



Standard Specification for Fixed Anchorages Installed on Structures used for Rope Rescue Training¹

This standard is issued under the fixed designation F2822; 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 standard specifies the minimum strength requirements for anchorages permanently installed or attached to training towers or other structures used for rope rescue training. It does not describe how those anchorages are constructed, installed in, or attached to the structure nor does it include any factors of safety. It only specifies the design loads that must be considered.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

F2266 Specification for Masses Used in Testing Rescue Systems and Components

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *anchorage, n*—a permanently attached point on the structure that is used as an attachment for rope or hardware. Also referred to as an *anchor*.

3.1.2 *failure, n*—the point at which some part of the anchor physically distorts or begins to detach from its mounting point on the structure.

3.1.3 *proof load, n*—a predetermined test load, greater than the service load, to which a specimen is subjected before

¹ This specification is under the jurisdiction of ASTM Committee F32 on Search and Rescue and is the direct responsibility of Subcommittee F32.01 on Equipment, Testing, and Maintenance.

Current edition approved Nov. 1, 2016. Published November 2016. Originally approved in 2010. Last previous edition approved in 2010 as F2822 – 10. DOI: 10.1520/F2822-10R16.

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.

acceptance for use. In this standard the proof load is twice the maximum anticipated load on an anchor.

4. Performance Requirements

4.1 Each anchorage shall be designed to hold a minimum of 40 kN in all directions of potential loading.

5. Other Requirements

5.1 The anchorage shall be manufactured in such a way that a carabiner with a gate opening of 25 mm or greater shall fit around it and the gate shall be able to close and lock.

5.2 The anchorage shall be constructed using rounded stock or with beveled or chamfered edges to minimize damage to hardware, rope, or webbing that is attached to the anchorage.

TEST METHODS

6. Scope

6.1 This test method provides basic testing procedures for product acceptance. It is a nondestructive “proof load” test and therefore is not a test of ultimate load-carrying capacity of the anchor.

7. Significance and Use

7.1 This test verifies that a carabiner can be attached to the anchorage and that the anchorage will hold a minimum of twice the anticipated load.

8. Hazards

8.1 The anchorage, attaching carabiners, or rope could fail and eject parts. The test load or testing machine could fall. Use a safety screen, protective eyewear, do not increase the test load any greater than necessary, and do not perform this test alone.

9. Procedure

9.1 Attach the testing device to the anchorage using a carabiner that has a gate opening of 25 mm or greater and a strength of at least 40 kN.

9.2 Subject the anchorage to a force of 10.88 kN in the direction of anticipated loading, maintain the force for one minute then remove the force.

9.3 Repeat the test specified above, altering the direction of anchorage loading, until the anchorage has been tested in all directions of anticipated use.

9.4 Observe the condition of the anchorage after each test. Anchorages shall be capable of withstanding the load without breaking, cracking, or permanent deformation visible to the unaided eye.

10. Precision and Bias

10.1 Insufficient information is currently available to characterize the precision and bias of the test method described

here. As the test method is more widely used, the precision and bias will be characterized.

11. Marking

11.1 Anchorages that show no damage shall be marked as tested per ASTM XXXXXX and the date.

12. Keywords

12.1 anchorage; anchors; fire training tower; rappel tower; rope rescue training facilities; training tower

APPENDIXES

(Nonmandatory Information)

X1. PROOF TEST LOAD

X1.1 The 10.88 kN proof test load was calculated by assuming a system with a rope travelling through a pulley (with a 0 degree included angle) attached to the anchorage. A Type V load [272 kg] as described in Specification **F2266** is either being raised or lowered with the rope. The pulley creates a

force multiplying situation so that the anchorage is actually supporting a 544 kg load. That load was then doubled to account for potential maximum dynamic loading of the anchorage.

X2. TEST PROCEDURE

X2.1 The test load can be applied using a hydraulic ram mounted to an appropriate fixture so that the pull is in the direction of anticipated use during training evolutions. The proof test could also be performed by attaching a pulley to the

anchorage through a load cell, routing a rope through the pulley at a 0 degree included angle, anchoring or terminating one end of the rope and pulling or weighting the other until the specified force is applied.

X3. TYPES OF ANCHORAGES

X3.1 This standard is applicable to many types of anchoring devices. Eye bolts, swivel lifting eyes, cast in place, or welded loops, etc. When installing anchorages it is important to follow

the manufacturer's or design engineer's instructions regarding the direction and angle of pull.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; http://www.copyright.com/