Designation: D5121 – 15

Standard Practice for Preparation of Rock Slabs for Durability Testing[1]

This standard is issued under the fixed designation D5121; 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 preparation of rock slabs for various tests and any visual inspections used to evaluate the durability of rock for erosion control. These tests include, but are not limited to, Test Methods D5240, D5312, and D5313. This practice is appropriate for the assessment of breakwater stone, armor stone, riprap, and gabion sized rock materials.

1.2 *Units*—The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered standard.

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values shall conform to the guidelines for significant digits and rounding established in Practice D6026, unless superseded by this standard.

1.4 *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.*

1.5 *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 a specific hazards statement, see Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D4992 Practice for Evaluation of Rock to be Used for Erosion Control

D5240 Test Method for Testing Rock Slabs to Evaluate Soundness of Riprap by Use of Sodium Sulfate or Magnesium Sulfate

D5312 Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions

D5313 Test Method for Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions

D6026 Practice for Using Significant Digits in Geotechnical Data

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 *rock saw, n*—a saw capable of cutting rock. The term "rock saw" shall include the blade which saws the rock, any components that control or power the sawing process or both, and framework on which the blade and any other associated components are mounted.

3.2.2 *slab, n*—a section of rock having two smooth, approximately parallel faces, produced by two saw cuts. The thickness of the slab is generally less than the other dimensions of the rock. The slab will be the specimen of a rock which will subsequently undergo durability tests.

3.2.3 *slice, n—in rock testing*, the smooth surface of rock piece produced by the cutting of the rock by a rock saw.

3.2.4 *gabion-fill stone, n*—stone generally less than 25 kg (50 lb) and placed in baskets of wire or other suitable material.

[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.

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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.

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

These baskets are then tied together to form an integral structure designed to resist erosion along stream banks and around bridge piers.

4. Significance and Use

4.1 This practice is used to prepare rock specimens for durability testing and to evaluate any internal defects, such as cracks, that may not be apparent on the surfaces of broken blocks of rock. Such evaluation can also aid in the selection and location of slabs for testing as outlined in Practice D4992. In some cases, the need for further testing or evaluation may be eliminated.

4.2 The sawing of rock samples will reduce them to a suitable specimen size and quantity for testing and, in many cases, preserve the natural structure of the internal defects so the samples can be evaluated by the various durability tests.

4.3 Durability tests specimens should be 65 ± 5 mm (2.5 ± 0.25 in) thick normal to bedding or any potential planes of weakness which may be observed in the samples. In no case will the size of the slab be less than 125 mm (5 in.) on a side, excluding the thickness Ideally, a test specimen size equal to the proposed design size would provide the ultimate in correlation between laboratory tests and actual field performance. However, in most cases, this is neither practical nor economically feasible.

5. Apparatus

5.1 *Rock Saw*—Any laboratory diamond saw used to cut geological and concrete specimens, or a diamond saw used for lapidary purposes, shall be acceptable. A minimum blade diameter of 35 cm (14 in.) will be needed to obtain the required slab (a larger blade is preferable). The blade shall be a circular diamond blade. The size of the slab that can be obtained by sawing is limited by the blade-stabilizing flanges. Table 1 gives the approximate blade diameter and slab height relationships for saws typically used.

5.1.1 The rock saw apparatus shall have a vise to hold the samples during the cutting process, in addition to an automatic feed (either gravity, hydraulic, or screwfeed operated) that controls the cutting action. A table saw with a removable vise is also acceptable. The saw shall have a platform to prevent the cut slab from falling and shattering.

5.2 *Camera*—A video or still camera capable of producing good quality, color images for taking pictures of the rock sample and specimens before and after slab cutting.

5.3 *Photographic Scale*—A scale of appropriate dimension and division when compared to the field of view and the detail being studied. When selecting a scale, always choose the scale that will provide at least as precise a measurement as the system that will be measuring the photographic information. If the system has a precision to one millimetre, make sure the scale used is accurate and precise to at least one millimetre across the entire scale.

TABLE 1 Approximate Blade Diameter and Slab Height Relationship

Blade Diameter, Nominal, cm (in.)	Slab Height, Nominal, cm (in.)
35 (14)	15 (6)
45 (18)	20 (8)
60 (24)	25 (10)

6. Materials

6.1 *Coolant*—Water shall be used as a coolant between the rock surface and the saw blade during the cutting process. Coolants other than water may interfere with subsequent testing or evaluation, or both.

6.2 *Wash*—Water shall be used for washing samples and specimens. Washing with something other than water may interfere with subsequent testing or evaluation or both.

7. Hazards

7.1 Circular, diamond saw blades do not have sharp protruding teeth that wood-cutting blades have, and as such are not inherently as dangerous as blades with teeth. However, their use does require care, safe handling procedures, and proper safety equipment.

7.2 During the sawing action rock cuttings may become projectiles and potentially harm eyes. Also, blades have been known to stick or bind and the object being cut or the blade may become a projectile.

8. Procedure

8.1 Choose individual rock samples for testing that are representative of the total rock mass, as noted in Practice D4992. The sample shall be of a size to fit within the vise of the saw without further mechanical reduction of size.

NOTE 1—Test specimens may also be prepared by cutting a 65 mm (2.5 in.) thick slab from a 150-mm (6-in.) diameter drill core such that any apparent zones of weakness are included

8.2 Clamp the rock sample in the vise, or hand-hold it on the saw table such that the rock sample will be sawn perpendicular to the bedding or banded texture of the rock, unless another orientation is specified for the saw cut.

8.3 Cut the sample in a single pass between the midpoint of the rock and one-third of the distance from its edge. Make the cut either by: (*1*) automatically feeding the sample within the vise through the blade, or (*2*) hand-holding and hand-feeding soft rocks through the blade. The automatic feed is preferable. In either case, saw the rock to minimize breakage which can result from internal cracks, features of weakness, or the sawing operation. Care shall be taken to produce a cut as smooth as possible.

8.4 Remove the rock from the saw after each cut is made. Wash and examine the slice. Note the presence of bedding planes, fractures, and other planes of weakness and their condition.

8.5 Place the rock sample back in the vise and make a second, parallel cut at some distance from the first one in the same manner. The thickness of any slab produced from two cuts shall be determined by the type of durability test for which the slab is sawed and as discussed in 4.3.

8.6 Repeat steps 8.2 – 8.5 as many times as needed to produce the number of specimens and test slabs needed.

8.7 Label each test specimen with a suitable waterproof marker. Record the image of each test specimen in such a way that the slab fills most of the photograph. Wet or partially wet test specimens usually show more detail than dry specimens. Include a scale in all photographs.

8.8 Visual examination may indicate some slabs are unsuitable for testing due to breakage during or after slab cutting, or for some other reason; discard these slabs.

9. Report: Test Data Sheet(s)/Form(s)

9.1 Record the following information:
9.1.1 Identification number,
9.1.2 Sample location,
9.1.3 Rock type (formational name is optional),
9.1.4 The number of trials needed to obtain the number of test slabs requested from each sample,
9.1.5 Textures, defects, or other information obtained from the visual examination that may affect the durability testing of the rock,
9.1.6 Mass of the rock slab,
9.1.7 A color image of the sample prior to the slab cutting, with a dimensional scale,
9.1.8 A color image of the specimen slab with a dimensional scale, and
9.1.9 Name of individuals performing the preparation.

10. Keywords

10.1 defects; diamond saw blade; durability; rock saw; slabs

SUMMARY OF CHANGES

In accordance with Committee D18 policy, this section identifies the location of changes to this standard since the last edition (2010) that may impact the use of this standard. (July 1, 2015)

(1) Revised 1.1 to include what materials are deemed appropriate for use in this practice.
(2) Revised 1.3, 1.5, and 3.1, caveats to meet D18.91 editorial requirements.
(3) Revised the ASTM Standard D5240 title in 2.1 to reflect its change.
(4) Added 3.2.4 to include gabion-fill as it is not referenced in Terminology D653.
(5) Revised 5.1 for ease of use and clarification.
(6) Revised 5.2 to include the allowed use of video cameras to record rock and slab images.
(7) Added 5.3 to clarify the use of a photographic scale that is referenced in 9.1.7 and 9.1.8.
(8) Revised 8.4 for ease of use and clarification.
(9) Added 8.7 for ease of use and clarification.
(10) Revised Section 9 title to meet D18.91 editorial requirements.