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Standard Practice for Direct Push Installation of Prepacked Screen Monitoring Wells in Unconsolidated Aquifers[1]

This standard is issued under the fixed designation D6725; 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.

1. Scope

1.1 This practice is based on recognized methods by which direct push monitoring wells may be designed and installed for the purpose of detecting the presence or absence of a contaminant, and collecting representative groundwater quality data. The design standards and installation procedures herein are applicable to both detection and assessment monitoring programs for facilities.

1.2 The recommended monitoring well design, as presented in this practice, is based on the assumption that the objective of the program is to obtain representative groundwater information and water quality samples from aquifers. Monitoring wells constructed following this practice should produce relatively turbidity-free samples for granular aquifer materials ranging from gravels to silty sand. Strata having grain sizes smaller than the recommended design for the smallest diameter filter pack materials should be monitored by alternative monitoring well designs which are not addressed in this practice.

1.3 Direct push procedures are not applicable for monitoring well installation under all geologic and soil conditions (for example, installation in bedrock). Other rotary drilling procedures are available for penetration of these consolidated materials for well construction purposes (Guide D5092). Additionally, under some geologic conditions it may be appropriate to install monitoring wells without a filter pack (EPA 1991). Guide D6724 may be referred to for additional information on these and other methods for the direct push installation of groundwater monitoring wells.

1.4 The values stated in inch-pound units are to be regarded as standard. The values in parentheses are for information only.

1.5 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

1.6 *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 judgement. 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 the 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:*[2]

D1452 Practice for Soil Exploration and Sampling by Auger Borings

D1587 Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes

D2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)

D3694 Practices for Preparation of Sample Containers and for Preservation of Organic Constituents

D4043 Guide for Selection of Aquifer Test Method in Determining Hydraulic Properties by Well Techniques

D4044 Test Method for (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers

D4104 Test Method (Analytical Procedure) for Determining Transmissivity of Nonleaky Confined Aquifers by Overdamped Well Response to Instantaneous Change in Head (Slug Tests)

D4448 Guide for Sampling Ground-Water Monitoring Wells

D4700 Guide for Soil Sampling from the Vadose Zone

D5088 Practice for Decontamination of Field Equipment Used at Waste Sites

D5092 Practice for Design and Installation of Groundwater Monitoring Wells

[1] This practice 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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[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.

D5314 Guide for Soil Gas Monitoring in the Vadose Zone
D5521 Guide for Development of Groundwater Monitoring Wells in Granular Aquifers
D5778 Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils
D5781 Guide for Use of Dual-Wall Reverse-Circulation Drilling for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices
D5782 Guide for Use of Direct Air-Rotary Drilling for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices
D5783 Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices
D5784 Guide for Use of Hollow-Stem Augers for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices
D5785 Test Method for (Analytical Procedure) for Determining Transmissivity of Confined Nonleaky Aquifers by Underdamped Well Response to Instantaneous Change in Head (Slug Test)
D5786 Practice for (Field Procedure) for Constant Drawdown Tests in Flowing Wells for Determining Hydraulic Properties of Aquifer Systems
D5787 Practice for Monitoring Well Protection
D5881 Test Method for (Analytical Procedure) Determining Transmissivity of Confined Nonleaky Aquifers by Critically Damped Well Response to Instantaneous Change in Head (Slug)
D5912 Test Method for (Analytical Procedure) Determining Hydraulic Conductivity of an Unconfined Aquifer by Overdamped Well Response to Instantaneous Change in Head (Slug) (Withdrawn 2013)[3]
D6001 Guide for Direct-Push Groundwater Sampling for Environmental Site Characterization
D6282 Guide for Direct Push Soil Sampling for Environmental Site Characterizations
D6285 Guide for Locating Abandoned Wells
D6634 Guide for Selection of Purging and Sampling Devices for Groundwater Monitoring Wells
D6724 Guide for Installation of Direct Push Groundwater Monitoring Wells
D6771 Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations (Withdrawn 2011)[3]

3. Terminology

3.1 *Definitions*—Refer to Terminology D653 for definitions of terminology.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *prepacked screen*—a manufactured well screen that is assembled with a slotted inner casing and an external filter media support. The external filter media support may be constructed of a stainless steel wire mesh screen or slotted PVC that retains filter media in place against the inner screen. The filter media is usually composed of graded silica sand.

3.2.2 *tremie pipe or tube*—a pipe or tube that is used to transport filter pack materials and/or annular sealant materials from the ground surface into the borehole annulus or between casings and casings or riser pipe of a monitoring well.

4. Summary of Practice

4.1 This practice provides information for installing a prepacked screen monitoring well using direct push techniques. When constructed following this Standard Practice the direct push installed monitoring wells can meet most state regulations and federal guidelines (EPA 1986, 1991, 1992) for well construction (Fig. 1) and protection of the aquifer and groundwater resources.

4.2 Initially the outer casing (or probe rod) is advanced to depth using direct push methods. The monitoring well is constructed inside the casing with prepacked well screens and riser pipe. The casing is retracted to set the well at the desired depth in the formation. Bottom up tremie installation of the annular seal and grout is conducted through the outer casing as it is retracted. This grouting method is required to obtain the highest integrity well construction. Commonly available types of above ground or flush mount well protection are installed to physically protect the well and prevent tampering. The small diameter wells may be developed using bailers, peristaltic pumps, bladder pumps or an inertial check valve system. The inertial check valve and tubing system is especially effective when used for development in medium to coarse-grained aquifers. This development method simultaneously surges and purges fines from the screen interval. Slug testing of the wells can be conducted to determine local aquifer properties and verify that development has been successful. Low flow and other sampling techniques may be used to obtain representative water quality samples. Clear and accurate documentation of the well construction is required.

5. Significance and Use

5.1 This practice is intended to provide the user with information on the appropriate methods and procedures for installing prepacked screen monitoring wells by direct push methods. The monitoring wells may be used to obtain representative water quality samples for aqueous phase contaminants or other analytes of interest, either organic or inorganic (Kram et al. 2000, McCall 2000, McCall et al. 1997). The monitoring wells may also be used to obtain information on the potentiometric surface of the local aquifer and properties of the formation such as hydraulic conductivity or transmissivity.

5.2 Use of direct push methods to install monitoring wells can significantly reduce the amount of potentially hazardous drill cuttings generated during well installation at contaminated sites. This may significantly reduce cost of an environmental site investigation and groundwater monitoring program. Minimizing generation of hazardous waste also reduces the exposure hazards to site workers, local residents, and the environment.

5.3 Direct push methods for monitoring well installation are limited to use in unconsolidated formations such as alluvial/

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