



**Designation: D 4452 – 85 (Reapproved 1995)<sup>ε1</sup>**

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 Test Methods for X-Ray Radiography of Soil Samples<sup>1</sup>**

This standard is issued under the fixed designation D 4452; 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.

---

<sup>ε1</sup> NOTE—Editorial changes were made throughout in April 1995.

---

### **1. Scope**

1.1 These test methods cover the determination of the quality of soil samples by X-ray radiography.

1.2 These test methods enable the user to determine the effects of sampling and natural variations within samples as identified by the extent of the relative penetration of X rays through soil samples.

1.3 These test methods can only be used to their fullest extent after considerable experience is obtained through many detailed comparisons between the X-ray film and the sample X-rayed.

1.4 The values stated in inch-pound units are to be regarded as the standard.

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.* For specific precaution statements, see Section 6.

### **2. Referenced Documents**

#### **2.1 ASTM Standards:**

D 653 Terminology Relating to Soil, Rock, and Contained Fluids<sup>2</sup>

E 7 Terminology Relating to Metallography<sup>3</sup>

### **3. Terminology**

#### **3.1 Definitions:**

3.1.1 For definitions of terms relating to soil samples, refer to Terminology D 653.

3.1.2 For definitions of terms relating to X rays, refer to Definitions E 7.

### **4. Significance and Use**

4.1 Many geotechnical tests require the utilization of undisturbed, representative samples of soil deposits. The quality of these samples depends on many factors. Many of the samples

obtained by undisturbed sampling methods have inherent anomalies. Sampling procedures cause disturbances of varying types and intensities. These anomalies and disturbances, however, are not always readily detectable by visual inspection of the undisturbed samples before or after testing. Often test results would be enhanced if the presence and the extent of these anomalies and disturbances are known before testing or before destruction of the sample by testing. Such determinations assist the user in detecting flaws in sampling methods, the presence of natural or induced shear planes, the presence of natural intrusions, such as gravels or shells at critical regions in the samples, the presence of sand and silt seams, and the intensity of some of the unavoidable disturbances caused by sampling.

4.2 X-ray radiography provides the user with a picture of the internal massive structure of the soil sample, regardless of whether the soil is X-rayed within or without the sampling tube. X-ray radiography assists the user in identifying the following:

4.2.1 Appropriateness of sampling methods used,

4.2.2 Effects of sampling in terms of the disturbances caused by the turning of the edges of various thin layers in varved soils, large disturbances caused in soft soils, shear planes induced by sampling, or extrusion, or both, effects of overdriving of samplers, the presence of cuttings in sampling tubes, or the effects of using bent, corroded, or nonstandard tubes for sampling,

4.2.3 Naturally occurring fissures, shear planes, and the like,

4.2.4 The presence of intrusions within the sample, such as calcarious nodules, gravel, or shells, and

4.2.5 Sand and silt seams, organic matter, large voids, and channels developed by natural or artificial leaching of soils components.

### **5. Apparatus**

5.1 *X-Ray Radiography Equipment*—The equipment shall have a minimum output voltage of 100 kV. Equipment with a peak current of approximately 15 mA is needed for a wide range of applications capable of accommodating commercially available film, suitable for the sample sizes to be X-rayed, and suitable for the sample holders. The equipment may be equipped with a fluoroscope.

NOTE 1—Certain types of samples may require equipment capable of

---

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee D-18 on Soil and Rock and are the direct responsibility of Subcommittee D18.07 on Identification and Classification of Soils.

Current edition approved Jan. 25, 1985. Published March 1985.

<sup>2</sup> Annual Book of ASTM Standards, Vol 04.08.

<sup>3</sup> Annual Book of ASTM Standards, Vol 03.03.