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Indian Standard
CODE OF PRACTICE FOR
THIN-WALLED TUBE SAMPLING OF SOILS
(*Second Revision*)

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INDIAN STANDARDS INSTITUTION
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Indian Standard
CODE OF PRACTICE FOR
THIN-WALLED TUBE SAMPLING OF SOILS
(Second Revision)

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*Shri Verma acted as Chairman in the meeting in which this Indian Standard was finalized.

Indian Standard

**CODE OF PRACTICE FOR
THIN-WALLED TUBE SAMPLING OF SOILS**

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 30 January 1986, after the draft finalized by the Soil Engineering Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Undisturbed samples of soil are required for a number of soil test, such as unconfined compression test, consolidation test, permeability test and triaxial compression test. It has been recognized that it is not practicable to obtain a truly undisturbed sample but if certain procedures and precautions are observed it is possible to get relatively undisturbed samples which may be considered sufficient keeping in view the nature of tests to be performed on these samples. This code deals with the method of obtaining such samples using thin walled tube samplers with sampler heads (with and without check valves).

0.2.1 This standard was first published in 1963 and revised in 1972. In this revision, requirements regarding specifications for sampling tubes have been reviewed based on indigenous availability taking into consideration the general practice in the country, the sampling tubes have been restricted to four sizes only. The detail specification of sampling tubes and sampler head are covered in separate Indian Standard.

0.3 In very loose saturated sandy and silty, soils and clays the use of a piston sampler may often be necessary to secure a suitable undisturbed sample, the details of which are covered in IS : 10108-1982*.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS:2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Code of practice for sampling of soils by thin wall sampler with stationary piston.

†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This Standard describes the method for obtaining relatively undisturbed cohesive and $C-\phi$ soil samples suitable for laboratory tests, using a thin-walled metal tube.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 2809-1972* shall apply.

3. EQUIPMENT

3.1 Drilling Equipment — The equipment used shall provide a reasonably clean hole before insertion of the thin-walled tube, shall not disturb the soil to be sampled, and shall effect a rapid penetration of the tube into the soil to be sampled.

NOTE — Where casing is used, the equipment shall be capable of driving and removing the casing and shall include a pressure pump for clean-out operations. Where drilling fluid is used, a suitable mud pump is required. Where augers are used for clean-out purposes no special equipment other than that for sampling is generally required. The hole may be cleaned with a bailer with a flap valve but this should not be used in sandy soils.

3.2 Sampler Head — It shall conform to IS : 11594-1985†.

3.3 Thin-Walled Tubes — It shall conform to IS : 11594-1985†. These may be of Stainless Steel and Copper.

3.4 Sealing Material — Any wax that does not have appreciable shrinkage or does not permit evaporation of water from the sample shall be permitted. A mixture of paraffin wax and bees wax in the proportion 4 : 1 has also been found to be suitable.

3.5 Miscellaneous Items — Labels, data sheets shipping containers, etc.

4. PROCEDURE

4.1 Driving the Casing — Where casing is used it shall not be driven below the sampling level, and casing pipe should be in such a way that it does not disturb the soil to be sampled.

*Glossary of terms and symbols relating to soil engineering (*first revision*).

†Specification for mild steel thin walled sampling tubes and sampler heads.

4.2 Cleaning the Hole

4.2.1 The hole shall be cleaned to sampling elevation using whatever method is preferred that will ensure that the soil to be sampled is not disturbed. In saturated sandy and silty soils the drilling equipment should be withdrawn slowly to prevent loosening of the soil around the hole.

4.2.2 Where casing is used, the hole shall be cleaned out to the bottom or just below the casing. A clean-out auger should be used to clean the bottom of the hole, when necessary.

4.2.3 Bottom discharge bits shall not be permitted for clean-out purposes; side or upward discharge bits may be permitted.

4.2.4 The water level in the hole should be maintained at or above the ground water level, especially in soils that might be disturbed by the flow of ground water into the drill hole such as sandy and silty soils.

4.3 Obtaining Soil Sample

4.3.1 The depth of bottom of the casing, if used, below ground level and the water level in the bore hole should be noted.

4.3.2 Sampling shall be done as soon as possible after the clean-out operation and shall not be done after an interval, for example, where a hole has been cleaned-out and left overnight.

4.3.3 The assembled sampling tube should be lowered to the bottom of the hole, and the following information should be noted.

- a) Depth of bottom of bore hole below ground level;
- b) Amount of penetration of the sampling tube into the soil, under the combined weight of the tube and the rods; and
- c) Water level in the bore hole.

4.3.4 The sampling tube shall then be pushed into the soil by a continuous and rapid motion. In no case the tube shall be pushed farther than the length provided for the sample. About 50 mm shall be allowed for cuttings and sludge. A clearance of 10 to 20 mm shall be allowed below the sampled head in the tube. The depth of penetration of the tube shall also be noted. Before pulling out the tube, at least 5 min shall be allowed to elapse after pushing the tube after which the tube shall be turned at least for two revolutions to shear the sample off at the bottom.

NOTE — In case the equipment used for SPT is also used for driving the sampling tube, then the length of penetration shall be limited to 50 blows.

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4.3.5 Samples shall be taken, by repeating the sampling procedures, at every change in stratum or at intervals not more than 1.5 m, whichever is less. Samples may be taken at lesser intervals if specified or found necessary. The intervals be increased to 3 m if in between vane shear test or SPT is performed.

4.3.6 Field Observations — Water-table information including ground water level, elevations at which the drilling water was lost, or deviations at which water under excess pressure was encountered should be recorded on the field logs.

4.4 Preparation for Shipment

4.4.1 Upon removal of the sampling tube, the length of the sample in the tube and the length between the top of the tube and the top of the sample in the tube shall be measured and recorded.

4.4.2 The disturbed material in the upper end of the tube shall be completely removed before applying wax for sealing. The length and type of the sample so removed should be recorded.

4.4.3 The soil at the lower end of the tube shall be reamed to a distance of about 20 mm. After cleaning both ends shall be sealed with wax applied in a way that will prevent wax from entering the sample. Wax used for sealing should not be heated to more than a few degrees above its melting temperature. The empty space in the samplers, if any, should be filled with moist soil, saw dust etc, and the ends covered with tight fitting caps.

4.4.4 If it becomes necessary to keep the samples at the site for some time, they shall be kept in the shade. They should be kept over a bed of sand, jute bags, saw dust, etc and covered over on top with similar material (sand, jute bags, saw dust, etc). The bed and top cover should be kept moist. Such bedding and top cover may also be provided at the time of shipment of the samplers with samples (*see 4.4.3*).

4.5 Labelling and Shipping

4.5.1 Labels giving the following information should be affixed to the tubes:

- a) Tube number,
- b) Job designation,
- c) Sample location,
- d) Boring number,
- e) Sample number,
- f) Depth,
- g) Penetration, and
- h) Gross recovery ratio.

4.5.1.1 The tube and boring numbers should be marked in duplicate.

4.5.2 Duplicate markings of the boring number and sample number on a sheet which will not be affected by moisture should be enclosed inside the tube.

5. REPORT

5.1 All data obtained during the boring and sampling operations shall be recorded in the field as per details given in Appendix A.

A P P E N D I X A

(*Clause 5.1*)

PRO FORMA FOR RECORD OF OBSERVATIONS DURING UNDISTURBED SAMPLING OF SOILS USING THIN-WALLED TUBE SAMPLES (see Note)

Name of Project:

- | | | |
|-------------------------------------|-----------|--------------------------------|
| a) Drilling Details | <i>OR</i> | b) Trial Pit |
| Bore hole No. and Coordinates: | | Location: |
| Drilling method: | | Dimensions: |
| Surface elevation at bore hole top: | | Elevation at top
Dimensions |

Date of boring: Start _____ Finish _____

Details of casing, if used:

Name of driller:

c) **Observations of Water Levels in the Bore Holes:**

- 1) Ground water level
- 2) Elevations at which drilling water was lost with the related to sampling
- 3) Elevations at which water under excess pressure was encountered with time related to sampling

- 4) Water level before insertion of casing if used
- 5) Water level after insertion of casing if used
- 6) Water level after pulling out of casing if used and possible
- 7) Whether drilling mud was used

d) Sampling Operations

- 1) Sampling tube No. 1 2 3 4 5 6 7 8
- 2) Sample No.
- 3) Method used for cleaning bottom of hole with date and time
- 4) Depth to bottom of casing below ground level
- 5) Date and time of sampling
- 6) Sampling details:
 - i) Total lengths, L_s
 - ii) Size
- 7) Level of water maintained in the bore hole
- 8) Depth to bottom of cleaned bore hole below GL
- 9) Level of water in the hole at the time of sampling
- 10) Amount of penetration of the tube under its weight and weight of rods
- 11) Method used for pushing the tube
- 12) Depth of penetration of the tube
- 13) Distance between top of tube and top of sample (measured after withdrawal), L_e
- 14) Whether soil sample in the tube was up to the cutting edge of the tube after withdrawal, if not how much within
- 15) Any evidence of slipping of the soil sample in the tube at the time of withdrawal
- 16) Thickness of soil sample removed from the cutting edge (bottom) end of the tube
- 17) Any disturbed material removed from the top end of the tube
- 18) Length of soil sample left in the tube

- 19) Weight of tube with soil sample left in the tube
- 20) Field description of soil, from soil removed from the ends of the tube (composition, condition, colour, structure, consistency, etc)
- 21) Remarks and special observations, if any

NOTE — This *pro forma* has been made comprehensive to include all observations indicated in the code. The Proforma may be modified to suit individual job conditions. Some of the items indicated in the *pro forma* may not be needed when sampling from a open trial pit. In such a case the direction of sampling, horizontal or vertical should also be indicated.

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