Standards of Japanese Geotechnical Society for Soil Sampling

— Standards and Explanations —

(English Version)

- **JGS 1221-1995**: Method for Obtaining Undisturbed Soil Samples using Thin-walled Tube Sampler with Fixed Piston
- **JGS 1222-1995**: Method for Obtaining Undisturbed Soil Samples using Rotary Double-tube Sampler
- **JGS 1223-1995**: Method for Obtaining Undisturbed Soil Samples using Rotary Triple-tube Sampler
- **JGS 1224-1995**: Method for Obtaining Soil Samples using Double-tube Sampler with Sleeve
- **JGS 1231-1995**: Method for Obtaining Undisturbed Soil Block Samples

May 1998

Japanese Geotechnical Society

FOREWORD

As the world's interest in soil sampling methods is distinctly evident in recent years with a visible movement towards international standardization, this booklet compiles five Japanese Geotechnical Society's Standards in English concerning soil sampling methodologies and procedures including supplementary explanation documents.

Since the 1960's, the Japanese Geotechnical Society has published more than eighty issues of the Standards of Japanese Geotechnical Society (JGS), and the Society has borne the substancial responsibility for the Japanese Industrial Standards (JIS) related to geotechnology ever since their establishments inaugurated in the 1950's. Currently, these JGS Standards and JIS are being translated to English with the primary objective of promoting and disseminating the practical use of these publications overseas. It should be noted that the Japanese text must be considered as the standard manuscript and the English version provides only as a reference.

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Designation: JGS 1231-1995

Method for Obtaining Undisturbed Soil Block Samples

1. GENERAL

1.1 Purpose

This method covers the sampling of undisturbed soil block samples for testing.

1.2 Scope of Application

This standard shall be applied to the soil from which the sample is directly cut out by hand carving.

1.3 Definition of Terms

Block sampling is defined as sampling a soil block from the ground by hand carving.

Undisturbed soil sample is defined as that whose soil structures and mechanical properties are kept as close as possible to those of in situ soil.

[Notes]

1. In case the method employed is partly different from this standard, details shall be recorded clearly in the report.

1.2 The size of the sample shall be such that it may be handled by hand.

2. TYPES OF SAMPLING

Two types of sampling, cutting off type and pushing down type block sampling, may be employed.

[Note]

2. In general, cutting off type block sampling is for soil with low collapsibility and pushing down type for soil with high collapsibility.

3. TOOLS

3.1 Cutting Off Type Block Sampling

(1) Cutting Tool for Sampling

It shall not disturb the soil to be sampled, and shall be able to take a soil block large enough for testing. For rough carving a scoop or a small shovel is used, and for finishing a straight edge or cutter knife is used.

(2) Sample Container

It shall protect the sample and have enough stiffness not to deform the sample during shipping. In general, a wooden or steel box 20 - 30 mm larger than the sample is used.

(3) Sealing Material

It fills the space between the sample container and the sample, and protects both ends of the sample. Paraffin or sand is used.

3.2 Pushing Down Type Block Sampling

(1) Cutting Tool for Sampling

Same as 3.1 (1).

(2) Sample Container

Same as 3.1 (2). In general, cylindrical tubes made of steel with a cutting edge at the end are used.

(3) Sealing Material

Same as 3.1 (3).

[Notes]

3.1

(1) Cutting tools must be selected in accordance with the stiffness and density of the sample. A saw or other cutting tool with a sharp edge is used on some occasions for finishing.

(2) Material properties and shapes are decided by the size of the sample and the type of test for it.

(3) When paraffin is used to fill the gap between the container and sample, polyethylene film, vinyl sheet or cloth is used to prevent permeation of paraffin into the sample.

3.2

(2) Split tubes may be used.

4. PROCEDURE

4.1 Cutting Off Type Block Sampling

(1) Rough Carving Around the Sample

The surrounding and upper parts of the intended sample are carefully carved approximately 2 - 3 times the size of the sample with a scoop.

(2) Sampling

The roughly carved sample is carefully trimmed with a straight edge or cutter knife to exact size and shape. Then the sample is covered with the container, the gap is filled with sealing material to fix the sample, and the bottom of the sample is cut carefully to separate it from parent ground. The bottom surface of the sample is trimmed, sealed, and covered with a protective lid.

4.2 Pushing Down Type Block Sampling

(1) Rough Carving Around the Sample

Same as 4.1 (1)

(2) Sampling

After the upper surface of the roughly carved sample is finished flat, the sample container is placed on it, and the sample is cut down by several millimeters with a tool like a cutter knife along the periphery of the container. After each cutting of several millimeters the container is pushed down vertically to retain the sample. After putting the exact volume of sample into the container, the bottom of it is separated from the ground. The lower end of the separated sample is trimmed and sealed with such materials as paraffin.

[Notes]

4.1

(1) In case the soil is excavated close to the intended sample by a machine, excavation should be carefully done in a way that will not disturb the sample. After that, rough carving should be done by hand.

(2) a. The procedure for the cutting off type block sampling is shown in Fig. 1.

b. If the sample has voids or high permeability, the sample shall be wrapped with vinyl sheet or polyethylene film in order to protect the sample from paraffin permeation, before filling with paraffin.

4.2

(2) The procedure for the pushing down type block sampling is shown in Fig. 2.

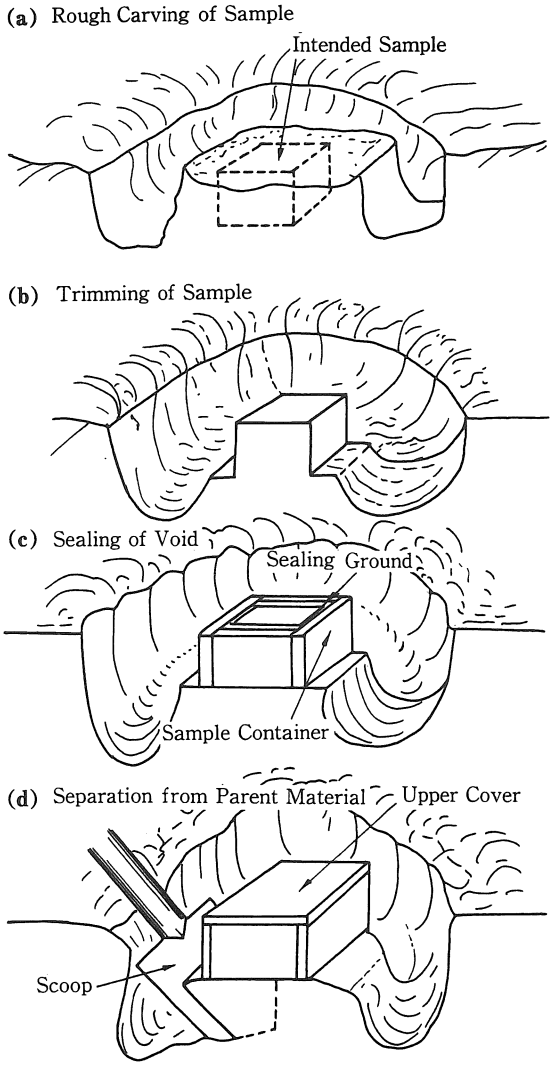

Fig.1 Procedure for Cutting Off Type Block Sampling

5. SAMPLE HANDLING

(1) Transport the sample to a laboratory as soon as possible. During the transportation, avoid any shock, vibration or temperature change which will affect the quality of the sample.

(2) When the sample is stored temporarily on site, avoid any shock, vibration or temperature change which will affect the quality of the sample.

[Notes]

5. The following information shall be recorded on the side of the container.

a. Name of the project,

b. Location number and sample number,

c. Sampling depth,

d. Direction of the sample and

e. Sampling date.

(2) Sandy soils containing little fines may be dehydrated and frozen, if these do not affect the quality of the sample.

6. REPORT

The report shall include the following information:

(1) Details of an alternate method when the method employed is partly different from this standard,
(2) Name of the project,
(3) Sampling location and sample number,
(4) Sampling depth,
(5) Shape and size of the sample,
(6) Sampling method,
(7) Sampling date and
(8) Other remarks and notations.

[Note]

6.

(8) Other remarks such that the soil layer varies greatly within the sample, this also shall be reported.

EXPLANATION OF THIS STANDARD

1. General

It is necessary for block sampling to excavate a test pit, a trench or a tunnel in the ground, or to make an exposed slope before sampling, because in this method the sampling technician should approach the ground and cut directly the sample. Therefore, this method may be employed where the sampling object is near the ground surface and above the ground water level.

If the sampling object is deep, the cost of preparation is higher than that of conventional sampling from the bored hole because a large scale excavation is needed. If the ground water level is high, dewatering and shoring is necessary. Therefore, economical considerations are important in adopting this method, even though the method is applicable to all kinds of ground.

In this standard, the size of the sample taken is limited to that a man can handle with his hand, i.e., a cube of 30 cm each. Block samples of larger size may be taken, if a supporting machine and many technicians are employed.

However, the purpose of this standard is to apply it to a sample for general laboratory testing. Therefore, a large size sample is difficult to cut by hand and to transport by conventional means, and therefore, the size of the sample is limited.

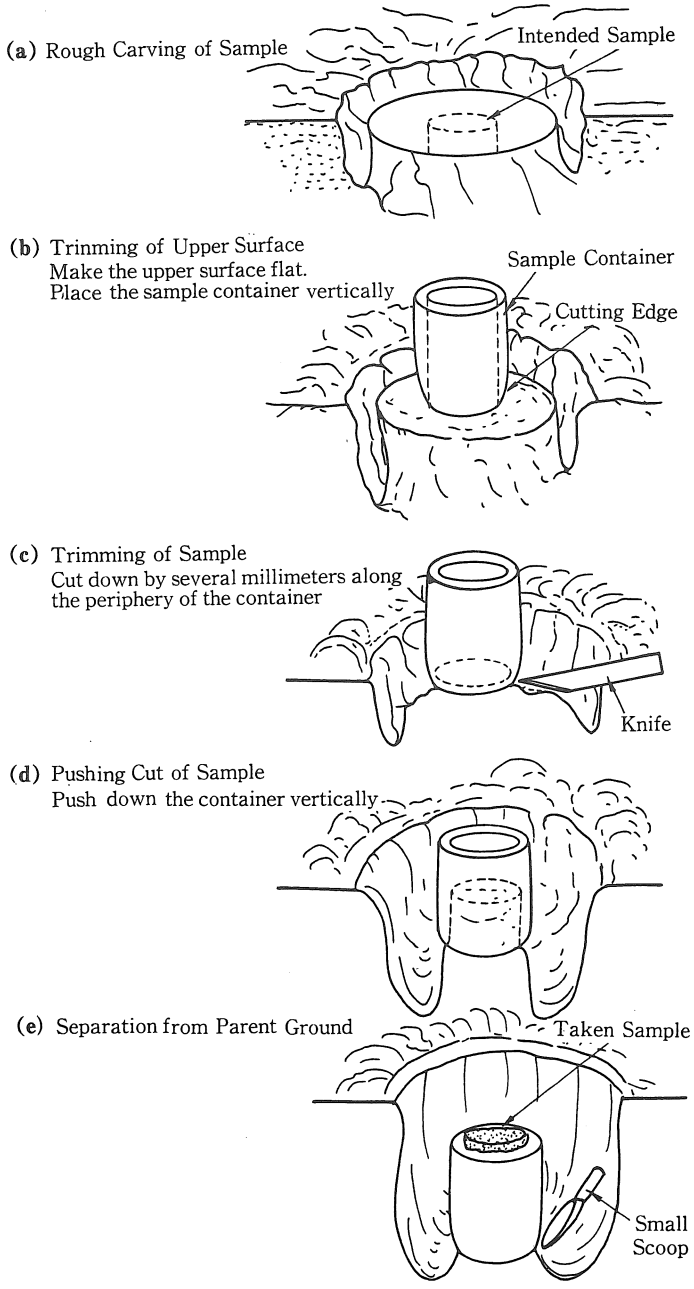

Fig.2 Procedure for Pushing Down Type Block Sampling

2. Preparation for Sampling

A hydraulic shovel or backhoe may be used to excavate to the exact depth for a test pit or a trench. In this case, machine excavation should stop at about 0.5 m above the

sampling depth, and care should be taken not to excavate too much. In case the sampling depth is more than 2.0 m below the ground surface, the law requires slope excavation or shoring for some types of soil (Regulation). Even if the intended ground surface is exposed, and the sample can be taken at the slope, slope failures may occur during sampling and counter measures against them should be considered.

3. Types of Sampling

Selection between the two types of sampling, i.e., cutting off type and pushing down type, depends on the self supporting characteristics of the ground and the types of laboratory tests for the sample (JGS, 1986). For example, if it is anticipated that the sample is easily disturbed by laboratory trimming, pushing down type sampling in situ is better. For specially weak soil which is difficult to trim in the laboratory, the sample is carefully cut down in situ, covered directly with a sleeve, transported, and tested in the laboratory (JGS, 1979).

4. Tools for Sampling

Cutting tools for the sample should be selected based on the stiffness and water content of the soil. For hard clay samples a sharp edged tool may be used. It is important in obtaining undisturbed samples to be careful not to ruin the edge and to use a good cutting tool.

The type and size of the sample container is decided by the sample handling used after shipment to the laboratory. In cut off sampling, square containers of steel or wood are often used based on transportability. Steel containers can be re-used, but become heavy and difficult to handle when the size of the sample is large. In push down sampling, sample containers of cylindrical tube with a cutting edge are often used. In this case a split tube as shown in Fig.5.7.1 is sometimes used to make it easy to take out the sample from the container.

5. Sampling Procedure

The area around the intended sample is carved out roughly by hand, taking care not to disturb the sample and a flat, table-like surface is created on the ground surface above the sample area, removing any loose soil.

In cut off sampling, the ground is trimmed carefully to make a block larger by several centimeters than the sample container. Next, the block is trimmed with sharp tools like a knife or cutter to a size smaller by about 2 cm than the sample container. Then it is covered with polyethylene film, followed by the sampling container, and the void between the sample and the container is filled with sealing material. Sealing material is generally melted paraffin, though sand or sawdust may be used if the soil is hard and self-supporting enough. After the paraffin becomes solid, the sample is covered at the top and cut at the bottom with a knife or a scoop to separate it from the parent ground, and placed up side down. Excess parts of the sample at the bottom of the container are cut carefully to fit, and the sample is sealed and covered. At that time directions such as top and bottom, and right and left should be marked.

In push down sampling, as shown in Fig. 2, the sample container with cutting edge is placed vertically on the flat trimmed ground surface, the sample is trimmed like a table to a diameter larger by about 1-2 mm than the inner diameter of the container and to a thickness of 5-6 mm, and then the container is pushed down vertically and evenly. The above operations are repeated carefully and patiently until the surface of the sample protrudes above the container by about 2-3 cm. It is extremely important at this time not to deviate the axis of the container in any way. For this purpose, a weight is placed on the container in some cases and it is pushed down evenly. It is also important for the inner surface of the container to be smooth, and it may be effective to coat it with grease in order to decrease friction. After putting a sample of intended length into the container, the bottom of the sample is cut carefully with a cutter.

When the sample is separated from the parent ground in both methods samples containing hard gravel or clear boundaries of layer are apt to have cracks caused by separation shear along the boundaries between the matrix and the gravel, and be deformed. Therefore, the direction and

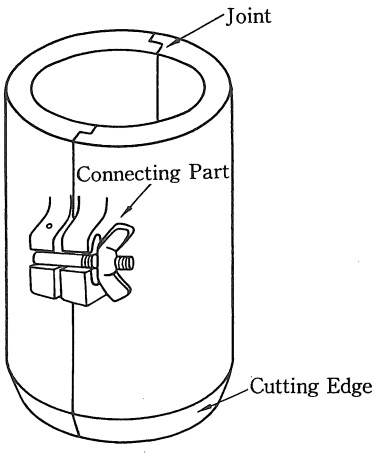

Fig.5.7.1 An Example of Split Tube

position of separation should be decided carefully so as not to affect the inner sample. If the residual part over the container at the bottom is too large, the sample is apt to have a crack due to its own weight. Therefore, cutting too big a sample should be avoided.

References

(1) Regulation for labor, safety, and health: 407th article, 361th article (in Japanese).

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(3) Japanese Geotechnical Society (1979): Methods for Soil Tests (2nd Revision), p. 566 (in Japanese).