UL 768

STANDARD FOR SAFETY

Combination Locks

UL Standard for Safety for Combination Locks, UL 768

Eighth Edition, Dated January 6, 2006

Summary of Topics

This revision of ANSI/UL 768 is being issued to update the title page to reflect the reaffirmation of ANSI approval. No changes in requirements have been made.

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. Changes in requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

The requirements are substantially in accordance with Proposal(s) on this subject dated May 25, 2018.

No Text on This Page

January 6, 2006
(Title Page Reprinted: July 12, 2018)

UL 768

Standard for Combination Locks

First Edition – January, 1953
Second Edition – May, 1961
Third Edition – July, 1972
Fourth Edition – August, 1978
Fifth Edition – June, 1984
Sixth Edition – February, 1994
Seventh Edition – December, 1999

Eighth Edition

January 6, 2006

This ANSI/UL Standard for Safety consists of the Eighth Edition including revisions through July 12, 2018.

The most recent designation of ANSI/UL 768 as a Reaffirmed American National Standard (ANS) occurred on July 12, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 768 on April 5, 1976. 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.

No Text on This Page

CONTENTS

INTRODUCTION

CONSTRUCTION

PERFORMANCE

MARKING

INTRODUCTION

1 Scope

1.1 These requirements cover combination locks intended for attachment on doors of safes, chests, vaults, and the like, to provide a means of locking the boltwork against unauthorized opening.

1.2 These requirements are intended to test the ability of combination locks to resist unauthorized opening of the combination locks by sense of sight, touch, or hearing. Combination locks covered by these requirements may or may not have integral protection against entry by force.

2 General

2.1 Components

2.1.1 Except as indicated in 2.1.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.1.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

2.1.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.1.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

2.2 Units of measurement

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

2.3 Undated references

2.3.1 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.

3 Classification

3.1 Combination locks are classified as Group 1, Group 1R, Group 2M, or Group 2.

3.2 GROUP 1 – Those locks that have a high-degree of resistance to expert or professional manipulation. The protection against expert manipulation includes advanced construction features not found in conventional designs. Group 1 locks shall have 20 working hours of resistance to expert or professional manipulation. See 10.1.1 – 10.1.5 and 10.5.1 – 10.5.8.

3.3 GROUP 1R – Group 1R locks shall have 20 working hours of resistance to expert or professional manipulation, the same as for Group 1 and, in addition, have 20 working hours of resistance to radiological attack. See 10.2.1 and 10.5.1 – 10.5.8.

3.4 GROUP 2M – Those locks that have 2 working hours of resistance to expert or professional manipulation. See 10.3.1 – 10.3.5 and 10.5.1 – 10.5.8.

3.5 GROUP 2 – Those locks that have a moderate degree of resistance to unauthorized opening. See 10.4.1 – 10.4.4 and 10.5.1 – 10.5.8.

4 Glossary

4.1 For the purpose of this standard the following definitions apply.

4.2 DRIVE CAM –

a) A circular component connected directly to the spindle; its drive pin transfers rotation to the wheels, and its gate is shaped to accept the lever nose.

b) The drive cam screws onto the spindle within the lock case. It is locked into position by a spline key that is pushed snugly into a groove milled into the drive cam and spindle. Once locked into position on the spindle, the drive cam's purpose is to transmit the drive to the wheels and also to withdraw the lock bolt. The drive from the drive cam to the third wheel is transmitted via a small drive pin on the cam.

4.3 DRIVE PIN – A pin extending from the underside of the drive cam and from all but the first wheel in a wheel pack; it transfers motion to the next component in the wheel pack.

4.4 FENCE – A part of the lever (see 4.6) projecting across the periphery of the wheels that fit into the wheel gates, permitting the lever nose to engage in the drive cam.

4.5 GATE – The cutout in the periphery of the tumbler that is engaged by the fence on the lever assembly.

4.6 LEVER (DROP LEVER) –

a) Connects bolt and drive cam during lock operation.

b) Serves to retract the bolt when the proper combination has been aligned.

c) The drop lever attaches to the bolt via a pivot screw or post. Attached to the lever is a fence (see 4.4) that drops into the wheel gate when they are correctly aligned. The nose of the drop lever rides on the drive cam, dropping into a gate in the drive cam when the wheels are correctly positioned. When the combination wheels of the lock are properly aligned, the fence of the lever enters the wheel pack only after the drive cam gate is positioned at the lever nose. Once the lever nose has entered the drive cam gate and the lever fence has entered into the wheel gates, the locking, or blocking bolt of the lock is capable of being withdrawn by further rotation of the lock dial.

4.7 TUMBLER PACK – Set of wheels, flys, and isolation (spacing) washers supported by a torque adjuster or wave washer and secured with a retainer.

4.8 WHEEL POST – A component, usually cast as part of the lock case or cover, on which the wheel pack is assembled and about which the wheels rotate.

4.9 WHEEL – Assembly, usually in the form of a circular disc, having a gate and drive pin whose locations are set to selected positions to permit combination change.

CONSTRUCTION

5 General

5.1 A lock shall present a user with a minimum of 1,000,000 (one million) separate dialable or enterable codes or combinations. Although a combination lock may provide for a choice of 1,000,000 codes or combinations, there may be some codes or combinations that the user is advised not to use. The instructions with the lock shall advise the user of these cautions and conditions; for example:

a) The same digit or character for each input;

b) Digits or characters in rising or descending order with spacing of 5 or less digits or characters between each entry;

c) Telephone numbers and birth dates;

d) Digits or characters that associate with a company or individual name;

e) Simple combinations such as 20-40-60; and

f) An original factory combination or code.

On mechanical dial-type combination locks, there is a segment of numbers that cannot be used as the last number in a sequence since the use of numbers in that segment will cause a malfunction of the lock.

6 Nonmetallic Parts

6.1 Factors taken into consideration when determining compliance with the requirements of nonmetallic parts are:

a) Mechanical strength,

b) Resistance to impact,

c) Moisture absorptive properties, and

d) Resistance to distortion of the material under conditions of normal or abnormal usage.

See Tests of Polymeric Material, Section 13.

7 Corrosion Protection

7.1 All working parts of the lock mechanisms shall be constructed of brass, bronze, stainless steel, or equivalent corrosion-resistant materials, or shall have a protective finish that permits the lock mechanism to comply with the Salt Spray Corrosion Test, Section 12.

PERFORMANCE

8 General

8.1 Fourteen samples of a Group 1, a Group 1R, and a Group 2M lock, and five samples of a Group 2 lock are to be tested. All samples are to be mounted on 1/4-inch (6.4-mm) thick steel plates 6 by 8 inches (152 by 203 mm).

9 Operation Test

9.1 The lock shall operate as intended on the code or combination to which it is set.

10 Resistance to Unauthorized Opening

10.1 Group 1

10.1.1 A Group 1 lock shall resist unauthorized opening for a period of 20 working hours when subjected to the manipulation techniques specified in 10.5.3 – 10.5.5.

10.1.2 The time period specified in 3.2 and 10.1.1 may include one person working 20 hours, two people working together 10 hours, or equivalent combinations. This time limit is not to include the time spent on the unsealed sample.

10.1.3 A three-wheel lock shall not open when the dial is turned more than one full dial graduation on either side of the proper graduation for each wheel. A four-wheel lock shall not open when the dial is turned more than 1-1/4 dial graduations on either side of the proper graduation for each wheel.

10.1.4 The test for a three-wheel lock is to be conducted by changing the combination one number at a time in the following manner:

a) Dial the combination with the first number one graduation lower than set, and the second and third numbers as they are set;

b) Then dial the combination with the first number one graduation higher than set, and the second and third numbers as they are set;

c) Then dial the combination with the second number one graduation lower than set, and the first and third numbers as they are set;

d) Then dial the combination with the second number one graduation higher than set, and the first and third numbers as they are set;

e) Then dial the combination with the third number one graduation lower than set, and the first and second numbers as they are set; and

f) Then dial the combination with the third number one graduation higher than set, and the first and second numbers as they are set.

10.1.5 A four-wheel lock is to be tested in the same sequence as described in 10.1.4 except that the change is to be 1-1/4 dial graduations lower or higher.

10.1.6 If the lock opens as a result of any of these attempts, the trial is to be repeated with the number changed 1/4 of a graduation more. The lock shall not open on that trial.

10.2 Group 1R

10.2.1 A Group 1R combination lock shall comply with all of the requirements for Group 1 locks and in addition shall be secure against radiological attack for 20 hours with a radioactive source not exceeding the equivalent of 10 curies of cobalt 60 at a 30-inch (762-mm) distance.

10.3 Group 2M

10.3.1 A Group 2M lock shall resist unauthorized opening for a period of two working hours when subjected to the manipulation techniques specified in 10.5.3 – 10.5.5.

10.3.2 The time period specified in 3.4 and 10.3.1 may include one person working 2 hours, two persons working 1 hour, or equivalent combinations. This time limit is not to include the time spent on the unsealed sample.

10.3.3 A three-wheel lock shall not open when the dial is turned more than 1-1/4 dial graduations on either side of the proper graduation for each wheel. A four-wheel lock shall not open when the dial is turned more than 1-1/2 dial graduations on either side of the proper graduation for each wheel.

10.3.4 The test is to be conducted as described in 10.1.4 except that the change in the graduation is to be 1-1/4 for a three-wheel lock and 1-1/2 for a four-wheel lock.

10.3.5 If the lock opens as a result of any of these attempts, the trial is to be repeated with the number changed 1/4 of a graduation more. The lock shall not open on that trial.

10.4 Group 2

10.4.1 Testing of a Group 2 lock is to consist of setting the wheels to various combinations to determine that the lock operates as intended but does not open with the dial turned beyond the tolerances specified in 10.4.2.

10.4.2 A three-wheel lock shall not open when the dial is turned more than 1-1/4 dial graduations on either side of the proper graduation for each wheel. A four-wheel lock shall not open when the dial is turned more than 1-1/2 dial graduations on either side of the proper graduation for each wheel.

10.4.3 The test is to be conducted as described in 10.1.4 except that the change in graduation is to be 1-1/4 for a three-wheel lock and 1-1/2 for a four-wheel lock.

10.4.4 If the lock opens as a result of any of these attempts, the trial is to be repeated with the number changed 1/4 of a graduation more. The lock shall not open on that trial.

10.5 All classes

10.5.1 Punching of a combination lock shall result in the lock bolt becoming immobilized by mechanical means.

Exception: Immobilization by mechanical means is not required on an offset-spindle-type lock in which punching of the spindle does not defeat the locking action.

10.5.2 Manipulation tests on Group 1, Group 1R, and Group 2M locks are to be conducted by teams of experts composed of not less than two and not more than four individuals. The team of experts is to be provided with three samples of the lock that have been set on different combinations and sealed in a manner that indicates when they have been disassembled. The team of experts is to be provided with one sample of the lock that is not sealed and which is capable of being disassembled for examination of the construction and operation.

10.5.2 revised July 10, 2013

10.5.3 Tests on Group 1, Group 1R, and Group 2M combination locks are to involve expert manipulation techniques, including:

a) Walking the wheels,

b) Feeling the wheel gates,

c) Sighting variations on the dial, or

d) Any other techniques that develop as a result of the examination.