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Standard Guide for Installation of Direct Push Groundwater Monitoring Wells¹

This standard is issued under the fixed designation D6724/D6724M; 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.

^{ε1} NOTE—Reapproved with editorial changes to References section in March 2024.

1. Scope*

1.1 This guide describes various direct push groundwater monitoring wells and provides guidance on their selection and installation for obtaining representative groundwater samples and monitoring water table elevations. Direct push wells are used extensively for monitoring groundwater quality in unconsolidated formations. This guide also includes discussion of some groundwater sampling devices which can be permanently emplaced as monitoring wells.

1.2 This guide does not address the single event sampling of groundwater using direct push water samplers as presented in Guide D6001/D6001M. The methods in this guide are often used with other tests such as direct push soil sampling (Guide D6282/D6282M) and the cone penetrometer test (Guide D6067/D6067M). The guide does not address the installation of monitoring wells by rotary drilling or sonic drilling methods such as those presented in Practice D5092/D5092M. Techniques for obtaining groundwater samples from monitoring wells are covered in Guides D4448, D7929, and Practice D6771. Practice D6725/D6725M addresses direct push wells using pre-packed screens.

1.3 The installation of direct push groundwater monitoring wells is limited to unconsolidated soils and sediments including clays, silts, sands, and some gravels and cobbles. Penetration may be limited, or damage may occur to equipment, in certain subsurface conditions; some of which are discussed in 5.5. Information in this guide is limited to groundwater monitoring in the saturated zone.

1.4 The values stated in either inch-pound units or SI units presented in brackets are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other.

Combining values from the two systems may result in non-conformance with the standard.

1.5 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026, unless superseded by this standard.

1.6 This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgement. Not all aspects of this guide 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.

1.6.1 This guide does not purport to comprehensively address all of the methods and issues associated with monitoring well installation. Users should seek input from qualified professionals for the selection of proper equipment and methods that would be the most successful for their site conditions. Other methods may be available for monitoring well installation, and qualified professionals should have flexibility to exercise judgement concerning alternatives not covered in this guide. The practice described in this guide is current at the time of issue; however, new, alternative, and innovative methods may become available prior to revisions. Therefore, users should consult with manufacturers or producers prior to specifying program requirements.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

¹ This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.21 on Groundwater and Vadose Zone Investigations.

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*A Summary of Changes section appears at the end of this standard

Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

- D653** Terminology Relating to Soil, Rock, and Contained Fluids
- D3740** Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D4448** Guide for Sampling Ground-Water Monitoring Wells
- D4750** Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well) (Withdrawn 2010)³
- D5088** Practice for Decontamination of Field Equipment Used at Waste Sites
- D5092/D5092M** Practice for Design and Installation of Groundwater Monitoring Wells
- D5254/D5254M** Practice for Minimum Set of Data Elements to Identify a Groundwater Site (Withdrawn 2019)³
- D5299/D5299M** Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities
- D5434** Guide for Field Logging of Subsurface Explorations of Soil and Rock (Withdrawn 2021)³
- D5474** Guide for Selection of Data Elements for Groundwater Investigations (Withdrawn 2021)³
- D5521/D5521M** Guide for Development of Groundwater Monitoring Wells in Granular Aquifers
- D5730** Guide for Site Characterization for Environmental Purposes With Emphasis on Soil, Rock, the Vadose Zone and Groundwater (Withdrawn 2013)³
- D5978/D5978M** Guide for Maintenance and Rehabilitation of Groundwater Monitoring Wells
- D6001/D6001M** Guide for Direct-Push Groundwater Sampling for Environmental Site Characterization
- D6026** Practice for Using Significant Digits and Data Records in Geotechnical Data
- D6067/D6067M** Practice for Using the Electronic Piezocone Penetrometer Tests for Environmental Site Characterization and Estimation of Hydraulic Conductivity
- D6282/D6282M** Guide for Direct Push Soil Sampling for Environmental Site Characterizations (Withdrawn 2023)³
- D6286/D6286M** Guide for Selection of Drilling and Direct Push Methods for Geotechnical and Environmental Subsurface Site Characterization
- D6452** Guide for Purging Methods for Wells Used for Ground Water Quality Investigations
- D6564/D6564M** Guide for Field Filtration of Groundwater Samples
- D6634/D6634M** Guide for Selection of Purging and Sam-

pling Devices for Groundwater Monitoring Wells (Withdrawn 2023)³

- D6725/D6725M** Practice for Direct Push Installation of Prepacked Screen Monitoring Wells in Unconsolidated Aquifers
- D6771** Practice for Low-Flow Purging and Sampling Used for Groundwater Monitoring
- D6914/D6914M** Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices
- D7242/D7242M** Practice for Field Pneumatic Slug (Instantaneous Change in Head) Tests to Determine Hydraulic Properties of Aquifers with Direct Push Groundwater Samplers (Withdrawn 2022)³
- D7352** Practice for Volatile Contaminant Logging Using a Membrane Interface Probe (MIP) in Unconsolidated Formations with Direct Push Methods
- D7929** Guide for Selection of Passive Techniques for Sampling Groundwater Monitoring Wells

3. Terminology

3.1 Definitions—For common definitions of terms in this standard, refer to Terminology **D653**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 dual tube systems, *n*—a system whereby inner and outer tubes are advanced independently or simultaneously into the subsurface strata.

3.2.1.1 Discussion—The outer casing tube is used for borehole stabilization. The inner tube for is used sampler recovery and insertion of other devices. In Practice **D6282/D6282M**, direct push soil sampling the dual tube system takes soil samples with a sampler fixed to the inner rods.

4. Summary of Guide

4.1 This guide provides information to be used by experienced groundwater professionals for exploration of the subsurface and ambient groundwater conditions.

4.2 This guide outlines a variety of field methods for installing direct push groundwater monitoring wells. Installation methods include: (1) soil probing using combinations of dynamic (percussion or vibratory) driving with, or without, additions of static (constant) force; (2) static force from the surface using hydraulic penetrometer or drilling equipment; and (3) incremental drilling combined with direct push methods. Methods for installation of annular seals and annular grouts are also discussed as well as abandonment grouting.

4.3 This guide addresses considerations for selection and use of direct push well systems and installation techniques that may be classified into two main categories; exposed screen techniques and protected screen techniques. In exposed screen techniques, the screened casing may serve as the drive rod, or may surround a drive rod that is removed following installation. In protected screen techniques, the well may be advanced along with a protective outer casing, or may be lowered into a driven casing that is subsequently removed. Alternatively, the screen, riser, and a retractable shield may be driven simultaneously and all remain in the ground.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.