Designation: D8170 – 20

Standard Guide for Using Disposable Handheld Soil Core Samplers for the Collection and Storage of Soil for Volatile Organic Analysis[1]

This standard is issued under the fixed designation D8170; 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 guide is intended for application to soils that may contain volatile organic compounds.

1.2 This guide provides a general procedure and considerations associated with using a disposable handheld soil core sampler to collect and temporarily store a soil sample for volatile organic analysis.

1.3 In general, an initial soil sample is collected (see Guides D6169/D6169M and D6282/D6282M) and the disposable handheld soil core sampler is then used to collect the 5 or 25 g soil sample from the initial soil core sample. The disposable handheld soil core sampler can also serve as a sample storage chamber. It is recommended that this standard be used in conjunction with Guides D4547, D4687, D6169/D6169M, D6232, D6282/D6282M, D6418, and D6640, as appropriate, which provide information on the collection of the initial soil core sample.

1.4 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026. Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard.

1.5 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 judgment. 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 *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.*

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

D4547 Guide for Sampling Waste and Soils for Volatile Organic Compounds

D4687 Guide for General Planning of Waste Sampling

D5088 Practice for Decontamination of Field Equipment Used at Waste Sites

D5792 Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives

D6026 Practice for Using Significant Digits in Geotechnical Data

D6169/D6169M Guide for Selection of Soil and Rock Sampling Devices Used With Drill Rigs for Environmental Investigations

D6232 Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities

D6282/D6282M Guide for Direct Push Soil Sampling for Environmental Site Characterizations

D6418 Practice for Using the Disposable En Core Sampler

[1] This test method 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.

Current edition approved June 1, 2020. Published June 2020. DOI: 10.1520/D8170-20.

[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.

for Sampling and Storing Soil for Volatile Organic Analysis (Withdrawn 2018)[3]

D6640 Practice for Collection and Handling of Soils Obtained in Core Barrel Samplers for Environmental Investigations

3. Terminology

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

4. Summary of Guide

4.1 This guide discusses the use of disposable handheld soil core samplers to collect and store a soil sample of approximately 5 or 25 g for volatile organic analysis. The disposable handheld soil core samplers, which generally consist of a coring body/storage chamber, O-ring sealed plunger, and air-tight sealing cap, are designed to collect and hold a soil sample during shipment to the laboratory for analysis. The disposable handheld soil core sampler should be made to prevent the release of volatile organic compounds and should not adsorb the volatile organic compounds.

4.2 After the sample is collected in the disposable handheld soil core sampler, the coring body/storage chamber is sealed with an air-tight cap and immediately becomes a sample storage chamber. To minimize loss of volatile compounds due to volatilization or biodegradation from the time of collection until analysis or chemical preservation in the laboratory, sample storage in the disposable handheld soil core sampler is specified at 4 ± 2°C for up to 48 h (see Guide D4547, Practice D6418, and any local, regional or national requirement, for example USEPA SW-846 Method 5035A[4] in the United States). For storage periods beyond 48 h, other storage temperatures can be used as an option, provided it can be shown that the longer storage time used does not influence the concentrations of the volatile organic compounds (VOCs) of interest in the samples (see Guide D4547), or that the data generated by analysis of the samples meet the data quality objectives (DQOs) (see Practice D5792).

5. Significance and Use

5.1 This guide is for the use of disposable handheld soil core samplers in collecting and storing approximately 5 or 25 g soil samples for volatile organic analysis in a manner that reduces loss of contaminants due to volatilization or biodegradation. In general, an initial soil core sample is collected (see Guides D6169/D6169M and D6282/D6282M) and the disposable handheld soil core sampler is then used to collect the 5 or 25 g soil sample from the initial soil core sample. The disposable handheld soil core sampler can also serve as a sample storage chamber.

5.2 The physical integrity of the soil sample is maintained during sample collection, storage, and transfer in the laboratory for analysis or preservation.

5.3 During sample collection, storage, and transfer, there is very limited exposure of the sample to the atmosphere.

5.4 Laboratory subsampling is not required for samples collected following this guide. The sample is expelled directly from the coring body/storage chamber into the appropriate container for analysis, or preservation, at the analytical laboratory without disrupting the integrity of the sample. Subsampling from the disposable handheld soil core sampler should not be performed to obtain smaller sample sizes for analysis.

5.5 This guide specifies sample storage in the disposable handheld soil core sampler at 4 ± 2°C for up to 48 h.

5.6 This guide does not use methanol preservation or other chemical preservatives in the field. As a result, there are no problems associated with flammability hazards, shipping restrictions, or dilution of samples containing low volatile concentrations due to solvents being added to samples in the field.

5.7 The disposable handheld soil core samplers are single-use devices. They should not be cleaned or reused.

5.8 This disposable handheld soil core samplers cannot be used for collecting cemented material, consolidated material, or material having fragments wider than the mouth of the device or coarse enough to interfere with proper coring techniques.

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective sampling. Users of this practice are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

Practice D3740 was developed for agencies engaged in the laboratory testing and/or inspection of soil and rock. As such, it is not totally applicable to agencies performing this practice. However, user of this practice should recognize that the framework of practice D3740 is appropriate for evaluating the quality of an agency performing this practice. Currently there is no known qualifying national authority that inspects agencies that perform this practice.

6. Apparatus

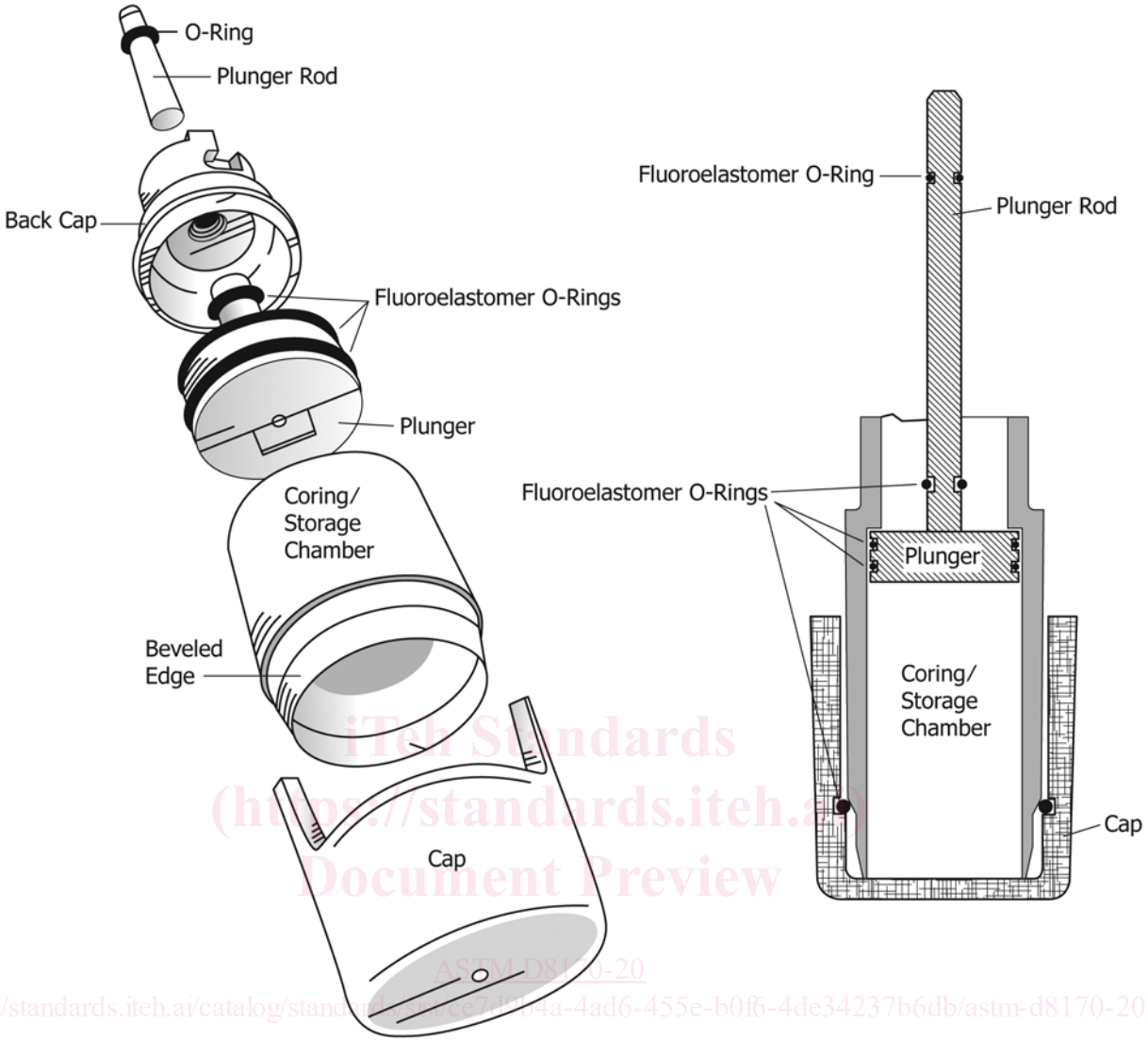
6.1 *Disposable Handheld Soil Core Sampler*—The disposable handheld soil core sampler has three basic components: the coring body/storage chamber, which is volumetrically designed to collect and store a soil sample of approximately 5 or 25 g; an O-ring sealed plunger for nondisruptive extrusion of the sample into an appropriate container for analysis or preservation at the analytical laboratory; and, an air-tight sealing cap (see Fig. 1).

6.1.1 The coring body/storage chamber of the 5 g sampler has a volume of 3 cm^3 to give a sample size of approximately 5 g, assuming a soil density of 1.7 g/cm^3. The coring body/storage chamber of the 25 g sampler has a volume of 14.5 cm^3 to give a sample size of approximately 25 g, assuming a soil density of 1.7 g/cm^3.

6.1.2 The air-tight seal of the sampler is provided by: polytetrafluoroethylene/silicone septa in the cap, fluoroelastomer O-rings around the device mouth, and/or a fluoroelastomer O-rings on the plunger (see Fig. 1).

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

[4] Referenced EPA document can be found at: https://www.epa.gov/sites/production/files/2015-07/documents/epa-5035a.pdf (website verified as of 05/26/2020).



NOTE 1—The placement of the fluoroelastomer O-rings is design dependent and presented here only to show potential locations.

FIG. 1 Components of a Generic Disposable Handheld Soil Core Sampler.

6.1.3 The coring body/storage chamber, plunger, and cap of the disposable handheld soil core sampler are constructed of inert composite polymers.

6.1.4 The disposable handheld soil core sampler is certified as clean upon receipt and should not be reused.

6.1.5 Depending on the design of the disposable handheld soil core sampler, an extruding tool may be necessary.

6.2 Cooler with ice or cold packs, or refrigerated compartment regulated at 4 ± 2°C.

6.3 *Minimum/Maximum Temperature Monitor*—This is any device that registers the minimum and maximum temperatures reached during a given period of time in °C, has an accuracy of ±2°C, and has a range that includes the specified storage temperature in divisions of 1°C, such as a minimum/maximum thermometer or temperature data logger.

7. General Sampling Guidance

7.1 The size of the disposable handheld soil core sampler to be used is determined by the size of the sample required by the laboratory analytical procedure. If a sample size of approximately 5 g is required for analysis, the 5 g handheld soil core sampler, and not the 25 g device, should be used to collect and store the sample. Subsampling from the handheld soil core sampler should not be performed to obtain smaller sample sizes for analysis.

7.2 If volatile organic contaminant levels in the soil being sampled are not known, it is recommended that three samples be collected at each sampling location using three disposable handheld soil core samplers. One sample should be screened at the analytical laboratory to determine whether low-level or high-level sample preparation methods will be required for volatile organic analysis. The remaining two samples can be used for the determinative laboratory analysis. For guidance on sample collection, sample handling, and sample preparation methods for volatile organic analysis, see Guide D4547. For quality assurance considerations related to field sampling, see Guide D4687.

NOTE 2—If determination of moisture content is required for reporting