1 Scope
1.1 This standard applies to disperse natural and man-made soil composition and condition which allow for continuous immersion probe and establishes basic requirements for equipment and techniques in probing analysis of the data.
1.2 This standard does not apply to soils containing particles of size greater than 10 mm in an amount of more than 25% by weight, with static probing and soils containing particles of size greater than 10 mm in an amount of more than 40% by weight, the dynamic sensing.
1.3 This standard does not apply to frozen soils.

2 Normative references
This standard refers to the following legal and regulatory documents:
NPAOP 63.21-1.01-09. Safety rules during construction, repair and maintenance of roads
B V.2.1-5-2000 GOST (GOST 20522-96) soil. The methods of static processing test results. Terms.
B V.2.1-6-2000 GOST (GOST 30672-99) soil. Field tests. Terms.
"The procedure for conducting medical examinations of certain categories of workers", approved by the Ministry of Health of Ukraine of 21.05.2007 №246

3 Terms and definitions, and abbreviations POZNAKY
3.1 Terms and Definitions
3.1.1statychne sensing
The process of dipping the probe into the soil under static load of pushing measurement of soil resistance immersion probe
3.1.2 Dynamic probing
The process of dipping the probe into the soil under impact loading (drums sounding) measurement of resistance of soil immersion probe
3.1.3 jacket
Part of the probe type and static probing, located directly above the cone and having a diameter smaller than the diameter of the cone and the cone moving along ahead with the casing, provides the ability to measure the resistivity of the soil in the cone
3.1.4 friction clutch
Part II probe type for static probing, located directly above the cone and the housing and having a diameter equal to the diameter of the cone and moving pointervalno after them, provides the ability to measure the resistance of the soil friction along its lateral cylindrical surface
3.1.5 resistivity ground under a cone
The resistance movement of the cone of soil under static probing, referred to the square base of the cone (frontal section)
3.1.6 resistivity soil on the lateral surface friction clutch
Soil resistance attributed to the lateral (cylindrical) surface friction clutch
3.1.7 resistance of the soil on the side of the probe
The resistance of the soil on the side of the casing and probe type for static sensing, which allows for an assessment of possible friction on the lateral surface of the soil piles
3.1.8 conditional dynamic resistance of soil sensing
Resistance to dynamic immersion probe referred to the base of the cone area (frontal section) of a hammer blow.
3.2. And reducing Poznaky
q ̅c - resistivity ground under a cone probe
Qs - total resistance of the soil on the side of the probe
fs - resistivity of soil at the site of lateral surface friction clutches probe
PD - conditional dynamic resistance sensing
A - energy density sensing
K - coefficient taking into account energy losses
V.3. - Point sensing

4 GENERAL
4.1 This standard establishes methods such field tests of soils:
static sensing;
dynamic sensing.
4.2 General requirements for field tests of soil, machinery and equipment, site preparation for tests given in ISO B V.2.1-6.
4.3 Methods field tests probing the soil used in combination with other types of geotechnical works or separately:
- Determining the spatial variability of soil layers and lenses and their status for select locations research platforms and depth of field soil test other methods (presiometriya, stamp tests, etc.) and include sampling soil disturbed and undisturbed structure for laboratory tests;
determine the extent of soil compaction and structure of space and time for quality control construction of road embankments, dams and other soil ground facilities or dumps;
assess the possibility of piling and determine the depth of immersion, define the data for the calculation of pile foundations;
determine the depth of the roof rock and coarse soils.
4.4 Probing soils perform indentation in the ground at static sensing probe or pile the soil under dynamic sensing probe while measuring continuously (with automatic recording) or at specified intervals for depth indicators characterizing the soil resistance immersion probe.
4.5 Quantitative assessment of the characteristics of physical and mechanical properties of soils in probing is carried out indirectly based on statistically proved relationships between indicators of soil resistance to immersion probe results and determine the characteristics of other standard methods, including and on samples selected at the next geotechnical drilling exploration wells.
4.6 Method of probing, probing depth and location sensing points defining a program of engineering and geological surveys.
4.7 In the process of probing tests should be carried out tests on samples journals listed in Annexes A and B. You uploads automatic sensing records (if any).
4.8 The test results must execute as geotechnical sections constructed on the basis of parameters graphs soil resistance immersion probe, not as separate logically unrelated charts static or dynamic sensing.
4.9 The scale charts sensing is not recommended to change compared with standardized according to Annex B, since the main purpose methods of static and dynamic sensing is precisely estimate the spatial variability characteristics of soil depth engineering-geological section, not indirectly determine the statistical dependencies parameters of their physical and mechanical properties .

5 static sensing
5.1 The method
5.1.1 Test method of static ground probing performed by special units that provide indentation probe into the soil.
5.1.2 When static sounding according to the resistance measuring ground under the probe tip and on the side of the probe determined:
Soil resistivity probe under a cone - q ̅c (probes for type I and II according to Annex G);
the total resistance of the soil on the side of the probe - Qs (for probe type and according to Annex G);
resistivity of soil at the site of lateral surface friction clutches probe - fs (probe for type II under Annex D).
Notes:
1 For the special task possible measurement of pore pressure occurs in pore water at sensing using sensors pore pressure. Sensors installed on the cone of the probe (piezo-cones) or immediately after a cone (piezo-probes).
2 When using specially designed probes in the probe can be measured: density, volumetric moisture and natural gamma background soil (using radioactivity logging), soil temperature and electrical resistance of the soil.

5.2 Equipment and devices
5.2.1 installation of static ground testing probing should include:
probe (set of rods and cone indenter);
indentation device and remove the probe;
support-anchor device;
a device for measuring pressure load resistance and indicators of soil.
5.2.2 Depending on the effort required for immersion probe in different soil conditions and ranges measurable indicators of soil resistance settings are divided according to Table 1.
Table - 1 Standardized Options settings for static sensing
Type
Setting the range effort and removing the indentation probe kN ranges indicators of soil resistance
qc, MPa fs, kPa Qs, kN
Very light Over 2 - 25 incl. 0.1 - 1.0 1 - 0.1 50 - 10
Easy Over 25 - 50 incl. 0.5 - 10 2 - 100 0.5 - 20
Average over 50 - 100 incl. 1 - 30 5 - 200 1 - 30
Heavy Over 100 inc. 2 - 50 10 - 500 2 - 60
5.2.3 Under construction indenter probes can be the following types:
Type I - a tube with a cone and casing;
Type II - probe cone clutch casing and friction.
Fundamental circuit designs static probes for sensing and basic parameters are shown in Figure D.2 (Appendix D).
Note. To probe type II permitted the use of extender located no closer than 1000 mm from the cone.
5.2.4 Periodically (but not less than 15 points probe) should check the straightness of the probe rods and the degree of reduction of the diameter of the frontal section of the cone.
Check straightness of the probe rods by adding links to sections of 3 m on a flat surface. Deviations of individual rods from a straight line shall not exceed 3 mm in any plane for the whole length of the segment that is checked.
Reducing the height of the cone indenter should not exceed 5 mm and the diameter reduction frontal section of 0.5 mm.
5.2.5 Support-anchor device must accept reactive efforts that occur during indentation and removing the probe.
5.2.6 The basic error of measuring devices (devices) must not exceed:
5% - when measuring pressure load is applied;
10% - at ground resistance measurement (not more than 5% of the greater of the measured values);
1.0 cm - when measuring immersion depth of the probe.
5.2.7 Devices for measurement of soil resistance immersion probe can be mechanical or automatic. Perhaps the combination of these devices.
Possible registration information during the trial, both in the field journal and the diagram tape or in memory block registration system.
5.2.8 Measuring devices (devices) must calibrate according to the nameplate, but not less than once every 3 months, or if necessary before leaving the study.
5.3 Preparation for testing
5.3.1 Preparation for installation of static ground testing performed probing accordance with the instructions for use.
5.3.2 Before you start, check the straightness of the probe and the degree of reduction in the size of the cone indenter in accordance with 5.2.4.
5.3.3 Deviation from the vertical mast installation should not exceed 2 °.
5.4 Performance test
5.4.1 Static sounding should be performed by a probe of continuous indentation in the ground, following the order of operations provided operating manual installation.
5.4.2 Breaks in immersion probe only possible to build the probe rods.
5.4.3 In the process of probing is necessary to carry out continuous monitoring of verticality immersion probe.
5.4.4 Indicators ground resistance should be recorded continuously or at intervals of not more than 0.2 m deep dives under the table A.1.
5.4.5 Speed ​​immersion probe the soil should be (20 ± 5) mm / s.
5.4.6 Test end after reaching a certain depth immersion probe or landmark efforts in Table A.1. After the test tube is removed from the soil, as well tamponuyut.
5.4.7 Performance soil resistance immersion probe logged test (Appendix A) diagram on the tape or memory block registration system.
5.5 Treatment of results
5.5.1 According to measurements obtained during the test, calculated value, qc, Qs (for probe type I) and qc, fs (for probe type II) Table A.1 and using the program E.1 (Annex D) build charts changes in these variables depth sensing Figure B.1 (Appendix B).
5.5.2 On the basis of a visual analysis of the schedules should be determined intervals by probing deep wells, which is a significant change in the resistance of soil sensing. Excluding the values ​​are significantly different, calculate the average values ​​of soil resistance sensing and statistical parameters of its heterogeneity: S2 - variance, S - standard deviation, Kv - coefficient of variation, ρ - rate measurement accuracy in the sample (Table B.2).
5.5.3 For the average values ​​of soil resistance sensing build continuous graphics - q ̅c = f (H), at which point these specific depth Figure E.2.
5.5.4 Based on the charts intervals averaged values ​​of soil resistance sensing build, involving data topozyomky, geotechnical sections Figure E.3, which determines the location and depth of sampling in the next exploratory engineering-geological drilling and other necessary types geotechnical studies of soils.

6 DYNAMIC SENSING
6.1 The method
6.1.1 Test soil by dynamic probing performed by special units that provide shock immersion probe method.
6.1.2 Dynamic probing determine the number of beats for immersion probe per decimeter depth probing wells - n, b / dm sensing point (T.Z).
6.2 Equipment and devices
6.2.1 The structure of units for testing of soil dynamic probing should include:
probe (set of rods and cone indenter);
shock device with guide rails risers for immersion probe;
a device for removing the probe.
6.2.2 Depending on the values ​​of specific energy sensing in different soil conditions and range measured conditional dynamic resistance of soil sensing settings are divided according to tables 2 and 3.
\_ Table 2 Technical parameters powerful industrial plants for dynamic sensing
Installation Type Weight hammer kg Height of drop hammer frequency of beats, beats / min Specific energy sensing A N / m conditional dynamic resistance sensing
PD MPa
1 2 3 4 5 6
Easy 20-50 30 0.4 2800 0.7 incl.
Average 60 0.8 15-30 11200 more than 0.7 - 17.5 incl.
Weight 120 28,000 1.0 15-30 Over 17.5
Note 1. Predefined conditional dynamic resistance of soil sensing to select the type of installation carried out by the stock materials, according to the first test point probing or drilling data.

Table 3 \_ Technical parameters universal device for work mainly in remote areas and on the slopes and slopes
Of Sections The main indicators of universal device mode equipment
Very easy Easy Medium Difficult
1 2 3 4 5 6
1 indenter:
cone with a vertical angle α ° 60 60 60 60
head-sectional diameter, mm 19.6 19.6 19.6 19.6
head-sectional area, m2 3,0 • 10-4 3,0 • 10-4 3,0 • 10-4 3,0 • 10-4
2 Weight probe
diameter mm 14 14 14 14
Length, m 0.8 0.8 0.8 0.8
Weight, kg 0,96 0,96 0,96 0,96
the maximum length of the column rods, m 12.0 12.0 12.0 12.0
3 Starting weight of the probe, along with the first bar, kg 3.89 3.89 3.89 3.89
4 Impact device:
Weight, kg 7.5 7.5 7.5 7.5
discharge height, m ​​0.048 0.12 0.30 0.75

A.1.

m

number

m

number

m

number