UL 72

STANDARD FOR SAFETY

Tests for Fire Resistance of Record Protection Equipment

UL Standard for Safety for Tests for Fire Resistance of Record Protection Equipment, UL 72

Sixteenth Edition, Dated April 7, 2015

Summary of Topics

This revision of ANSI/UL 72 dated April 17, 2020 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 January 3, 2020.

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UL 72

Standard for Tests for Fire Resistance of Record Protection Equipment

The First through Ninth editions were titled Standard for Fire Resistance Classification of Record Protection Equipment.

Fifth Edition – December, 1941
Sixth Edition – April, 1947
Seventh Edition – July, 1952
Eighth Edition – October, 1968
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Tenth Edition – October, 1971
Eleventh Edition – February, 1977
Twelfth Edition – March, 1983
Thirteenth Edition – January, 1991
Fourteenth Edition – November, 1995
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Sixteenth Edition

April 7, 2015

This ANSI/UL Standard for Safety consists of the Sixteenth Edition including revisions through April 17, 2020.

The most recent designation of ANSI/UL 72 as a Reaffirmed American National Standard (ANSI) occurred on April 17, 2020. 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 the test procedures applicable to the fire-resistance classification of record protection equipment intended to provide protection to one or more types of records when exposed to various durations of fire exposure.

1.2 Record protection equipment consists of self-contained, moveable devices of varying configurations, such as insulated bodies with insulated doors or drawers or lids, nonrated multidrawer devices housing individually rated drawer bodies, and other similar constructions.

1.3 Tests conducted in accordance with these requirements are intended to demonstrate the performance of record protection equipment during exposure to fire, but are not intended to determine acceptability for use after fire exposure.

1.4 Under these requirements, record protection equipment is exposed to a fire endurance test and an explosion test. Equipment intended to provide impact resistance is also exposed to a fire and impact test. The fire endurance test is intended to demonstrate the ability of the device to prevent the development of temperatures and relative humidity (Classes 125 and 150 only) exceeding the specified limits inside the device for the classification desired. The explosion test is intended to demonstrate the ability of the device to withstand a sudden exposure to high temperatures and prevent an explosion of the device from a buildup of steam or other gases. The fire and impact test is intended to demonstrate the ability of the device to protect contents from heat, to the extent described in the requirements, before and after an impact due to falling 30 ft (9.1 m).

1.5 The fire exposures are controlled to achieve specified temperatures throughout a specified time period. These fire test exposures by themselves may not be representative of all fire conditions; conditions may vary with changes in the amount, nature, and distribution of fire loading; the size and fire or nonfire resistive construction of the building; and the location of the device within the building.

1.6 The interior sample temperature and relative humidity limitations applied to the three classes of devices reflect the type of records to be stored in the device. Class 350 rated devices are intended to protect paper records, Class 150 rated devices are intended to protect paper and nonpaper records such as EDP media (magnetic tapes) and photographic records, and Class 125 rated devices are intended to also protect flexible computer disks. However, nonpaper records are not used as contents for the tests described in these requirements since testing to determine the ability of all available nonpaper records to withstand these conditions is not within the scope of these requirements.

1.7 Record protection equipment may incorporate locking devices, but the burglary resistance of such mechanisms is not within the scope of these requirements.

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.

4 Classifications and Ratings

4.1 Record protection equipment is classified in terms of an interior temperature limit and a time in hours. Three temperature limits are employed: 350°F (177°C), 150°F (66°C), or 125°F (52°C). The time limits employed are 4, 3, 2, 1, or 1/2 h. The complete rating indicates that the specified interior temperature limit is not exceeded when the device is exposed to the standard test fire as described in these requirements for the length of time specified including the cool-down period following the standard fire exposure.

4.2 Record protection equipment may have additional ratings (be multi-rated) for integrally constructed subcompartments that, when tested as part of the device, provide a greater degree of protection than the basic equipment. The basic equipment, for example, may be rated Class 350, whereas an integrally constructed subcompartment may be rated Class 125 or 150. A nonrated cabinet, for example, may incorporate insulated drawers rated for a combination of Classes 125, 150, and 350. The hourly time element is the same for the basic equipment, if rated, and each subcompartment or drawer.

4.3 Temperature classifications of 150°F (66°C) and 125°F (52°C) further indicate that interior relative humidities of 85 and 80 percent, respectively, are not exceeded when the device is exposed to the standard test fire and the cooling period following the standard test fire.

4.4 Ratings assigned to record protection equipment are as follows:

a) Class 125 – 4, 3, 2, 1 or 1/2 h.

b) Class 150 – 4, 3, 2, 1 or 1/2 h.

c) Class 350 – 4, 3, 2, 1 or 1/2 h.

TESTS

5 General

5.1 The descriptions of certain tests include reference to "the usability of the contents." Contents employed in tests of record protection equipment as specified herein are to be of material considered common newsprint and coated and uncoated magazine paper. The uncoated paper is to have a surface pH of less than 7.0.

5.2 The contents of record protection equipment shall not be adversely affected by temperature, humidity, or chemical off-gasing that could cause them to be unusable. The contents are considered to be usable after tests if able to withstand ordinary handling; that is,

a) They do not crumble or fall apart or adhere to one another (stick together) such that they are incapable of being separated without defacing or rendering papers useless during removal and examination and

b) They are legible without the use of supplemental devices or aides of any kind.

5.3 Insulation used in record protection devices shall be of material that retains its heat-insulating properties.

6 Fire Endurance Test

6.1 General

6.1.1 Class 350 record protection equipment shall withstand the fire endurance test for the classification period desired by preventing the interior temperature from exceeding the rated temperature during the

period of fire exposure and during the cooling period after the fire exposure; without destroying the usability of the contents; and without developing conditions indicating disintegration of parts or materials likely to affect the tightness of closure or the insulation.

6.1.2 Class 125 and 150 record protection equipment shall withstand the fire endurance test for the classification period desired by preventing the interior temperature from exceeding the rated temperature during the period of fire exposure and during the cooling period after the fire exposure, and without developing conditions indicating disintegration of parts or materials likely to affect the tightness of closure or the insulation. In addition, the interior relative humidity shall not exceed 85 percent for Class 150 equipment and shall not exceed 80 percent for Class 125 equipment during both the fire-exposure period and during the cooling period until the interior temperature has decreased to 120° F (49° C) or a temperature decrease of 4°F (2°C) has occurred if the interior temperature remains at less than 120°F for the duration of the test.

6.1.3 Representative samples of each line of equipment are to be selected for test.

6.1.4 For fire safe, if a given line of equipment differs only in size, and not in such details as wall thickness, hinge construction, latch bolts and number of doors, the largest size is to be selected for test. Intermediate sizes may be selected for test if the line includes a relatively large number of sizes or if the interior dimensions vary from those of the largest unit to result in the reduction of the volume by more than 50 percent.

6.1.5 For file cabinet, if the design incorporates horizontal partitions separating the drawer cavities such that each cavity is a separate insulated interior volume, and if a given line of equipment differs only in number of drawers, the largest size and the maximum drawer size is to be selected for test. For example, 4 drawer size can represent 3, 2, 1 drawer size.

6.1.6 If file cabinets constructed in 6.1.5 are produced in a wide range of sizes in width and depth, or if the interior volume of the insulated compartment varies from that of the largest insulated compartment to result in the reduction of the volume by more than 50 percent, intermediate sizes are to be selected for test.

6.1.7 Thermocouples shall consist of wires not smaller than 20 AWG (0.52 mm^2) and not larger than 18 AWG (0.82 mm^2). The thermocouple wire shall comply with the Tolerances on Initial Values of EMF versus Temperature tables in the Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples, ANSI/ASTM E230/E230M.

6.2 Thermocouple locations

6.2.1 Thermocouples for monitoring temperatures inside the test sample are to be located in the sample as follows:

a) Class 350 rated devices with impact test:

1) For equipment with doors (or lids), within each insulated compartment – four thermocouples to be located 6 in (150 mm) from interior top and 1 in (25 mm) from interior sides. The two front thermocouples to be 1 in from the interior door. The two back thermocouples to be 6 in from the interior back. For equipment with doors in pairs, a fifth thermocouple to be located opposite the center door joint, 1 in from the interior surfaces of the doors and 6 in from the interior top shown in Figure 6.1.

2) For equipment with horizontally sliding drawers, within each insulated drawer compartment – three thermocouples to be located in the top compartment, with one thermocouple to be in each front corner, 6 in from interior top and 1 in from interior sides and interior drawer head; and one thermocouple to be at the center rear, 6 in from interior

top and 6 in from interior back. In the compartment below the top compartment, one thermocouple at left front corner, 6 in from interior top and 1 in from interior side and interior drawer head. In all other compartments, one thermocouple to be at alternate front corners located as indicated for the compartment below the top compartment shown in Figure 6.2.

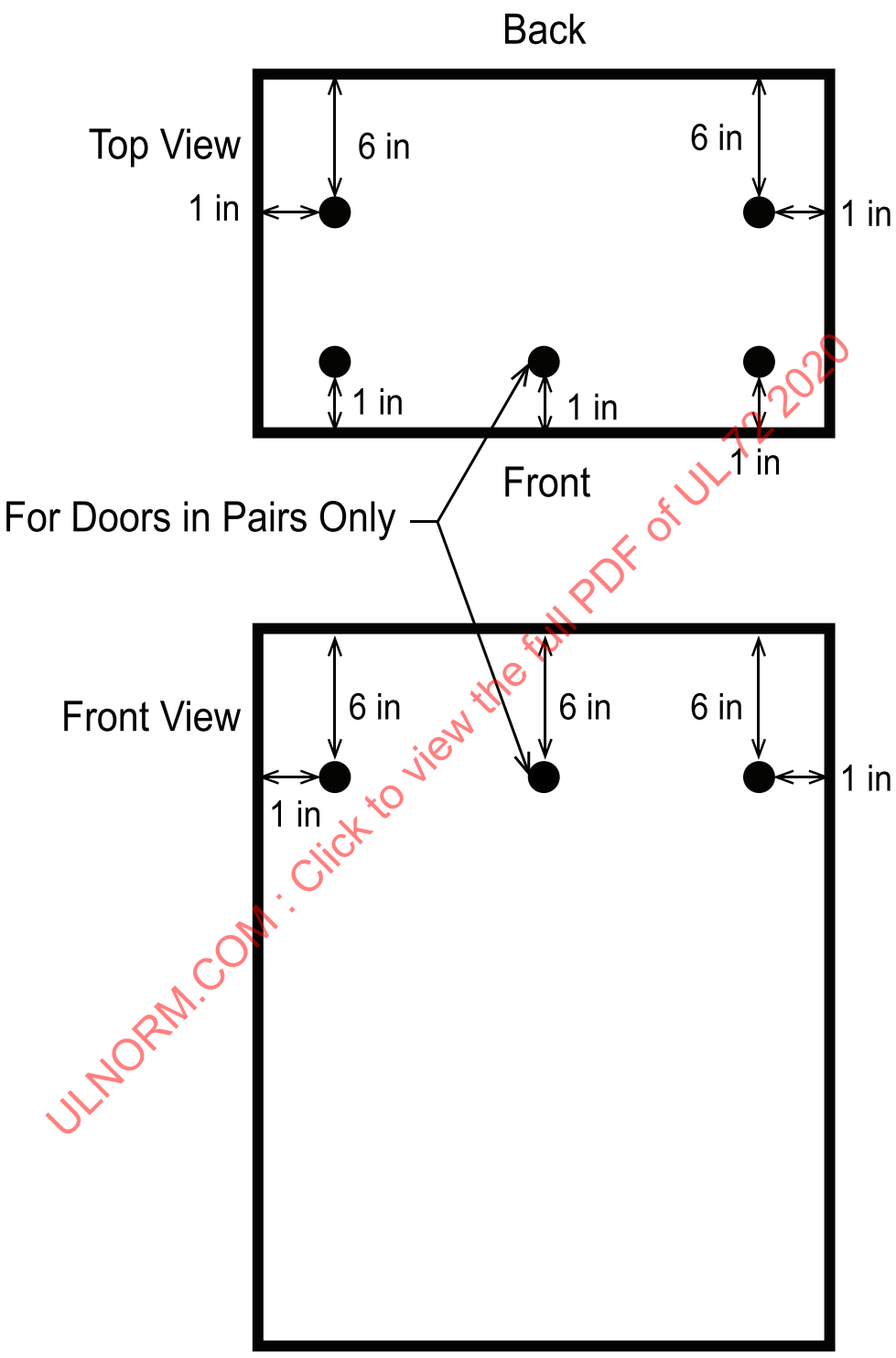
b) Class 350 rated devices without impact test: For all types of equipment, within each insulated compartment – all thermocouples to be located at the center of the interior but to be not more than 7-1/2 in (190 mm) from each interior face (top, bottom, sides, back, and drawer head or door) shown in Figure 6.3.

c) Class 150 and 125 rated devices with and without impact test:

1) For equipment with doors (or lids), within each insulated compartment – four thermocouples to be located in the top corners, with the two front thermocouples 1 in from interior top and 1 in from interior sides and interior door. The two back thermocouples to be 1 in from interior top, sides, and back. For equipment with doors in pairs, a fifth thermocouple to be located opposite the center door joint, 1 in from the interior surfaces of the doors and 1 in from interior top shown in Figure 6.4.

2) For equipment with horizontally sliding drawers, within each insulated drawer compartment – three thermocouples to be located in the top compartment, with one thermocouple to be in each front corner, 1 in from interior top, sides, and drawer head; and one thermocouple to be at center rear, 1 in from interior top and back. In the compartment below the top compartment, one thermocouple to be at left front corner, 1 in from interior top, side, and drawer head. In all other compartments, one thermocouple to be at alternate front corners located as indicated for compartment above shown in Figure 6.5.

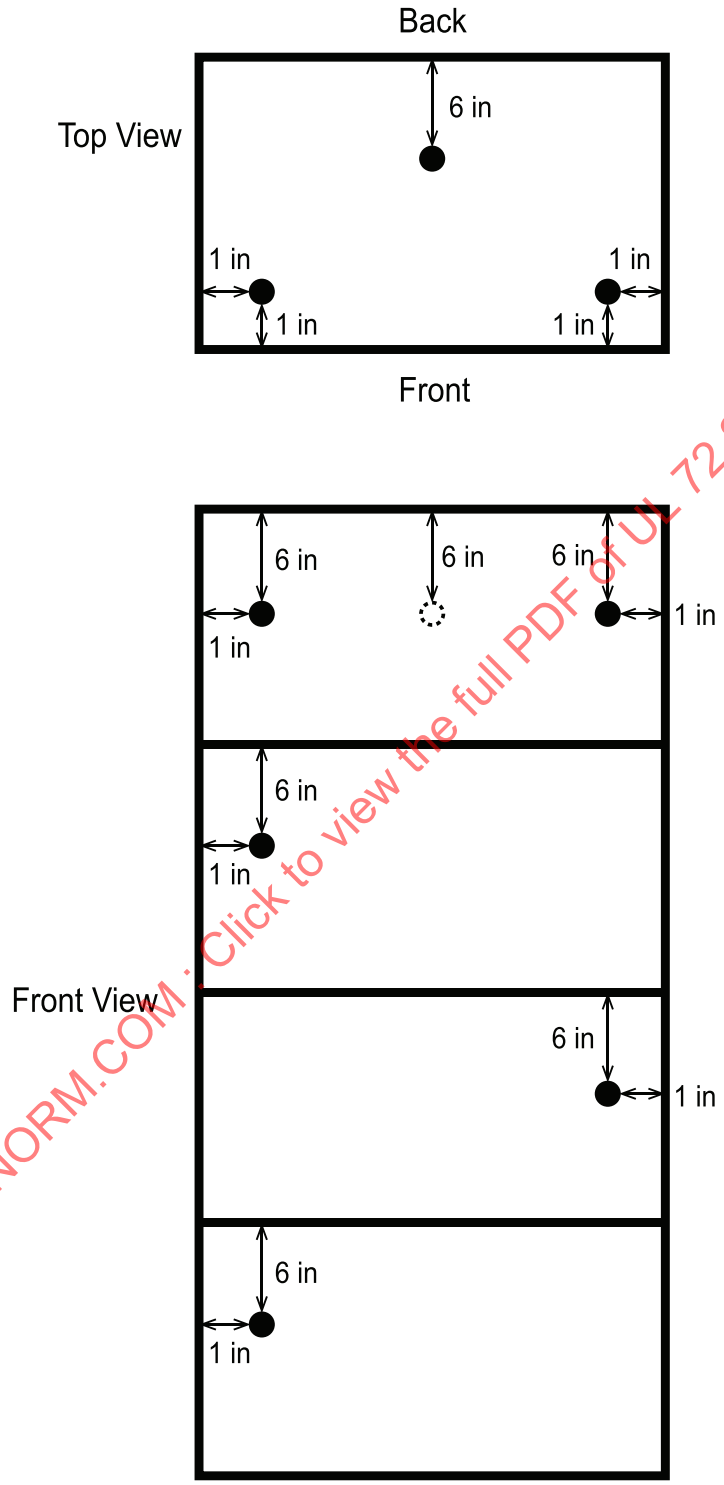
Figure 6.1



1 in = 2.5 cm

6 in = 15.2 cm

Figure 6.2



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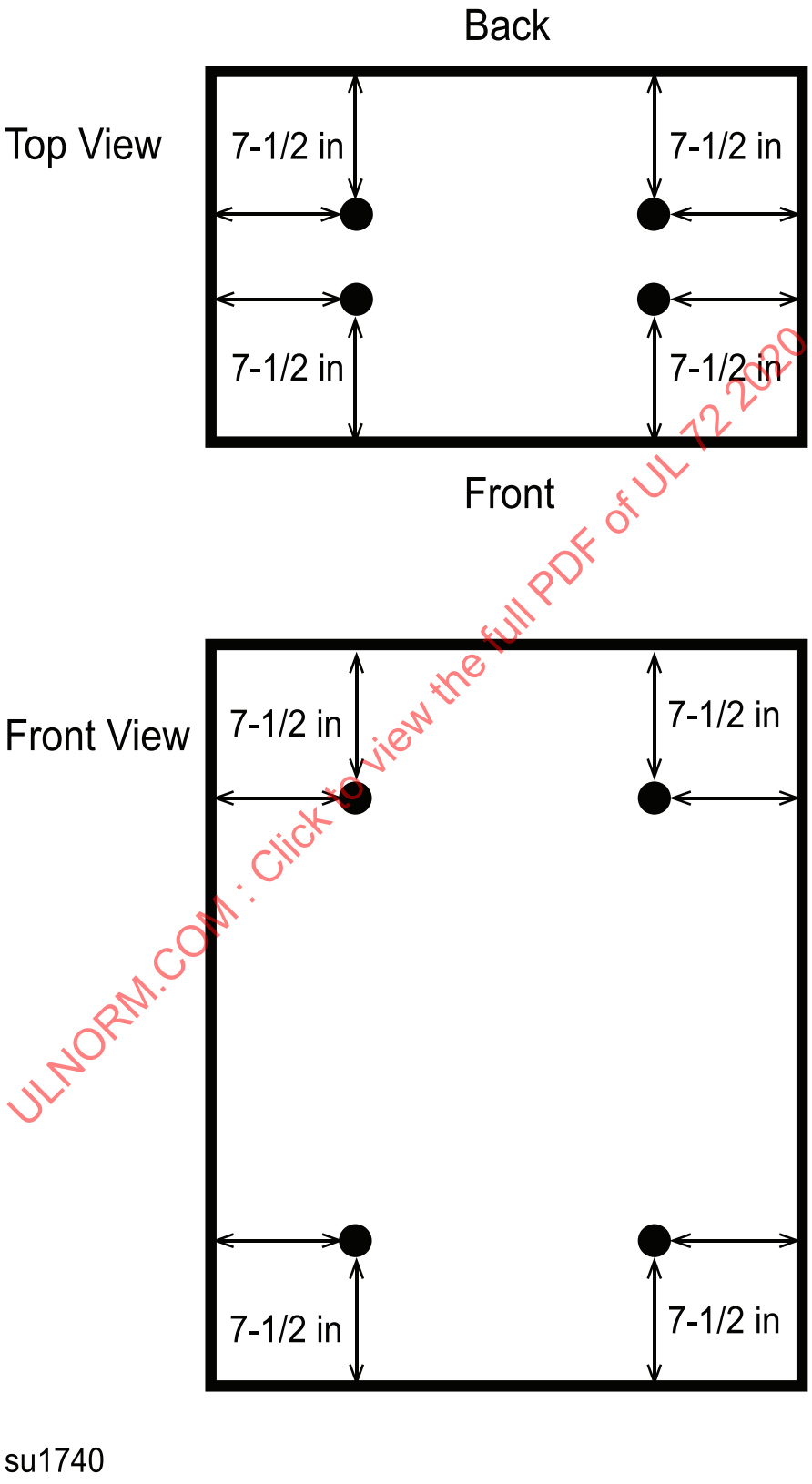
1 in = 2.5 cm

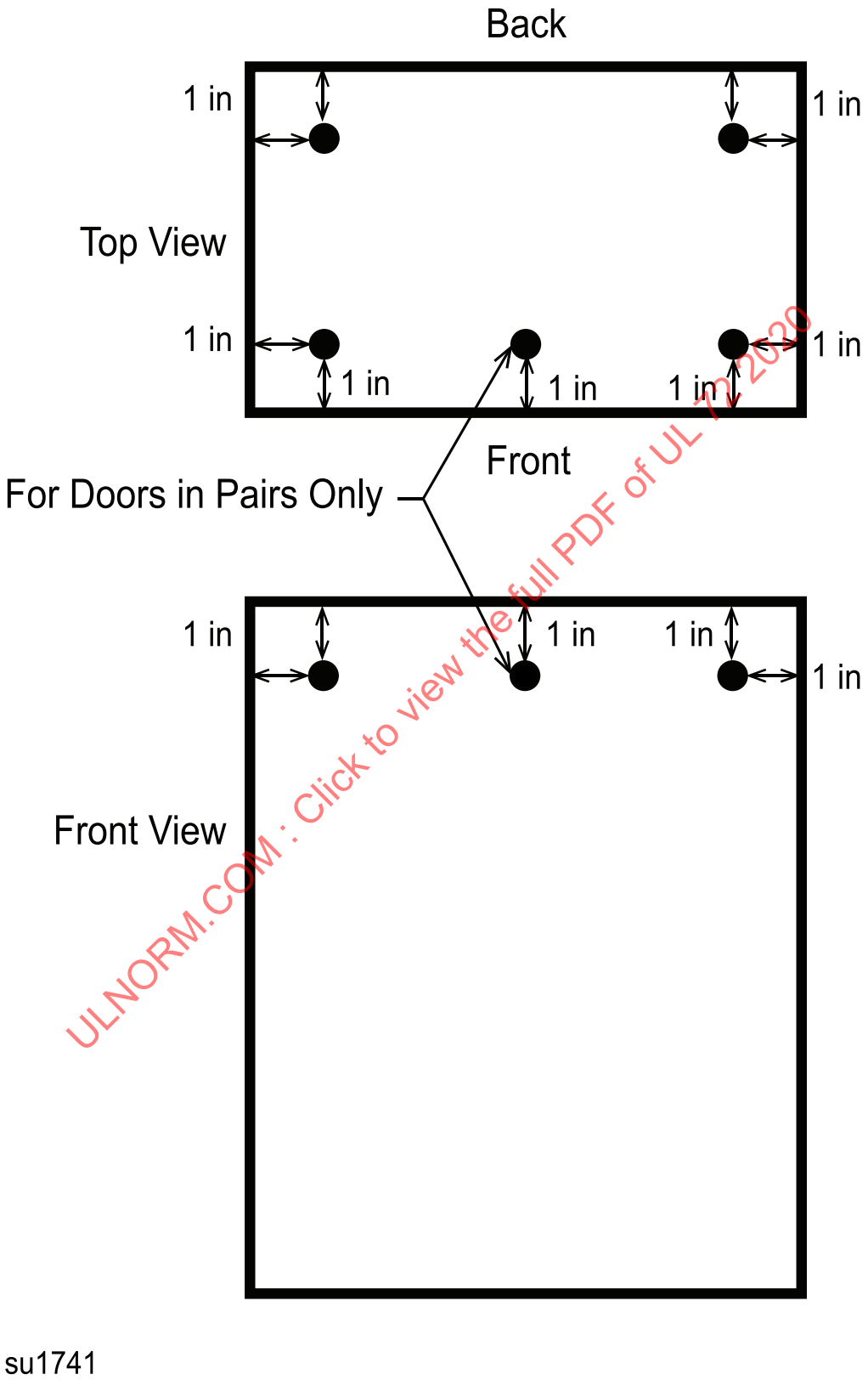
6 in = 15.2 cm

Figure 6.3



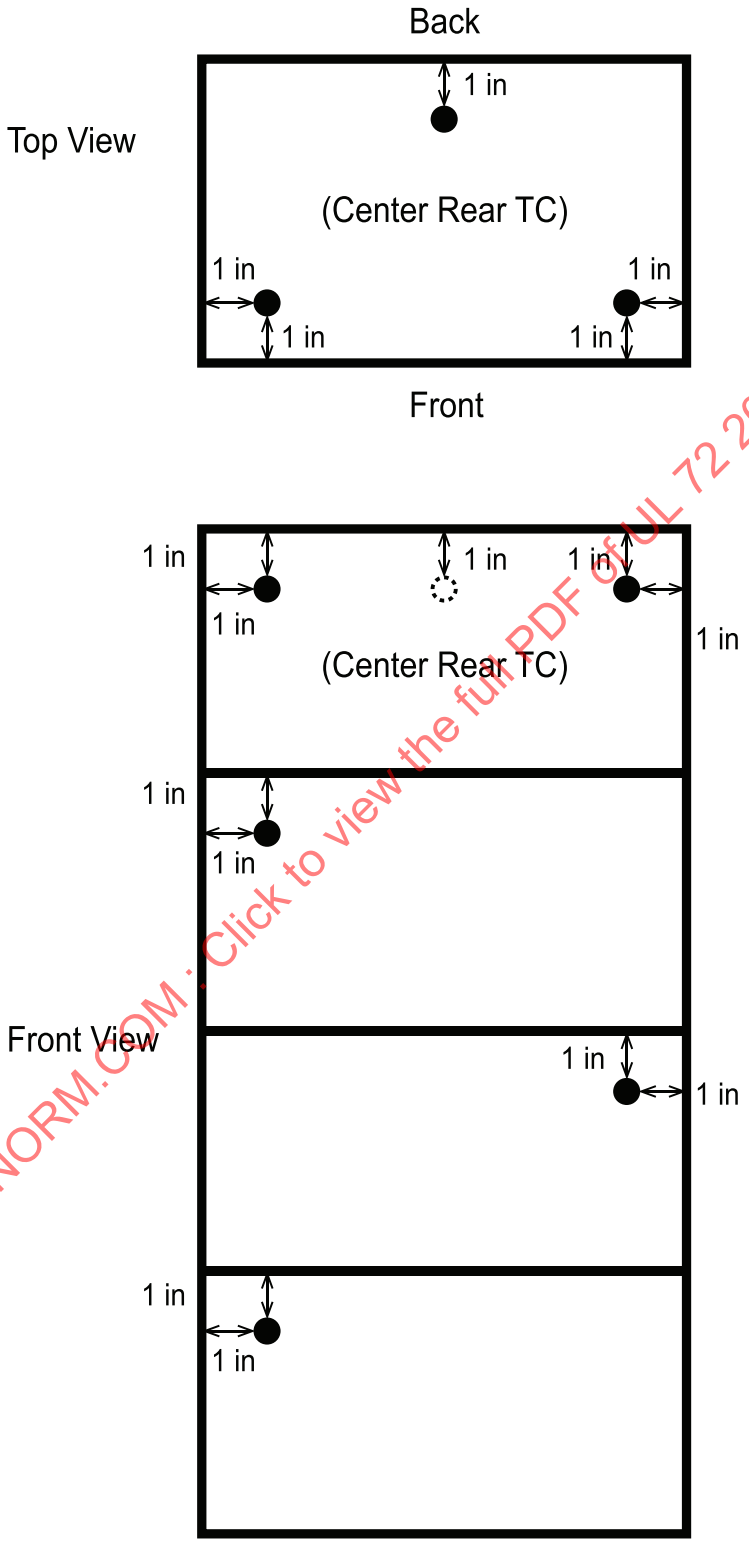
7-1/2 in = 19.05 cm

Figure 6.4



1 in = 2.5 cm

Figure 6.5



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1 in = 2.5 cm

6.2.2 If the equipment to be tested has construction features which make the specified locations of thermocouples impracticable, locations are to be selected in accordance with the intent of 6.2.1.

6.3 Humidity measuring equipment

6.3.1 For equipment to be rated Class 125 or 150, the relative humidity on the interior of the test specimen is to be recorded by means of electronic sensing elements that are accurate to within ±1.5 percent and are to consist of transducers having resistance that varies with humidity[a]. At least one sensing element is to be located 18 in (460 mm) from the top interior surface and at least one is to be located 18 in from the bottom interior surface. For equipment with an interior height of 36 in (920 mm) or less, the sensing elements are to be located midway between the top and bottom surfaces. All electronic sensing elements are to be located midway between the interior surfaces of the sides and midway between the interior surfaces of the door and the back.

[a] American Instrument Company Type H-3 sensor is acceptable for this purpose. Other sensors having characteristics that are determined to be equivalent or comparable are also acceptable.

6.3.2 The sample is to be completely lined with individual sheets of paper on each inner wall and bottom surface of each storage area. If necessary, masking tape is to be used to hold the paper in place. Loosely crumpled paper then is to be evenly distributed to fill the storage area, including drawers and cabinets, to at least 25 but not more than 50 percent of its capacity.

6.3.3 For equipment to be rated Class 125 or 150, the interior temperature at the start of the fire test is to be 65 – 75°F (18.3 – 23.9°C) and the relative humidity is to be a maximum of 65 percent. If the conditions in the test sample are not within these ranges, the sample is then to be conditioned to attain them for at least 12 h prior to the fire test.

6.3.4 The sample is to be placed in the furnace and then closed and latched, locked, or both latched and locked prior to test. The furnace fire is to be controlled to comply with the applicable portion of the Time-Temperature Curve for Control of Fire Tests, the coordinates of which are shown in Appendix A. The points on the curve that determine its character are:

a) 1000°F (538°C) at 5 min;

b) 1300°F (704°C) at 10 min;

c) 1550°F (843°C) at 30 min;

d) 1700°F (927°C) at 1 h;

e) 1850°F (1010°C) at 2 h;

f) 1925°F (1052°C) at 3 h;

g) 2000°F (1093°C) at 4 h.

6.3.5 The furnace temperatures for the fire endurance test are to be the average of temperatures obtained from readings of not less than four thermocouples symmetrically distributed to show the temperature near all parts of the test sample. The thermocouples are to be enclosed in protection tubes of such materials and dimensions that the time constant of the protected thermocouple assembly is within the range from 5.0 – 7.2 min. A typical thermocouple assembly complying with these time constant requirements may be fabricated by fusion-welding the twisted ends of 18 AWG (0.82 mm^2) Chromel-Alumul wires, mounting the leads in porcelain insulators and inserting the assembly so that the thermocouple bead is 1/2 in (12.7 mm) from the sealed end of a standard weight nominal 1/2-in iron, steel, or Inconel pipe. The exposed length of the pyrometer tube and thermocouple in the furnace chamber is to be not less than 12 in (305 mm). Other types of protecting tubes or pyrometers may be used, if they give

the same indications under test conditions within the limit of accuracy that applies for furnace-temperature measurements.

6.3.6 The junctions of the thermocouples are to be 2 in (50 mm) from the exposed faces of the test sample, including the closure face.

6.3.7 The temperatures are to be read and recorded at one minute intervals.

6.3.8 The accuracy of the furnace control is to be such that the area under the time-temperature curve, obtained by averaging the results from the thermocouple readings, is within:

a) Ten percent of the corresponding area under the standard time-temperature curve for fire tests of 1 h or less duration;

b) 7.5 percent for tests over 1 h but not more than 2 h; or

c) 5 percent for tests over 2 h.

6.3.9 The pressure in the furnace chamber during the test is to be maintained as close as possible to atmospheric pressure.

6.3.10 The furnace fire is to be continued for the period required for the classification desired. The fire is then to be extinguished and the test sample allowed to cool without opening the furnace. The temperatures on the interior of the sample are to be continuously recorded until a definite drop is noted.

6.3.11 In tests for Class 125 or 150 ratings, the interior temperature and relative humidity are to be recorded during the cooling cycle until the interior temperature has decreased to 120° F (49° C) or a temperature decrease of 4°F (2°C) has occurred if the interior temperature remains at less than 120°F for the duration of the test.

6.3.12 After the test sample has cooled sufficiently to permit handling, its door, drawer heads, or other closures are to be opened and the assembly dismantled. Examinations are to be made as to the heat-insulating properties of the sample, as evidenced by the usability of the paper contents (see 5.2), and as to the integrity of the closure mechanism (latched, locked, or both latched and locked).

7 Fire and Impact Test

7.1 General

7.1.1 Record protection equipment intended to provide impact resistance shall withstand the fire and impact test without permitting thermal damage to the paper contents.

7.2 Samples

7.2.1 Samples are to be selected in the same manner as for the fire endurance test.

7.2.2 The test sample for the fire and impact test is able to be provided with lifting hooks to facilitate the hoisting of the sample for the impact test.

7.3 Method

7.3.1 The sample is to be prepared as for the fire endurance test, except that no temperature or humidity measuring equipment is to be installed inside the test sample.

7.3.2 The sample is to be subjected to a standard fire exposure in a manner similar to that described in the fire endurance test, for the period of exposure time shown in Table 7.1. All surfaces of the sample are to be exposed to the temperature.

Table 7.1
Fire and impact test

Classification time element, h	Exposure time, min	Reheat time, min
3 – 4	60	60
2	45	45
1	30	30
1/2	20	20

7.3.3 After the fire exposure, the furnace fire is to be extinguished and the test sample withdrawn. The test sample is to be hoisted vertically so that its bottom is 30 ft (9.1 m) above a riprap of brick on a heavy concrete base, and then dropped. Two minutes are to elapse from the time the furnace fire is extinguished until the test sample is dropped.

7.3.4 When the test sample has cooled sufficiently for handling, it is to be inverted, put back in the test furnace, and again subjected to a standard fire exposure for the period of reheat time indicated in Table 7.1. The test sample is to be allowed to cool to less than 115°F (47°C) without opening the furnace.

7.3.5 After the test sample has cooled sufficiently to permit handling, the doors, drawer heads, or other closures are to be opened and the assembly dismantled. Examinations are to be made as to the heat-insulating properties of the sample, as evidenced by the usability of the paper contents (see 5.2). Observations are to be made of the integrity of the closure mechanism (latched, locked, or both latched and locked).

8 Explosion Test

8.1 General

8.1.1 Record protection equipment shall withstand the explosion test without thermal damage to the contents.

8.2 Samples

8.2.1 Samples are to be selected in the same manner as for the fire endurance test.

8.2.2 The test sample for the explosion test is able to be provided with lifting hooks to facilitate the handling and insertion of the sample into the furnace.

8.3 Method

8.3.1 The sample is to be prepared as for the fire endurance test, except that no temperature- or humidity-measuring equipment is to be installed inside the test sample. The procedure is to be as follows:

a) The empty, closed furnace is to be heated to a temperature of approximately 2000°F (1090°C).

b) The furnace door is to be opened momentarily and the test sample inserted. (During insertion of the test specimen, the temperature of the furnace drops several hundred degrees.)