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( पहला पुनरीक्षण )

*Indian Standard*

METHOD OF TEST FOR SOILS

PART 20 DETERMINATION OF LINEAR SHRINKAGE

( *First Revision* )

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**BUREAU OF INDIAN STANDARDS**  
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## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Soils and Soil Engineering Sectional Committee had been approved by the Civil Engineering Division Council.

With a view to establish uniform procedures for the determination of different characteristics of soils and also for facilitating comparative studies of the results, an Indian Standard Methods of Test for Soils IS 2720 has been published in 41 parts. This part deals with the determination of the linear shrinkage of soils. The test is of value in indicating the plastic properties of soils having low clay contents.

This standard was first published in 1966. In this revision apart from general updation, the two amendments issued have been incorporated and the quantities and dimensions have been given in SI units.

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.

# Indian Standard

## METHOD OF TEST FOR SOILS

### PART 20 DETERMINATION OF LINEAR SHRINKAGE

#### ( First Revision )

#### 1 SCOPE

1.1 This method covers the determination of the linear shrinkage of remoulded soils.

#### 2 REFERENCES

2.1 The Indian Standards listed below are necessary adjuncts to the standard.

IS No.	Title
460	Specification for test sieves: ( Part 1 ) : 1985 Part 1 Wire cloth test sieves ( second revision )
2720	Methods of test for soils: ( Part 1 ) : 1983 Part 1 Determination of dry soil samples for various test ( second revision )
12979 : 1990	Specification for mould for determination of linear shrinkage

#### 3 APPARATUS AND OTHER MATERIAL

3.1 **Two Palette Knives**, a convenient size is one having a blade about 10 cm long and 2 cm wide.

3.2 **Flat Glass Plate**, approximately 10 mm thick and 45 mm square, or an evaporating dish approximately 15 cm diameter.

3.3 **Mould**, conforming to IS 12979 : 1990.

3.4 **Oven**, thermostatically controlled with interior of non-corroding material to maintain the constant temperatures between 60 to 65°C and 105 to 110°C.

3.5 **Callipers**, vernier gauge to measure 15 cm.

3.6 **Silicone Grease or any other Suitable Grease**

#### 4 SOIL SAMPLE

4.1 A soil sample weighing about 150 g from the thoroughly mixed portion of the material

passing 425-micron IS Sieve [ see IS 460 ( Part 1 ) : 1985 ] obtained in accordance with IS 2720 ( Part 1 ) : 1983 shall be taken for the test specimen.

#### 5 PROCEDURE

5.1 The mould shall be thoroughly cleaned and a thin film of grease shall then be applied to its inner walls in order to prevent the soil from adhering to the mould.

5.2 About 150 g of the soil sample passing 425 micron IS Sieve ( see 4.1 ) shall be placed on the flat glass plate and thoroughly mixed with distilled water, using the palette knives, until the mass becomes a smooth homogeneous paste, with a moisture content approximately 2 percent above the liquid limit of the soil ( see Note 1 and Note 2 ). In the case of clayey soils, the soil paste shall be left to stand for a sufficient time ( 24 h ) to allow the moisture to permeate throughout the soil mass. The thoroughly mixed soil-water paste shall be placed in the mould such that it is slightly proud of the sides of the mould. The mould shall then be gently jarred to remove any air-pockets in the paste. The soil shall then be levelled off along the top of the mould with the palette knife. The mould shall be placed so that the soil-water mixture ( paste ) can air-dry slowly, until the soil has shrunk away from the walls of the mould ( see Note 3 ). Drying should then be completed first at a temperature of 60 to 65°C until shrinkage has largely ceased and then at 105 to 110°C to complete the drying. The mould and soil shall then be cooled and the mean length of soil bar measured if the specimen has become curved during drying. The measurement should be made along the mean arc ( see Note 4 ).

#### NOTES

1 The moisture content of the soil-water mixture at approximately 2 percent above the liquid limit of the soil is not critical to within a few percent.

2 The soil-water mixture should not be wet enough to allow segregation of the larger particles to the bottom of the mould.

**3** With soils of low plasticity or shrinkage where there is no danger of cracking due to rapid drying the moulds may be placed immediately in the high temperature oven.

**4** Should a specimen crack badly, or break, such that measurement is difficult, the test should be repeated at a slower drying rate.

**5.3** At least three determinations of linear shrinkage of the same soil shall be made and the average taken.

## **6 CALCULATIONS AND REPORT**

**6.1** The linear shrinkage of the soil shall be calculated as a percentage of the original length of the specimen from the following formula:

$$\text{Linear shrinkage} = \left[ 1 - \frac{\text{Length of oven dry specimen}}{\text{Initial length of specimen}} \right] \times 100 \text{ percent}$$

**6.2** The linear shrinkage of the soil shall be reported to the nearest whole number.

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