UL 437

STANDARD FOR SAFETY

Key Locks

UL Standard for Safety for Key Locks, UL 437

Eighth Edition, Dated May 15, 2013

Summary of Topics

This revision of ANSI/UL 437 dated January 31, 2023 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes 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.

The requirements are substantially in accordance with Proposal(s) on this subject dated September 30, 2022.

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UL 437

Standard for Key Locks

First Edition – December, 1953
Second Edition – May, 1973
Third Edition – January, 1975
Fourth Edition – September, 1979
Fifth Edition – February, 1986
Sixth Edition – November, 1994
Seventh Edition – August, 2000

Eighth Edition

May 15, 2013

This ANSI/UL Standard for Safety consists of the Eighth Edition including revisions through January 31, 2023.

The most recent designation of ANSI/UL 437 as a Reaffirmed American National Standard (ANS) occurred on January 31, 2023. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

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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INTRODUCTION

1 Scope

1.1 These requirements cover key locks categorized as follows and defined in Glossary, Section 3:

a) Cabinet locking cylinders,

b) Door locks,

c) Locking cylinders,

d) Security container key locks, Type 1 and Type 2, and

e) Two-key locks.

1.2 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire or of electric shock or injury to persons shall be evaluated using appropriate additional component and end-product requirements to maintain the level of safety as originally anticipated by the intent of this standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard does not comply with this standard. Revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

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.

2.4 Terminology

2.4.1 The term "product" refers to any type of lock or lock component covered by this standard.

3 Glossary

3.1 For the purpose of this standard, the following definitions apply.

3.2 BUMP KEY – A lock picking key often with uniform steeples between cuts, or a key often cut to the manufacturer's deepest depth of cut for each detainer (pin, disk, wafer, etc.) position, that is forced further into the lock cylinder via intentional impact. The transmission of energy from the bump key causes vertical movement of the detainers to cause a momentary break at the locks shear line.

3.3 CABINET LOCKING CYLINDER – A key cylinder for use in cabinets, drawers, and the like to resist unauthorized opening by picking methods, impression techniques, forcing methods, pulling, lock bumping, or drilling the cylinder.

3.4 DOOR LOCK – A locking assembly of the rim or mortise type for use on doors of stores, buildings, residences, and the like to resist unauthorized opening by jimmying the door, picking, impression techniques, lock bumping, or drilling the locking cylinder or assembly, sawing or drilling the lock bolt, pulling the lock cylinder, or other method involving the use of small hand tools.

3.5 LOCK BUMPING – A picking technique that utilizes a configured key forcefully impacted into the keyway.

3.6 LOCKING CYLINDER – A key cylinder for use in door locks, alarm control switches, alarm shunt switches, utility locks, and the like to resist unauthorized opening by picking methods, impression techniques, lock bumping, forcing methods, pulling, or drilling the cylinder.

3.7 SECURITY CONTAINER KEY LOCK – A lock constructed for use on collection safes, key locked safes, and similar containers to resist unauthorized opening by picking, impression techniques, drilling, pulling, punching , lock bumping, or forcing methods.

3.8 TWO-KEY LOCK – A two-key, plate tumbler type lock constructed for use on safe deposit boxes, collection safes, and the like to resist unauthorized opening by picking, impressioning, lock bumping, or forcing methods.

4 Installation and Operating Instructions

4.1 A copy or draft of the installation and operating instructions intended to accompany each product or component, or equivalent information, is to be provided and used as a guide in the examination and test of the product or component.

4.2 The instructions shall include such directions and information as deemed by the manufacturer to be necessary for installation, operation, maintenance, and use of the product.

CONSTRUCTION

5 General

5.1 The product shall be constructed so that it will operate when the intended key or keys are used.

5.2 The product shall be constructed for installation in a position or location that does not reduce the burglary resistant qualities.

5.3 The various parts shall be manufactured and assembled to maintain uniformity, particularly with regard to key bittings and tolerances.

5.4 Complete drawings of the construction of the product and specifications of material are to be provided for product investigation.

6 Nonmetallic Parts

6.1 Factors to be taken into consideration when evaluating the acceptability of nonmetallic parts are resistance to mechanical damage, resistance to impact, moisture absorption, and distortion at the temperature to which the material may be subjected under conditions of normal or abnormal use. See Polymeric Materials Tests, Section 13.

7 Corrosion Protection

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

8 Key Changes

8.1 For door locks and locking cylinders, there shall be at least 1000 key changes for a design. For security container key locks, there shall be at least one million key changes for a design. For two-key locks, there shall be at least 64 guard key changes, and at least 15,000 customer key changes for a design.

8.2 Data supporting a manufacturer's specification of the number of key changes, as well as a key chart showing the range of key cuts or bittings used in production, is to be furnished.

8.3 Table 8.1 shows the number of key changes related to key cuts and tumblers, wheels, levers, or pins.

Table 8.1
Key changes

Number of key cuts per tumbler, wheel, lever, or pin	Number of tumblers, wheels, levers, or pins							
	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1
2	2	4	8	16	32	64	128	256
3	3	9	27	81	243	729	2,187	6,561
4	4	16	64	256	1,024	4,096	16,384	65,536
5	5	25	125	625	3,125	15,625	78,125	390,625
6	6	36	216	1296	7,776	46,656	279,936	1,679,616
7	7	49	343	2401	16,807	117,649	823,543	5,764,801
8	8	64	512	4096	32,768	262,144	2,097,152	16,777,216

9 Security Container Key Locks – Type 1 and Type 2

9.1 The key of a security container key lock shall be field changeable.

9.2 The bolt lever shall fit snugly on its post and shall be secured tightly. The fence face shall be perpendicular to the plane of the tumblers.

9.3 In a tumbler wheel design lock the clearance between the fence face and the tumbler wheels shall not be less than 0.025 inch (0.64 mm) when the bolt lever is raised by means of a driver cam, and not less than 0.015 inch (0.38 mm) when the bolt lever is raised by means other than a driver cam.

9.4 The wheels, tumblers, levers, or pins shall run true, and be at right angles to their mounting post.

9.5 The lock shall be provided with means that immobilizes the lock bolt if the lock is punched or pulled.

9.6 The lock shall not open by using a key that is more than one key cut depth on either side of the design key cut depth for one of the tumblers, wheels, levers, or pins.

PERFORMANCE

10 Endurance Test

10.1 A product shall operate as intended during 10,000 complete cycles of operation at a rate not exceeding 50 cycles per minute.

10.2 A product having a changeable core or field-changeable key design shall operate as intended after each of 50 changes of the core or key.

11 Attack Resistance Tests

11.1 General

11.1.1 A product shall not open or be compromised as a result of application of the tools and methods described in this section.

11.1.2 The methods used to test the product can be a combination of methods and need not be limited to one technique or method.

11.1.3 Other test methods may be used if the construction and the security features of a product are not specifically covered by other test requirements.

11.2 Tools

11.2.1 Tools used for these tests are to include any common hand tools, hand or portable electric tools, drills, saw blades, puller mechanisms, and picking tools. For door locks only, pry bars up to 3 feet (0.9 m) long are also to be used.

Exception: Tools used on two-key locks are not to include saws, puller mechanisms, or portable electric drills.

11.2.2 Common hand tools are chisels, screwdrivers not more than 15 inches (380 mm) long, hammers having 3-pound (1.36 kg) head weight, jaw-gripping wrenches, and pliers.

11.2.3 Portable electric tools are:

a) Electrically operated vibrating needles, or

b) High speed hand held drills that:

1) Operate at 5000 rpm maximum,

2) Have not greater than 3/8 inch (9.5 mm) chuck size, and

3) Use high speed drill bits limited to 1/4 inch (6.4 mm) size.

11.2.4 Puller mechanisms are to be either a slammer type having a maximum head weight of 3 pounds (1.36 kg), or a screw type.

11.2.5 Picking tools are common or standard patterns, commercially available, as well as those designed for use on a particular make or design of key lock including custom designed bump keys.

11.3 Test samples

11.3.1 At least twenty four samples of locking cylinders, security container key locks, and two-key locks are to be provided for the tests in this section. At least six samples of door locks are to be provided for the tests in this section.

11.4 Test installation

11.4.1 Door locks are to be installed in accordance with the lock manufacturer's instructions in a 1-3/4-inch (44.4-mm) solid hardwood door of average size that is mounted in a 1-1/4-inch (38.1-mm) thick wood frame and reinforced as in practice. Door locks designed specifically for a certain door construction are to be tested in that door construction.

11.4.2 All product classes are to be installed in representative doors or safes typical of a normal installation. Sectioned doors or sectioned samples of critical parts may be used in place of full size samples.

11.5 Test applicability and time

11.5.1 Table 11.1 specifies the tests to be conducted on each product and the net working time in minutes for each test. The tests may be conducted in any sequence, either singly or in combination. An untested sample product may be used for each test, or, if agreeable to those concerned, a previously-tested sample may be used for any test.

Table 11.1
Attack resistance test time

Test	Cabinet locking cylinders	Net working time, minutes			
		Door locks and locking cylinders	Security container key locks		Two-key locks
			Type 1	Type 2	
Picking	5	10	1200[a]	30	45
Lock Bumping	5	10	1200[a]	30	45
Impression	5	10	1200[a]	30	45

Table 11.1 Continued on Next Page

Table 11.1 Continued

Test	Cabinet locking cylinders	Net working time, minutes			
		Door locks and locking cylinders	Security container key locks		Two-key locks
			Type 1	Type 2	
Forcing	2	5	60	30	5
Drilling	2	5	60	30	not applicable
Sawing	2	5	60	30	not applicable
Prying	2	5	60	30	not applicable
Pulling	2	5	60	30	not applicable
Driving	2	5	60	30	not applicable

[a] 1200 minutes = 20 hours

11.6 Picking test

11.6.1 Picking tools are to be used in an attempt to align the tumblers, levers, wheels, or pins in order to open the lock.

11.6.2 A master locksmith certified by the Associated Locksmiths of America (ALOA) shall perform the picking tests. The Certified Master Locksmith must be certified for a period of not less than three years.

11.7 Lock bumping test

11.7.1 Commercially available keys and/or custom designed bump keys are to be used in an attempt to open the lock by lock bumping techniques.

11.7.2 A master locksmith certified by the Associated Locksmith of America (ALOA) shall perform the lock bumping tests. The Certified Master Locksmith must be certified for a period of not less than three years.

11.8 Impression test

11.8.1 Keys are to be made using the impression technique in an attempt to open the lock.

11.8.2 A master locksmith certified by the Associated Locksmiths of America (ALOA) shall perform the impressioning tests. The Certified Master Locksmith must be certified for a period of not less than three years.

11.9 Forcing test

11.9.1 In an attempt to open the lock, rotary forces are to be applied with the test tools in the key slot, on the exposed part of the cylinder, and on the exposed portions of the lock assembly.

11.10 Drilling test

11.10.1 A drill and drill bits are to be used to drill the plug, exposed body of the lock, or other parts of the lock assembly in an attempt to open the lock.

11.10.2 Drilling tests are to include the use of different size bits such as 1/8, 3/16, and 1/4 inch sizes. Tests may include the technique of reaming the material in the key way so the pins or tumblers can be exposed or removed from their location.