



Designation: D4992 – 22

Standard Practice for Evaluation of Rock to be Used for Erosion Control¹

This standard is issued under the fixed designation D4992; 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 covers the evaluation of rock to be used for erosion control. The complexity and extent of this evaluation will be governed by the size and design requirements of the individual project, the quantity and quality of rock required, and the potential risk for property damage or loss of human life.

1.2 It is not intended that all of the evaluations listed in this practice be addressed for every project. For some small, less critical jobs, a visual inspection of the rock may be all that is necessary. Several of the evaluations listed may be necessary on large, complex, high-hazard projects. It is the responsibility of the designer to determine the intensity and number of evaluations made on any one project.

1.3 Examination of the rock at the source, evaluation of similar rock exposed to the environment at any field installations, as well as laboratory tests may be necessary to determine the properties of the rock as related to its predicted performance at the site of intended use **(1, 2, 3, 4, 5, 6)**.²

1.4 The examination of the rock at its source is essential to its evaluation for erosion control and aids in the planning of the subsequent laboratory examinations. Very large pieces of rock up to several tons weight are used in the control of erosion; take great care with the field descriptions and in the sampling program to assure that zones of impurities or weaknesses that might not occur in ordinary size specimens are recorded and evaluated for their deleterious potential under the conditions of intended use. It is necessary that the intended method of rock removal be studied to ascertain whether the samples taken will correspond to the blasting, handling, and weathering history of the rock that will finally be used **(3)**.

1.5 The specific procedures employed in the laboratory examinations depend on the kind of rock, its characteristics,

mineral components, macro and micro structure, and perhaps most importantly, the intended use, size of the pieces, and the exposure conditions at the site of use **(1, 2, 3, 4)**.

1.6 It is assumed that this practice will be used by personnel who are qualified by education and experience to plan the necessary evaluations and to conduct them so that the necessary parameters of the subject rock will be defined. Therefore, this practice does not attempt to detail the laboratory techniques required, but rather to mention them and only detail those properties that are of special concern in the course of the examination for rock to be used for erosion control.

1.7 *Units*—The values stated in SI units are to be regarded as standard. The inch-pound units given in parentheses are provided for information only.

1.8 *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.*

NOTE 1—Erosion stone pieces can weigh from several hundred pounds to several tons. Exercise caution at all times as the mass of each piece represents a potential pinch point and a lifting, handling, and carrying hazard.

1.9 *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.*

1.10 *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.*

¹ This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.17 on Rock for Erosion Control.

Current edition approved Jan. 1, 2022. Published January 2022. Originally approved in 1989. Last previous edition approved in 2014 as D4992 – 14². DOI: 10.1520/D4992-22.

² The boldface numbers in parentheses refer to the list of references at the end of this standard.

2. Referenced Documents

2.1 *ASTM Standards:*³

- C294** Descriptive Nomenclature for Constituents of Concrete Aggregates
- C295/C295M** Guide for Petrographic Examination of Aggregates for Concrete
- C535** Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- D653** Terminology Relating to Soil, Rock, and Contained Fluids
- D3042** Test Method for Insoluble Residue in Carbonate Aggregates
- D3740** Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D3967** Test Method for Splitting Tensile Strength of Intact Rock Core Specimens
- D5121** Practice for Preparation of Rock Slabs for Durability Testing
- D5240/D5240M** Test Method for Evaluation of the Durability of Rock for Erosion Control Using Sodium Sulfate or Magnesium Sulfate
- D5312/D5312M** Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions
- D5313/D5313M** Test Method for Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions
- D6473** Test Method for Specific Gravity and Absorption of Rock for Erosion Control
- D8281/D8281M** Test Method for Determining the Presence of Expanding Clays in Rock for Erosion Control Using Ethylene Glycol

3. Terminology

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

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *shot rock, n*—(synonym for quarry run); unprocessed stone produced from a source primarily by blasting. The term does not indicate stone size or gradation.

3.2.2 *shard, n*—a small piece of stone broken off from erosion stone, typically as the result of handling and stockpiling operations.

3.2.2.1 *Discussion*—Some erosion stone specifications define shards as broken pieces weighing less than two pounds.

4. Significance and Use

4.1 The field examination, sampling, and petrographic examination in this practice along with appropriate laboratory testing may be used to determine the suitability of rock for erosion control. Factors to consider include identification and

delineation of areas or zones of the rock, beds, and facies of unsuitable or marginal composition and properties due to weathering, alteration, structural weaknesses, porosity, and other potentially deleterious characteristics.

4.2 Evaluate both the rock mass properties and the rock material properties.

4.2.1 The rock mass properties are the lithologic properties of the in situ rock that are evaluated on a macroscopic scale in the field. These properties include features such as fractures, joints, faults, bedding, schistosity, and lineations, as well as the lateral and vertical extent of the rock unit.

4.2.2 The rock material properties are those lithologic properties that may be evaluated using small specimens and thus can be subject to meaningful laboratory testing. These properties would include mineral composition, grain size, rock hardness, degree of weathering, porosity, unit weight, and many others.

4.3 Rock proposed for use in erosion control applications are normally classified as either filter bedding stone, riprap stone, armor stone, or breakwater stone. However, these procedures may be also extended to rocks used in groin and gabion structures.

4.4 In cases in which only stockpile samples are to be obtained for laboratory testing, a full quarry geological examination may not be required. It is the responsibility of the specifier of this standard to indicate which sections of this Practice apply to the specific project.

NOTE 2—The quality of the result produced by this standard is dependent upon 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 testing/sampling/inspection/etc. Users of this standard 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 evaluation some of those factors.

5. Planning

5.1 Plan and schedule the field examination and subsequent laboratory examination including a review of available information about the source rock and the purpose for which it is intended. State geological surveys, geological divisions of state transportation departments, and geology/environmental departments of universities near the source to be examined are generally good sources of information. Consult local engineering geologists to gain collateral information that might be useful in examining the source site and any project installations, and in the planning of the laboratory test requirements.

5.2 This review may provide the name of the rock unit and key to lithologic descriptions, previous examinations, and structural and compositional characteristics affecting the rock in its intended use, as well as test data. The information may further assist in planning the examinations and alternatives to problems such as vertical quarry faces.

6. Materials and Equipment for Examinations

6.1 Equipment for the field examination will be at the investigator's discretion. A checklist of equipment may include, but not be limited to, the following:

³ 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.