



Designation: D 4083 – 89 (Reapproved 1994)^{ε2}

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Practice for Description of Frozen Soils (Visual-Manual Procedure)¹

This standard is issued under the fixed designation D 4083; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

^{ε1} NOTE—Keywords were added in January 1994. Section 1.4 was added editorially in January 1999.

1. Scope

1.1 This practice presents a procedure for the description of frozen soils based on visual examination and simple manual tests.

1.2 It is intended to be used in conjunction with Test Method D 2487 and Practice D 2488, which describe and classify soils, but do not cover their frozen state.

1.3 This procedure is based on “Guide to Field Description of Permafrost for Engineering Purposes,” National Research Council of Canada, 1963, and MIL-STD-619.

1.4 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project’s many unique aspects. The word “Standard” in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 ASTM Standards:

D 420 Guide for Investigating and Sampling Soil and Rock²
D 653 Terminology Relating to Soil, Rock, and Contained Fluids²

D 1452 Practice for Soil Investigation and Sampling by Auger Borings²

D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)²

D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)²

2.2 Military Standard:

MIL-STD-619 Unified Soil Classification System for

Roads, Airfields, Embankments and Foundations³

3. Terminology

3.1 Definitions:

3.1.1 Definitions of the soil components of a frozen soil mass, that is, boulders, cobbles, gravel, sand, fines (silt and clay), and organic soils and peat shall be in accordance with Terminology D 653.

3.1.2 The following terms are used in conjunction with the description of frozen ground areas (Fig. 1):⁴

3.1.2.1 *annual frost zone (active layer)*—the top layer of ground subject to annual freezing and thawing.

3.1.2.2 *frost table*—the frozen surface, usually irregular, that represents the level, to which thawing of seasonally frozen ground has penetrated. See Fig. 1.

3.1.2.3 *frozen zone*—a range of depth within which the soil is frozen. The frozen zone may be bounded both top and bottom by unfrozen soil, or at the top by the ground surface.

3.1.2.4 *ground ice*—a body of more or less clear ice within frozen ground.

3.1.2.5 *ice wedge*—a wedge-shaped mass in permafrost, usually associated with fissures in polygons.

3.1.2.6 *icing*—a surface ice mass formed by freezing of successive sheets of water.

3.1.2.7 *permafrost*—the thermal condition in soil or rock, wherein the materials have existed at a temperature below 0°C (32°F) continuously for a number of years. Pore fluids or ice may or may not be present.

3.1.2.8 *permafrost table*—the surface that represents the upper limit of permafrost.

3.1.2.9 *polygons (polygonal ground)*—more or less regular-sized surface patterns created by thermal contraction of the ground. Two types are common: (a) those with depressed centers and (b) those with raised centers.

3.1.2.10 *residual thaw zone*—a layer of unfrozen ground between the permafrost and the annual frost zone. This layer

¹ This practice is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.19 on Frozen Soils and Rock.

Current edition approved Feb. 24, 1989. Published October 1989. Originally published as D 4083 – 82. Last previous edition D 4083 – 83.

² Annual Book of ASTM Standards, Vol 04.08.

³ Available from Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120.

⁴ For more complete lists of generally accepted terms used in the description of frozen ground see: Hennion, F., “Frost and Permafrost Definitions,” *Bulletin 111*, Highway Research Board, Washington, DC 1955; and Brown, R. J. E., and Kupsch, W. D., “Permafrost Terminology,” *Technical Memorandum No. 111*, National Research Council of Canada, 1974.