Document Title: Description, AN, Classification of Exp Soils using WP4C		Part # and Rev. 13382	
		Release Date: 1-12-07	
Rev.	Description	Revision By	Date
-01	Updated to WP4C	DDH	11/12/10

Production Filename: 13382 (In Product Library)

Path to Working Files: DecaDoc\Application Notes\Master\Description

Dimensions: 8.5 inch wide, 11 inch tall

Material: Paper, 92 Bright White or better, 75g/m² or heavier

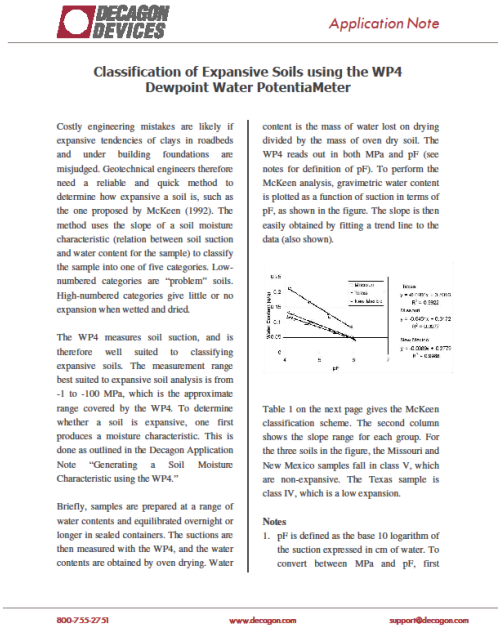
Colors: Color Print on White

Printer: HP Color LaserJet 8550-PS

Finish: None

Adhesive: None

Special Notes: Illustrations are Ref Only ** Not to Scale ** (Page 1 of 2)



DECAGON DEVICES Application Note

Classification of Expansive Soils using the WP4 Dewpoint Water PotentiaMeter

Costly engineering mistakes are likely if expansive tendencies of clays in roadbeds and under building foundations are misjudged. Geotechnical engineers therefore need a reliable and quick method to determine how expansive a soil is, such as the one proposed by McKeen (1992). The method uses the slope of a soil moisture characteristic (relation between soil suction and water content for the sample) to classify the sample into one of five categories. Low-numbered categories are "problem" soils. High-numbered categories give little or no expansion when wetted and dried.

The WP4 measures soil suction, and is therefore well suited to classifying expansive soils. The measurement range best suited to expansive soil analysis is from -1 to -100 MPa, which is the approximate range covered by the WP4. To determine whether a soil is expansive, one first produces a moisture characteristic. This is done as outlined in the Decagon Application Note "Generating a Soil Moisture Characteristic using the WP4."

Briefly, samples are prepared at a range of water contents and equilibrated overnight or longer in sealed containers. The suctions are then measured with the WP4, and the water contents are obtained by oven drying. Water content is the mass of water lost on drying divided by the mass of oven dry soil. The WP4 reads out in both MPa and pF (see notes for definition of pF). To perform the McKeen analysis, gravimetric water content is plotted as a function of suction in terms of pF, as shown in the figure. The slope is then easily obtained by fitting a trend line to the data (also shown).

Table 1 on the next page gives the McKeen classification scheme. The second column shows the slope range for each group. For the three soils in the figure, the Missouri and New Mexico samples fall in class V, which are non-expansive. The Texas sample is class IV, which is a low expansion.

Notes

1. pF is defined as the base 10 logarithm of the suction expressed in cm of water. To convert between MPa and pF, first

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