UL 1439

STANDARD FOR SAFETY

Tests for Sharpness of Edges on Equipment

UL Standard for Safety for Tests for Sharpness of Edges on Equipment, UL 1439

Fifth Edition, Dated April 21, 2015

Summary of Topics

This revision of ANSI/UL 1439 dated May 4, 2021 includes the following changes in requirements:

- ***Removed reference to 3M Company Type 4432 tape; Table 5.1***

- ***Revised test procedure in 7.2***

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated February 26, 2021.

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UL 1439

Standard for Tests for Sharpness of Edges on Equipment

The First and Second editions were titled Determination of Sharpness of Edges on Equipment.

First Edition – October, 1978
Second Edition – December, 1979
Third Edition – February, 1993
Fourth Edition – February, 1998

Fifth Edition

April 21, 2015

This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through May 4, 2021.

The most recent designation of ANSI/UL 1439 as an American National Standard (ANSI) occurred on April 21, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 1439 on August 2, 1989. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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CONTENTS

INTRODUCTION

CONSTRUCTION

TESTS

No Text on This Page

INTRODUCTION

1 Scope

1.1 These requirements cover a test procedure to be used to determine the potential personal injury related to the sharpness of edges that are part of or associated with appliances and equipment.

2 Units of Measurement

2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

3 Undated References

3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

CONSTRUCTION

4 General

4.1 An edge of an enclosure opening, frame, guard, knob, handle or the like of an appliance or equipment shall be smooth and rounded so as not to cause a cut-type injury when contacted during normal use or user maintenance.

Exception: A sharp edge that must be exposed to enable the product to perform its intended function need not comply with the requirement in 4.1.

TESTS

5 Apparatus

5.1 The test apparatus is to consist of the following:

a) Sharp-Edge Tester – The instrument consists essentially of a handle with a pivoted arm attached. A constant-tension spring secured to the handle is used to apply a steady force to the arm. The arm head is a piece of cylindrical steel, with an outside diameter of 1/2 in (12.7 mm) and a length of 3/4 in (19 mm), located at the end of the adjustable arm. The arm head is to be wrapped with three layers of tape, the two outer layers act as sensing tapes; the inner layer acts as an indicating tape. Alternately, the tapes are to be applied to a removable sleeve or cap that is placed onto the 1/2 in (12.7 mm) steel arm head. The sleeve or cap shall not exceed 5/8 in (15.9 mm) in diameter. See Figure 5.1 or Figure 5.2.

b) Indicating Tape (Inner Layer) – 3/4 in (19.1 mm) wide, adhesive backed, single-adhesive coated, vinyl foam tape, black in color, having the tape properties given in Table 5.1.

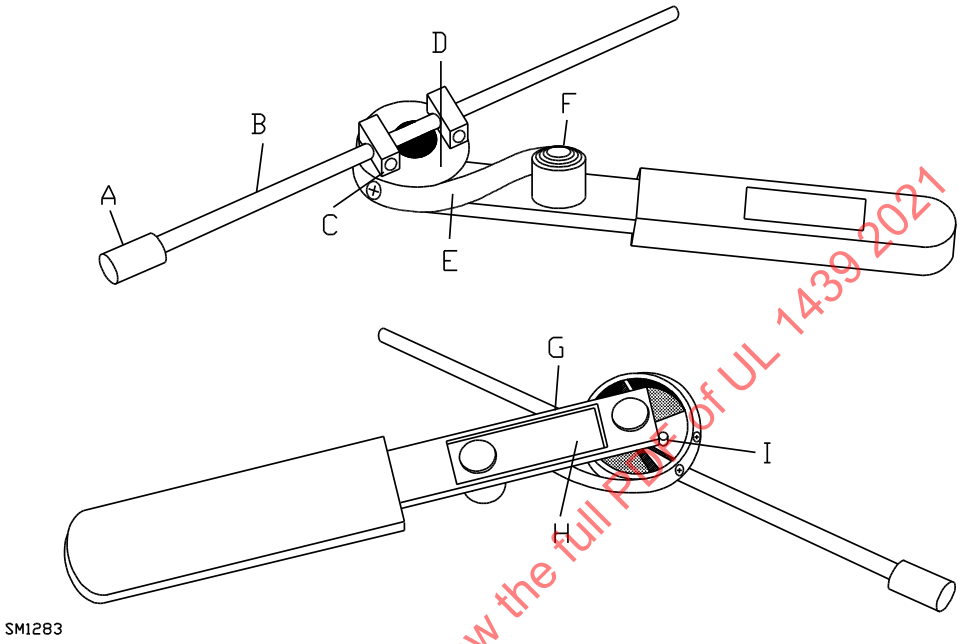
c) Sensing Tape No. 2 (Middle Layer) – 3/4 in (19.1 mm) wide, double-adhesive coated, vinyl foam tape, white in color, having the tape properties given in Table 5.1.

d) Sensing Tape No. 1 (Outer Layer) – 3/4 in (19.1 mm) wide, single-adhesive coated skived tetrafluorethylene tape – natural color, having the tape properties given in Table 5.1. The skived tetrafluorethylene backing (film) is shaved in a thin layer from a cylindrical block of material.

e) Calibration Equipment – A mass that can exert 1-1/2 ±0.03 lbf (6.672 ±0.133 N) and a length of string.

Figure 5.1

Sharp edge tester



A – Head, steel, 1/2 in diameter (12.7 mm), 3/4 in long (19 mm)

B – Arm, steel, 1/4 in diameter (6.4 mm), adjustable

C – Adjustment screw

D – Main drum, free to rotate on stud, sleeve bearing

E – Negator s-ring, 1/2 in wide (12.7 mm), 6-1/2 in long (165 mm)

F – Storage drum, free to rotate on stud, sleeve bearing

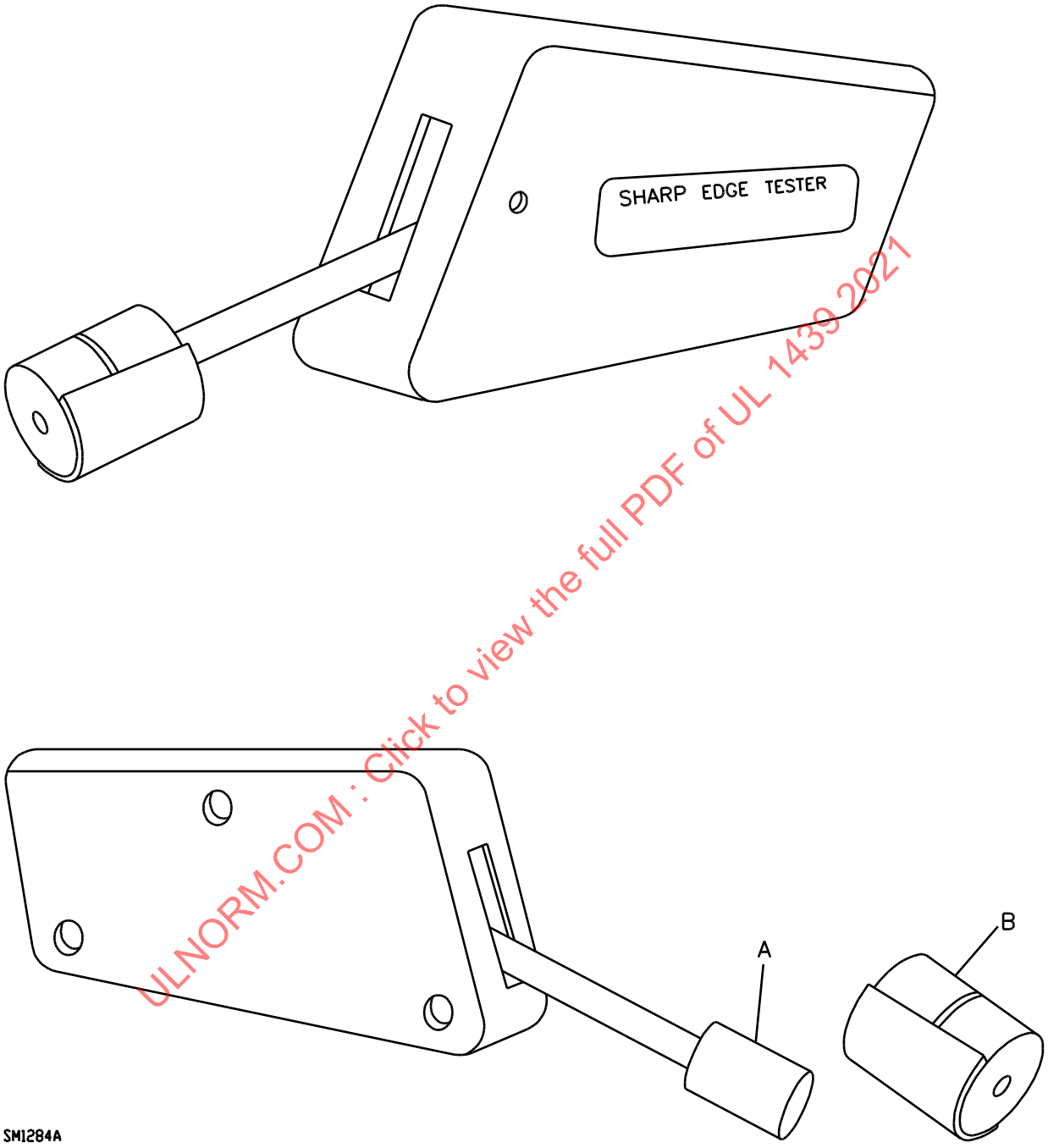
G – Adjustable wrench

H – Handle assembly

I – Stop

Figure 5.2

Sharp edge tester with tape cap (alternate construction)



A – Head, steel, 1/2 in (12.7 mm) diameter, 3/4 in (19 mm) long

B – Tape sleeve or cap, maximum 5/8 in (15.9 mm) diameter removable sleeve

Table 5.1
Average values of tapes-dimensions and properties

	Indicating tape[a]	Sensing tape No. 2[b]	Sensing tape No. 1[c]
Thickness	0.045 – 0.080 in (1.14 – 2.03 mm)	0.025 – 0.040 in (0.64 – 1.02 mm)	total with adhesive backing: 0.0045 (0.114 mm) backing: 0.0025 – 0.0035 inch (0.064 – 0.089 mm)
Density	25 – 27 lbs/cubic foot (400 – 433 kg/cubic meter)	14 – 20 lbs/cubic foot (224 – 321 kg/cubic meter)	–

[a] 3M Company Type 4516 or any other tape having the properties in Table 5.1 meets the intent of the requirements.

[b] TapeCase Ltd. Type VF 32, or Press-On Inc. Type VF 20103, or any other tape having the properties in Table 5.1 meets the intent of the requirements.

[c] Saint Gobain Company #2045-3 or any other tape having the properties in Table 5.1 meets the intent of the requirements.

6 Calibration of Tester

6.1 The sharp edge tester is to be calibrated so that a 1-1/2 ±0.03 lbf (6.672 ±0.133 N) is present at the center of the head when the arm is between stops. The length of the arm is to be adjustable for calibration purposes. See Figure 6.1 for a typical calibration procedure.

Exception: For special evaluations, when specified in the end-product standard, the force may be adjusted to a different value.

6.2 The adjustment set screws that hold the pivoted arm in place in the main drum are to be loosened.

6.3 With the handle securely held in a horizontal position, the calibration weight is to be attached to the center of the head.

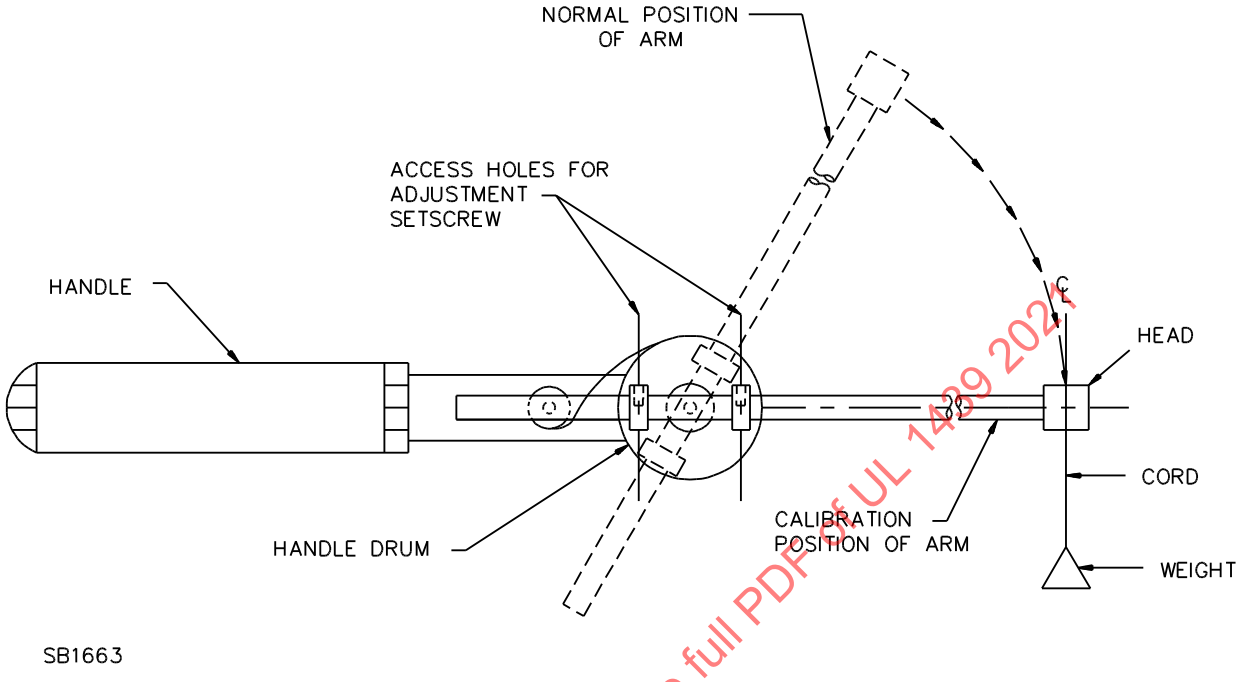
6.4 The length of the arm within the main drum is to be adjusted so that the weighted arm remains in a horizontal position with the calibration weight attached.

6.5 The adjustment setscrew(s) are to be tightened to securely lock the pivot arm in place within the main drum.

6.6 The calibration is to be rechecked and the weight removed.

Figure 6.1

Typical calibration procedure



7 Test Procedure

7.1 The curved face of the tester head is to be covered with three layers of tape in the order indicated below:

a) First Layer (Inner Layer) – Indicating type, black vinyl foam tape as described in 5.1(b).

b) Second Layer (Middle Layer) – Sensing Tape No.2, white vinyl foam tape as described in 5.1(c).

c) Third Layer (Outer Layer) – Sensing Tape No.1, tetrafluorethylene tape as described in 5.1(d).

7.2 Each tape is to be applied over a minimum of 90 degrees of the circumference of the test head to prevent stretching of the tape.

7.3 The tapes are not to be stretched when positioned on the head. See Figure 7.1

7.4 The center of the tape-covered head of the sharp-edge tester is to be positioned on the edge to be tested in the manner illustrated in Figure 7.2. The arm of the tester is to be between stops so that the tape-covered head exerts a 1-1/2 lbf (6.7 N) on the edge. The tester is to be immediately moved along the edge a distance of 2 in (50.8 mm) and then back to its starting position without removal of the tester from the edge. It is to then be withdrawn from the edge. The total distance of engagement between the edge and the tape-covered head is not to exceed 4 in (101 mm). The time of travel is not to take longer than 5 seconds nor less than 2 seconds.

Exception: An edge less than 2 in (50.8 mm) long is to be tested for a distance of twice its length. (Example: For an edge 1-1/2 in or 41.2 mm long, the tester is to be moved along its length and back to the starting position so that the total distance of engagement between the edge and tester is 3 in or 76.2 mm).