



Standard Test Methods for Basket Type Rescue Litters¹

This standard is issued under the fixed designation F2821; 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 These test methods will enable the user to determine if a rescue litter meets their requirement for strength depending upon their particular applications and methods of use.

1.2 The test methods described in this standard are designed to test several parameters under “manner of use” conditions.

1.3 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.

1.4 *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. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *basket type litter, n*—a conveyance for the sick or injured usually consisting of a tubular metal frame enclosing a molded plastic or wire shell. Also known as a basket stretcher.

2.1.2 *litter bridle, n*—a manufactured or improvised system that attaches the litter to the raising or lowering system.

2.1.3 *horizontal lift, n*—refers to the patient being in a horizontal position with the head and feet at approximately the same level. In this configuration the litter bridle attaches to the litter at four points.

2.1.4 *anchor plate, n*—a device installed inside the litter that is used to attach the litter to the bed of the test apparatus. It must be of sufficient size and stiffness to distribute the forces on the litter shell or frame, thereby allowing the test of the attachment points.

2.1.5 *vertical lift, n*—refers to the patient being in a head up and feet down position. In this configuration the litter bridle attaches to the litter at the head end only.

3. Summary of Test Method

3.1 Horizontal test method is designed to test the litter attachment points and the resistance of the litter to folding or curling.

3.2 Vertical test method is designed to test the structural strength of the head end of the litter or the manufacturer’s designated bridle attachment points or both, and for a two-piece litter, to also test the connection between the two sections of the litter.

3.3 These tests are destructive in nature and will require a new litter for each test.

4. Significance and Use

4.1 These test methods are intended to provide reproducible data from which acceptance criteria, design data, and specifications can be developed for basket type rescue litters.

5. Apparatus

5.1 *General*—Use calibrated electronic load measuring devices. The testing equipment shall have sufficient capacity to prevent yielding of its components under the anticipated ultimate load, and shall have sufficient stiffness to ensure that the applied tension loads remain parallel to the axis of the anchors.

5.2 *Anchor Plate*—(if used) Shall be installed in the litter in such a way that the force distributes equally and does not concentrate on a single element. The purpose is to test the attachment points of the litter bridle, the connection points that hold the halves of two-piece litter together, and the litter’s ability to resist folding or bending both longitudinally and laterally. The anchor plate size must be kept to a minimum so that it does not provide any increased resistance to the litter bending during a test. In cases where the litter does not have a frame, the plate shall span any ribs or other structural elements within the shell in order that the forces are distributed over a wide enough area that unintentional damage does not occur.

5.3 *Sample Orientation*—The litter subject to test can be loaded either horizontally or vertically depending upon the test apparatus being used.

6. Hazards

6.1 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the

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responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

6.2 These tests are destructive in nature and there is the potential for injury from flying objects that are ejected during the tests. The person performing the tests shall wear appropriate safety equipment, the test apparatus shall be properly guarded, and the tests shall not be performed alone.

7. Procedure for Horizontal Litter Test

7.1 Attach a 4 leg litter bridle to the litter at points designated by the litter manufacturer.

7.1.1 The bridle shall be constructed of chain or cable to eliminate stretching or the potential for any adjuster buckle slippage or both.

7.1.2 The internal angle of the bridle legs attached to the head and foot ends of the litter shall be $90 \pm 2^\circ$.

7.2 Secure the litter to the bed of the test machine using an anchor plate of approximately 40 by 40 cm (16 by 16 in.) inside the litter. The plate shall be centered between the rails and ends of the litter and shall span at least two rails (or ribs) and cross rails (or ribs) to distribute the forces in the litter. In cases where the litter does not have a frame, or if the specified plate size does not span the frame rails, the size can be increased to span structural elements in the shell or the frame.

7.3 Apply a pulling force to the bridle at the rate of 30 ± 2.5 cm (12 ± 1 in.) a minute. The test concludes when any part of the litter fails or when any part of a structural element is deformed more than 5 ± 0.5 cm (2 ± 0.2 in.).

8. Procedure for Vertical Litter Test

8.1 Attach test apparatus to the head end of the litter at points designated by the litter manufacturer. If the litter is equipped with designated connection points then those connection points shall be used. If the manufacturer suggests that the litter be attached with a system using rope or webbing wrapped around the frame rails, then those instructions shall be followed.

8.1.1 The bridle shall be constructed of chain or cable to eliminate stretching or the potential for any adjuster buckle

slippage or both. If rope or webbing is used it shall be of sufficient strength to minimize elongation and to insure that the litter is tested and not the attachment method or material.

8.2 The internal angle of the bridle shall be as small as possible. If manufactured connections on the litter are in such a location that the bridle contacts the shell of the litter, the bridle shall be extended just enough to eliminate contact with the litter shell.

8.3 Secure the litter to the bed of the test machine using an anchor plate approximately 40 by 40 cm (16 by 16 in.) inside the litter. The plate shall be centered between the rails (or ribs) at the end of the litter opposite of the bridle. The plate shall span any rails or cross rails to distribute the load on the litter frame or shell. In cases where the litter does not have a frame, or if the specified plate size does not span the frame rails, the size can be increased to span structural elements in the shell or the frame.

8.4 Apply a pulling force to the bridle at the rate of 30 ± 2.5 cm (12 ± 1 in.) a minute. The test concludes when any part of the litter fails or when any part of a structural element is deformed more than 5 ± 0.5 cm (2 ± 0.2 in.).

9. Report

9.1 Report the force on the litter at the time any structural element fails or the deformation of any structural element exceeds 5 ± 0.5 cm (2 ± 0.2 in.). Report the attachment points used, location of the failure, the dimensions of the bridle before and after the test, the internal angle of the bridle before and after the test, and any special concerns observed.

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. Keywords

11.1 lifting bridle; rescue litter; rescue stretcher; stretcher

APPENDIX

(Nonmandatory Information)

X1. Sample Test Setups

X1.1 Horizontal Litter Test

X1.1.1 **Fig. X1.1** shows a suggested schematic of a test setup. The key point to remember is that the reaction plate shall be large enough to span frame members or structural elements in the shell but not so large as to inhibit bending or curling of the frame, especially on the horizontal test.

X1.2 Vertical Litter Test

X1.2.1 **Fig. X1.2** shows the bridle attached to a frame down tube but depending upon the litter and the manufacturer's instructions it may be connected to designated attachment points or other locations on the frame.

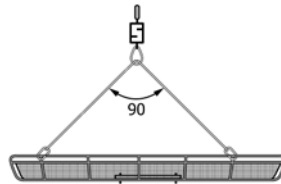
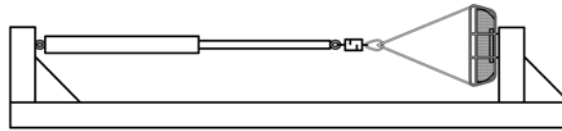


FIG. X1.1

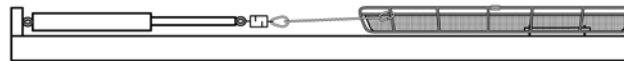
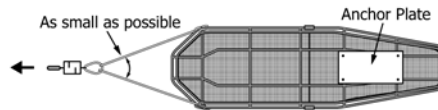


FIG. X1.2

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