



भारतीय मानक ब्यूरो BUREAU OF INDIAN STANDARDS

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG, NEW DELHI 110002

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व्यापक परिचालन मसौदा

हमारा संदर्भ : सीईडी43 /टी -9

01 नवम्बर 2019

तकनीकी समिति :

मृदा एवं नींव इंजीनियरी विषय समिति, सीईडी 43

प्राप्तकर्ता :

- 1 सिविल इंजीनियरी विभाग परिषद् के रुचि रखने वाले सदस्य
- 2 मृदा एवं नींव इंजीनियरी विषय समिति, सीईडी 43 एवं आईएस 2720 (भाग 1 से 41) की समीक्षा के लिए पैनल, सीईडी 43:P5 के सभी सदस्य
- 3 रुचि रखने वाले अन्य निकाय

महोदय/महोदया,

निम्नलिखित मसौदा संलग्न है :

प्रलेख संख्या	शीर्षक
सीईडी 43 (14796)WC	मृदा के लिए परीक्षण पद्धतियाँ: भाग 1 विभिन्न परीक्षणों के लिए सूखी मृदा के नमूनों को तैयार करना का भारतीय मानक मसौदा [आईएस 2720 (भाग 1) का तीसरा पुनरीक्षण] आई सी एस संख्या: 93.020

कृपया इस मानक के मसौदे का अवलोकन करें और अपनी सम्मतियाँ यह बताते हुए भेजे कि यदि यह मानक के रूप में प्रकाशित हो तो इन पर अमल करने में आपके व्यवसाय अथवा कारोबार में क्या कठिनाइयाँ आ सकती हैं ।

सम्मतियाँ भेजने की अंतिम तिथि: **31 दिसंबर 2019**.

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को उपरलिखित पते पर संलग्न फोर्मेट में भेजें।

यदि कोई सम्मति प्राप्त नहीं होती है अथवा सम्मति में केवल भाषा सम्बन्धी त्रुटि हुई तो उपरोक्त प्रलेख को यथावत अंतिम रूप दिया जाएगा । यदि सम्मति तकनीकी प्रकृति की हुई तो विषय समिति के अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रलेख को अंतिम रूप दे दिया जाएगा ।

यह प्रलेख भारतीय मानक ब्यूरो की वैबसाइट, www.bis.gov.in पर भी उपलब्ध है

धन्यवाद ।

भवदीय,

ह0/-

(संजय पंत)

प्रमुख (सिविल इंजीनियरी)

संलग्न : उपरलिखित



भारतीय मानक ब्यूरो BUREAU OF INDIAN STANDARDS

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**DRAFT IN
WIDE CIRCULATION**

DOCUMENT DESPATCH ADVICE

Reference	Date
CED 43/T- 9	01 November 2019

TECHNICAL COMMITTEE:

Soil and Foundation Engineering Sectional Committee, CED 43

ADDRESSED TO:

1. All Members of Civil Engineering Division Council, CEDC
2. All Members of Soil and Foundation Engineering Sectional Committee, CED 43 and the Panel for Reviewing of IS 2720 (Part 1 to 41), CED 43:P5
3. All other interests

Dear Sir/Madam,

Please find enclosed the following draft:

Doc No.	Title
CED43 (14796)WC	Draft Indian Standard for Methods of test for soils: Part 1 Preparation of dry soil samples for various tests [third revision of IS 2720 (Part 1)] ICS: 93.020

Kindly examine the draft standard and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for comments: 31 December 2019

Comments if any, may please be made in the format as given overleaf and mailed to the email id, madhurima@bis.gov.in.

In case no comments are received or comments received are of editorial nature, you will kindly permit us to presume your approval for the above document as finalized. However, in case comments of technical nature are received, then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website, www.bis.gov.in.

Thanking you,

Yours faithfully,

Sd/-

(Sanjay Pant)
Head (Civil Engg.)

Encl: as above

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENT ONLY

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Soil and Foundation Engineering
Sectional Committee, CED 43

Last date for Comment:
31 December 2019

Draft Indian Standard for

**METHODS OF TEST FOR SOILS:
PART 1 PREPARATION OF DRY SOIL SAMPLES FOR VARIOUS TESTS**

[Third revision of IS 2720 (Part 1)]

Soil and Foundation Engineering Sectional Committee, CED 43

FOREWORD

(Formal clauses to be added later)

With a view to establishing uniform procedure for the determination of different characteristics of soils, Indian Standards on methods of test for soils (IS 2720) have been formulated in various parts. This Standard (Part 1) covers method of preparation of soil samples for the various laboratory tests covered in the various parts of IS 2720. This part was first published in 1966 and subsequently revised in 1972 and 1983. Since then many of the other parts of this standard have been revised covering additional characteristics wherein requirements have been modified. This revised version has therefore been formulated in order to update in this respect. This revision of the standard has been also taken up to update it so as to take into account current practice of preparation of dry samples.

The following major modifications have been incorporated in this revision of the standard:

- a) The sieve sizes have been modified to 80 mm, 40 mm, 20 mm, 10 mm from the existing 75 mm, 37.5 mm, 19 mm and 9.5 mm respectively, and use of sieve sizes 63 mm, 13.2 mm and 6.7 mm has been discontinued whereas sieve size of 75 micron has been added
- b) Balances of improved sensitivity have been prescribed;

- c) Thermostatically controlled ovens capable of maintaining temperature between 105 °C and 110 °C have been specified in place of 105 ± 5 °C and 110 ± 5 °C;
- d) Use of other drying apparatus have not been permitted;

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

BUREAU OF INDIAN STANDARDS

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Soil and Foundation Engineering
Sectional Committee, CED 43

Last date for Comments:
31 December 2019

Draft Indian Standard for

**METHODS OF TEST FOR SOILS
PART 1 PREPARATION OF DRY SOILS SAMPLES
FOR VARIOUS TESTS**

[*Third revision of IS 2720 (Part 1)*]

1 SCOPE

1.1 This standard (Part 1) covers the method of preparation of dry soil sample from the bulk soil sample received from the field for various laboratory tests.

2 REFERENCES

The Indian Standards given below contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

<i>IS No.</i>	<i>Title</i>
460	Specification for test sieves:
Part 1:1985	Wire cloth test sieves(<i>third revision</i>)
Part 2:1985	Perforated plate test sieves(<i>third revision</i>)
Part 3:1985	Methods of examination of apertures of test sieves (<i>third revision</i>)
1607:2013	Methods for test sieving (second revision)
2720	Methods of test for soils:
Part 2:1973	Determination of water content (<i>second revision</i>)
Part 3/Sec 1:1980	Determination of specific gravity, Section 1 Fine grained soils (<i>first revision</i>)

Part 3/Sec 2: 1980	Determination of specific gravity, Section 2 Fine, medium and coarse grained soils (<i>first revision</i>)
Part 4:1985	Grain size analysis(<i>second revision</i>)
Part 5:1985	Determination of liquid and plastic limit (<i>second revision</i>)
Part 6:1972	Determination of shrinkage factors (<i>first revision</i>)
Part 7:1980	Determination of water content- dry density relation using light compaction (<i>second revision</i>)
Part 8:1983	Determination of water content- dry density relation using heavy compaction (<i>second revision</i>)
Part 9:1992	Determination of dry density- moisture content relation by constant mass of soil method (<i>first revision</i>)
Part 10:1991	Determination of unconfined compressive strength (<i>second revision</i>)
Part 11:1993	Determination of the shear strength parameters of a specimen tested in unconsolidated undrained triaxial compression without the measurement of pore water pressure (<i>first revision</i>)
Part 12:1981	Determination of shear strength parameters of soil from consolidated undrained triaxial compression test with measurement of pore water pressure (<i>first revision</i>)
Part 13:1986	Direct shear test (<i>second revision</i>)
Part 14:1983	Determination of density index (relative density) of cohesionless soils (<i>first revision</i>)
Part 15:1986	Determination of consolidation properties (<i>first revision</i>)
Part 16:1987	Laboratory determination of CBR (<i>second revision</i>)
Part 17:1986	Laboratory determination of permeability (<i>first revision</i>)
Part 18:1992	Determination of field moisture equivalent (<i>first revision</i>)
Part 19:1992	Determination of centrifuge moisture equivalent (<i>first revision</i>)
Part 20:1992	Determination of linear shrinkage (<i>first revision</i>)
Part 21:1977	Determination of total soluble solids (<i>first revision</i>)
Part 22:1972	Determination of organic matter (<i>first revision</i>)
Part 23:1976	Determination of calcium carbonate (<i>first revision</i>)
Part 24:1976	Determination of cation exchange capacity (<i>first revision</i>)
Part 25:1982	Determination of silica sesquioxide ratio (<i>first revision</i>)
Part 26:1987	Determination of pH value (<i>second revision</i>)
Part 27:1977	Determination of total soluble sulphates (<i>first revision</i>)
Part 30:1980	Laboratory vane shear test
Part 36:1987	Laboratory determination of permeability of granular soils (Constant head)
Part 37:1976	Determination of sand equivalent value of soils and fine aggregates
Part 39/Sec 1:1977	Direct shear test for soils containing gravel: Section 1 Laboratory test
Part 40:1977	Determination of free swell index of soils
Part 41:1977	Measurement of swelling pressure of soils

3 APPARATUS

3.1 Wooden-Mallet — For breaking soil clods.

3.2 Trays — For air drying of soil, of suitable size and of non-rusting material.

3.3 Pulverizing Apparatus — Either mortar and rubber covered pestle or a mechanical device consisting of mortar and a power-driven rubber covered pestle suitable for breaking up the aggregation of soil particles without reducing the size of the individual grains. Pestle and mortar made of soft wood may also be used.

3.4 Sampler — A suitable riffle sampler or sample splitter for quartering the samples (see IS 1607).

3.5 Sieves — Of sizes 80 mm, 40 mm, 20 mm, 10 mm, 4.75 mm, 2.00 mm, 425 micron and 75 micron [see IS 460 (Parts 1 to 3)].

3.6 Drying Apparatus

- a) *Drying Oven* — Thermostatically controlled, with interior of non-corroding material to maintain the temperature between 105 °C and 110 °C; and
- b) Any other suitable drying apparatus.

3.7 Balances

- a) Capacity 10 kg and minimum sensitivity 10 g
- b) Capacity 1 kg and minimum sensitivity 0.1 g
- c) Capacity 250 g and minimum sensitivity 0.01 g

4 PREPARATION OF SAMPLE FOR TESTS

4.1 General

Soil sample as received from the field shall be dried in the air or in sun. In wet weather, a drying apparatus may be used in which case the temperature of the sample should not exceed 60 °C. The clods may be broken with a wooden-mallet to hasten drying. The organic matter, like tree roots and pieces of bark should be removed from the sample. Similarly, matter other than soil, like shells should also be separated from the main soil mass. A noting shall be made of such removals and their percentage of the total soil sample. When samples are to be taken for estimation of organic content, lime content, etc, total sample should be taken for estimation without removing shells, roots, etc.

4.2 Drying of the Sample

The amount of drying depends upon the proposed test to be conducted on the particular sample. The type, temperature and duration of drying of soil sample for different tests are given in Table 1. When oven is used for drying, the temperature in the oven shall not exceed 110 °C (see Note). Chemical drying of samples should not be adopted for any tests.

NOTE — Soils containing organic or calcareous matter should not be dried at temperature above 60 °C.

Table 1 Quantity of Soil Sample Required for Conducting the Tests
(Clauses 4.2, 4.3 and 5.1)

SI No.	Test	Type, Temperature and Duration of Drying	Amount of Soil Sample Required for Test	Degree of Pulverization (Passing IS Sieve Size)	Ref to Part of IS 2720
(1)	(2)	(3)	(4)	(5)	(6)
i)	Water Content	Oven, 105-110 °C, 24 h	As given in Table 2	—	Part 2
ii)	Specific Gravity	Oven, 105-110 °C, 24 h	a) Fine Grained Soil - 50 g	2 mm	Part 3/Sec 1
			b) Coarse Grained Soil - 400 g	—	Part 3/Sec 2
iii)	Grain Size Analysis	Air Drying	As given in Table 3	—	Part 4
iv)	Liquid Limit	Air Drying	270 g	425 micron	Part 5
v)	Plastic Limit	Air Drying	60 g	425 micron	Part 5
vi)	Shrinkage factors	Air drying	100 g	425 micron	Part 6
vii)	Compaction				
	a) Light compaction	Air drying	6 kg (15 kg if soil is susceptible to crushing)	20 mm	Part 7
	b) Heavy compaction	Air drying	6 kg (15 kg if soil is susceptible to crushing)	20 mm	Part 8
	c) Constant mass	Oven, 105°C - 110 °C	6 kg (15 kg if soil is susceptible to crushing)	4.75 mm	Part 9
viii)	Unconfined compressive strength	Oven, 105°C - 110 °C	1 kg	—	Part 10
ix)	Triaxial compression (unconsolidation)	Oven, 105 °C - 110 °C	1 kg/5 kg	—	Part 11
x)	Triaxial compression (consolidation)	Oven, 105 °C - 110 °C	1 kg/5 kg	—	Part 12
xi)	Direct shear	Oven, 105°C - 110 °C	1 kg	4.75 mm	Part 13

SI No.	Test	Type, Temperature and Duration of Drying	Amount of Soil Sample Required for Test	Degree of Pulverization (Passing IS Sieve Size)	Ref to Part of IS 2720										
xii)	Density index (relative density)	Air drying/Oven 105°C -110 °C	As per the size of particle given below: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>80 mm</td> <td>45 kg</td> </tr> <tr> <td>40 mm</td> <td>12 kg</td> </tr> <tr> <td>20 mm</td> <td>12 kg</td> </tr> <tr> <td>10 mm</td> <td>12 kg</td> </tr> <tr> <td>4.75 mm</td> <td>12 kg</td> </tr> </table>	80 mm	45 kg	40 mm	12 kg	20 mm	12 kg	10 mm	12 kg	4.75 mm	12 kg	—	Part 14
80 mm	45 kg														
40 mm	12 kg														
20 mm	12 kg														
10 mm	12 kg														
4.75 mm	12 kg														
xiii)	Consolidation properties	Air drying/Oven 105°C -110 °C	500 g	—	Part 15										
xiv)	CBR	Air drying/Oven 105°C -110 °C	6 kg	20 mm	Part 16										
xv)	Permeability	Oven, 105°C -110 °C, 24 h	a) For 100 mm dia mould - 2.5 kg b) For 200 mm dia mould size - 5 kg	10 mm	Part 17										
xvi)	Field moisture equivalent	Air drying	50 g	425 micron	Part 18										
xvii)	Centrifuge moisture equivalent	Air drying	10 g	425 micron	Part 19										
xviii)	Linear shrinkage	Air drying	450 g	425 micron	Part 20										
xix)	Chemical test														
	a) Total soluble solids	Oven, 105°C -110 °C, 24 h	10 g	2 mm	Part 21										
	b) Organic matter	Air drying	100 g	2 mm	Part 22										
	c) Calcium Carbonate	Oven 105-110 °C, 24 h	5 g	425 micron	Part 23										
	d) Cation Exchange Capacity	Air drying	80-130 g	425 micron	Part 24										
	e) Silica-sesquioxide ratio	Oven 105-110 °C, 24 h	15 g	425 micron	Part 25										
	f) pH value	Oven, 105-110 °C, 24 h	30 g	425 micron	Part 26										
	g) Total Soluble Sulphates	Oven, 105-110 °C, 24 h	30 g	425 micron	Part 27										
xx)	Vane shear	Air drying/Oven drying, 105-110 °C	250 g	—	Part 30										
xxi)	Permeability of granular soils	Air drying/ Oven drying, 105-110 °C	5 kg	—	Part 36										
xxii)	Sand equivalent value	Oven drying, 105-110 °C	1 500 g	4.75 mm	Part 37										
xxiii)	Direct shear	Air drying/ Oven dry, 105-110 °C	Up to 120 g	20 mm	Part 39/Sec 1										
xxiv)	Free Swell index	Oven dry, 105-110 °C	20 g	425 micron	Part 40										
xxv)	Swelling pressure	Air drying/ Oven drying, 105-110 °C	2 kg	2 mm	Part 41										

4.3 Degree of Pulverization

The big clods may be broken with the help of wooden mallet. Further pulverization may be done in pestle and mortar. The pulverized soil shall be passed through the specified sieve for the particular test and the soil retained on that sieve shall be again pulverized for sieving. This procedure should be repeated until on further attempts at pulverizing very little soil passes through the specified sieve. Care should be taken not to break up the individual soil particles (see Table 1).

5 QUANTITY OF SAMPLE

5.1 The quantities of soil sample required for conducting various laboratory tests are given in Table 1 for guidance.

NOTE — For actual quantities, corresponding part of IS 2720 shall be referred.

5.2 When a smaller quantity has to be taken out of a bigger soil mass, the representative sampling shall be done by quartering or riffing.

NOTE— In the case of coarse gravel or gravelly soils quartering by forming a cone shall not be done. The entire sample shall be thoroughly mixed and spread on a flat surface. The sample as spread shall be divided into four quadrants and diagonally opposite quadrants mixed. This process shall be repeated till the desired quantity of sample is obtained.

Table 2 Quantity of Sample Required for Determination of Water Content

Sl. No.	Size of Particle more than 90 Percent Passing	Minimum Quantity of Soil Specimen to be taken for the Test Mass, in g
(1)	(2)	(3)
i)	425 micron IS Sieve	25
ii)	2 mm IS Sieve	50
iii)	4.75 mm IS Sieve	200
iv)	10 mm IS Sieve	300
v)	20 mm IS Sieve	500
vi)	40 mm IS Sieve	1 000

Table 3 Quantity of Soil Required for Grain Size Analysis

Sl. No.	Maximum Size of Material Present in Substantial Quantities	Mass to be taken for test
(1)	(2)	(3)
i)	80 mm	60 kg
ii)	40 mm	25 kg
iii)	20 mm	6.5 kg

iv)	10 mm	1.5 kg
v)	4.75 mm	400 g
vi)	2.0 mm	200 g
vii)	425 micron	50 g
viii)	75 micron	25 g