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Soil quality — Determination of carbon and nitrogen by near-infrared spectrometry (NIRS)

Qualité du sol — Dosage du carbone et de l'azote par spectrométrie proche infrarouge (SPIR)

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Foreword

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The committee responsible for this document is ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical methods and soil characteristics*.

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Soil quality — Determination of carbon and nitrogen by near-infrared spectrometry (NIRS)

1 Scope

This International Standard specifies a method for the determination of carbon and nitrogen in soils by direct measurement of sample spectra in the near-infrared spectral region. The spectra are evaluated by a suitable calibration model derived from the results obtained by reference methods.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11464, *Soil quality — Pretreatment of samples for physico-chemical analysis*

3 Principle

Soil samples are measured by reflectance near-infrared (NIR) spectroscopy. Diffuse reflectance NIR spectroscopy offers a non-destructive means for measurement of soil properties based on reflectance spectra of illuminated soils. Spectral data are evaluated by a suitable calibrating model derived from the measurement of a sufficient number of representative soil samples with known content of carbon and/or nitrogen determined by reference methods. Calibration equations reflect the relationship between the constituents of the sample and NIR spectral information. The soil samples and the set of calibrating samples for the NIR measurement are prepared the same way.

NOTE 1 NIR spectrometry is a very fast non-destructive and environmentally friendly analytical technique when compared to the standard chemical methods used as reference methods.

NOTE 2 Soils generally have similar reflectance spectra in the 1 100 nm to 2 500 nm range. The absorption peaks for soils in the near-infrared region are difficult to assign to specific chemical components.

4 Apparatus

4.1 Near-infrared instrument, based on measurement of reflectance spectra in the near-infrared region (wavelength range from 900 nm to 2 500 nm is usually applied). The instrument should be equipped with a suitable measurement cell for pulverized solid samples. The instrument should measure sufficiently large sample volume to eliminate any significant influence of inhomogeneity of the sample. The software shall allow instrument tests, calibration, sample measurement and data evaluation.

Resolution of the instrument should be equal to 8 nm or better.

NOTE Wavelengths of spectra recorded in higher resolution may be averaged to reduce spectra noise and there is a risk of over fitting of the calibration model. Instruments with lower resolution may be used if their performance is verified for intended purposes.

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