

Soil quality — Determination of unsaturated hydraulic conductivity and water-retention characteristic — Wind's evaporation method

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National foreword

This British Standard is the UK implementation of EN ISO 11275:2014. It is identical to ISO 11275:2004. It supersedes BS ISO 11275:2004, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EH/4, Soil quality.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Soil quality - Determination of unsaturated hydraulic conductivity
and water-retention characteristic - Wind's evaporation method
(ISO 11275:2004)

Qualité du sol - Détermination de la conductivité
hydraulique en milieu non saturé et de la caractéristique de
rétention en eau - Méthode par évaporation de Wind (ISO
11275:2004)

Bodenbeschaffenheit - Bestimmung der ungesättigten
hydraulischen Leitfähigkeit und des
Wasserrückhaltevermögens - Verdunstungsverfahren nach
Wind (ISO 11275:2004)

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Foreword

The text of ISO 11275:2004 has been prepared by Technical Committee ISO/TC 190 “Soil quality” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 11275:2014 by Technical Committee CEN/TC 345 “Characterization of soils” the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2014, and conflicting national standards shall be withdrawn at the latest by September 2014.

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Endorsement notice

The text of ISO 11275:2004 has been approved by CEN as EN ISO 11275:2014 without any modification.

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Introduction

Soil water content and matric pressure are related to each other and determine the water-retention characteristics of a soil. Soil water, which is in equilibrium with free water, is at zero matric pressure (or suction) and either the soil is saturated or the gaseous phase occurs only as small bubbles. As a saturated soil dries, the matric pressure decreases (i.e. becomes more negative), and the largest pores empty of water. Progressive decreases in matric pressure will continue to empty finer pores until eventually water is held in only the finest pores. Not only is water removed from soil pores, but the films of water held around soil particles are reduced in thickness. Therefore, a decreasing matric pressure is associated with decreasing soil water content^{[8],[9]}. Laboratory or field measurements of these two parameters can be made; and the relationship (which can be reported graphically, in tabular form, or possibly as an equation) is called the soil water-retention characteristic. The relationship extends from saturated soil to oven-dry soil (approximately 0 kPa to about -10^6 kPa matric pressure).

The soil water-retention characteristic is different for each soil type. The shape and position of the curve relative to the axes depend on soil properties such as texture, density and hysteresis associated with the wetting and drying history. Individual points on the water-retention characteristic curve may be defined for specific purposes.

The hydraulic conductivity is a measure of the rate at which liquid water can move through the soil under the influence of variations in matric pressure from point to point within the soil. The hydraulic conductivity of unsaturated soil depends on the same factors as does the soil water-retention characteristic, also showing hysteresis. As a saturated soil dries, the hydraulic conductivity decreases, and it is convenient to express the hydraulic conductivity corresponding to the soil water-retention characteristic as a function of the decreasing matrix pressure.

The results obtained using these methods can be used, for example:

- to provide an assessment of the equivalent pore-size distribution (e.g. identification of macro- and micro-pores);
- to determine indices of plant-available water in the soil and to classify soil accordingly (e.g. for irrigation purposes);
- to determine the drainable pore space (e.g. for drainage design, pollution risk assessments);
- to monitor changes in the structure of a soil (caused by e.g. tillage, compaction or addition of organic matter or synthetic soil conditioners);
- to ascertain the relationship between the negative matric pressure and other soil physical properties (e.g. hydraulic conductivity, thermal conductivity);
- to determine water content at specific negative matric pressures (e.g. for microbiological degradation studies);
- to estimate other soil physical properties.