UL 555C

STANDARD FOR SAFETY

Ceiling Dampers

UL Standard for Safety for Ceiling Dampers, UL 555C

Fifth Edition, Dated June 26, 2025

Summary of Topics

This new Fifth Edition of ANSI/UL 555C dated June 26, 2025 includes the following changes in requirements:

– Volume Control Ceiling Damper Closing Reliability Test Options; 9.4

– Hydrostatic Strength Test for Pneumatic Actuators; Section 13

– Spring Closing Force Test; 11.1

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated April 18, 2025.

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UL 555C

Standard for Ceiling Dampers

Prior to the first edition, the requirements for the products covered by this Standard were included in the Third Edition of UL 555 titled Fire Dampers and Ceiling Dampers.

First Edition – December, 1992
Second Edition – December, 1996
Third Edition – October, 2006
Fourth Edition – December, 2014

Fifth Edition

June 26, 2025

This ANSI/UL Standard for Safety consists of the Fifth Edition.

The most recent designation of ANSI/UL 555C as an American National Standard (ANSI) occurred on June 26, 2025. 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 ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements and methods of tests apply to ceiling dampers and ceiling air diffusers intended for installation in hourly rated fire resistive floor-ceiling and roof-ceiling assemblies. Fire resistive assemblies are investigated in accordance with the Standard for Fire Tests of Building Construction and Materials, UL 263.

1.2 Ceiling dampers are intended for use in sheet metal air duct outlets which penetrate the ceilings of hourly-rated fire resistive assemblies. Ceiling air diffusers are intended for use with Class 0 and Class 1 air duct connectors, or for ductless installation in the ceilings of hourly rated fire resistive assemblies. Ceiling dampers and ceiling air diffusers are designed for use as alternatives to previously tested hinged-door sheet metal type dampers installed at the bottom of sheet metal air ducts over each duct outlet. Ceiling dampers and ceiling air diffusers intended for installation in other types of fire resistive assemblies, such as assemblies without penetrations, are investigated in accordance with the Standard for Fire Tests of Building Construction and Materials, UL 263, in place of the Fire Endurance Test, Section 8, described in this Standard.

1.3 The investigation of ceiling dampers and ceiling air diffusers for use in floor/ceiling assemblies previously rated with a hinged-door sheet metal damper involves a comparison of the fire resistance performance of the ceiling damper or ceiling air diffuser with that of a hinged-door sheet metal damper. This is done to confirm that the substitution of the ceiling damper or ceiling air diffuser does not reduce the hourly fire endurance rating of an assembly previously rated with the hinged-door type damper. Ceiling dampers and ceiling air diffusers for use in floor/ceiling assemblies not previously rated with a hinged-door sheet metal damper shall be tested as a component of the proposed floor/ceiling assembly in accordance with the Standard for Fire Tests of Building Construction and Materials, UL 263. Ceiling dampers and ceiling air diffusers are not assigned hourly ratings, but rather are assembly components designated for use in specific hourly rated fire resistive assemblies incorporating air duct outlets penetrating protective ceilings.

1.4 The fire performance measured by UL 263 is based upon air movement being stopped at the start of a fire. Ceiling dampers and ceiling air diffusers intended for use in HVAC systems where the airflow is operational at the time of a fire, such as in a smoke control system, or from other situations in which the fan system is operational at the time of a fire are investigated for dynamic closure. Ceiling dampers and ceiling air diffusers intended for use where the air movement is effectively stopped at the start of a fire are not required to be investigated for dynamic closure.

1.5 Tests conducted in accordance with the test methods described herein are intended to develop data to enable regulatory authorities to determine the acceptability of ceiling dampers and ceiling air diffusers for use in floor-ceiling and roof-ceiling assemblies having hourly fire endurance ratings of the specified or shorter duration.

2 Components

2.1 A component of a product covered by these requirements shall comply with the requirements for that component and shall be used in accordance with its recognized rating established for the intended conditions.

2.2 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.

3 Units of Measurement

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

4 Undated References

4.1 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

5 Components

5.1 The load on a heat responsive link used in a ceiling damper or ceiling air diffuser shall be within the design load limits of the heat responsive link.

5.2 Component springs used in a ceiling damper or ceiling air diffuser shall be of a material having spring properties equivalent to stainless steel conforming to the Standard Specification for Stainless Steel Spring Wire, ASTM A313.

6 Corrosion Protection

6.1 A ferrous metal part used in the ceiling damper or ceiling air diffuser shall be one of the 300 Series of stainless steel or shall have one of the following corrosion-protection systems:

a) A hot-dipped mill galvanized coating complying with the coating Designation G60 or A60 in the Weight (Mass) of Coating requirements table in the Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, ASTM A653, with not less than 40 % of the zinc on any side, based on the minimum single spot test requirement in this ASTM Designation. The weight of the zinc coating is to be established in accordance with the Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings, ASTM A90. An A60 (alloyed) coating shall also comply with the requirements of 6.4.

b) A zinc coating, other than that provided on hot-dipped mill galvanized sheet steel, uniformly applied to an average thickness of not less than 0.41 mils (10.41 microns) on each surface with a minimum thickness of 0.34 mils (8.64 microns). The thickness of the coating is to be established in accordance with the test method in the Standard Guide for Measurement of Electrodeposited Metallic Coating Thicknesses by the Dropping Test, ASTM B555. An annealed coating shall also comply with the requirements of 6.4.

c) A cadmium coating not less than 0.5 mils (12.7 microns) thick on both surfaces. The thickness of coating is to be established in accordance with the test method in the Standard Guide for Measurement of Electrodeposited Metallic Coating Thicknesses by the Dropping Test, ASTM B555.

d) Two coats of an organic finish of the epoxy or alkyd-resin type or other outdoor paint on each surface. The acceptability of the paint is to be determined by its composition or by corrosion tests, as specified in the Standard for Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment, UL 1332.

e) A coating consisting of aluminum, zinc and silicon applied by the continuous hot-dip process to a minimum thickness of not less than 0.02 mm on each side. The quality of aluminized-zinc coating is

to be established in accordance with the Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process, ASTM A792/A792M.

6.2 Coated or uncoated metals used in the assembly of ceiling dampers or ceiling air diffusers shall be galvanically compatible.

6.3 Component springs and bearings used in the assembly of ceiling dampers or ceiling air diffusers shall be of material having resistance to atmospheric corrosion equivalent to brass or bronze.

6.4 A hot-dipped mill galvanized A60 (alloyed) coating or an annealed zinc coating that is bent or similarly formed after annealing and that is not otherwise required to be painted shall be painted in the bent or formed area as specified in 6.1(d) when the bending or forming process damages the zinc coating as described in 6.5.

6.5 When flaking or cracking of the zinc coating at the outside radius of the bent or formed section is visible at 25 power magnification, the zinc coating is to be considered damaged. Simple sheared or cut edges and punched holes are not to be defined as formed. Extruded edges and rolled edges and holes shall comply with 6.4.

PERFORMANCE

7 General

7.1 Representative samples of each size, style, and arrangement of ceiling dampers or ceiling air diffusers shall be subjected to the tests specified in Table 7.1. The representative sample sizes shall be determined on the basis of maximum ceiling damper or ceiling air diffuser size and most critical closing force condition.

Table 7.1
Tests for Ceiling Dampers and Ceiling Air Diffusers

Test	Sections	Approved for:			
		Static systems		Dynamic systems	
		Gravity-operated	Spring-operated	Gravity-operated	Spring-operated
1. Fire Endurance Test[a]	8	X	X	X	X
2. Closing Reliability	9	X	X	X	X
3. Salt-Spray Exposure	10	X	X	X	X
4. Spring Closing Force	11	–	X	–	X
5. Dynamic Closure	14	–	–	X	X

X Test applicable

– Test not applicable

[a] The Fire Endurance Test described in this Standard applies to ceiling dampers and ceiling air diffusers being evaluated for use in floor/ceiling assemblies previously tested with a hinged door sheet-metal damper. Ceiling dampers and ceiling air diffusers intended for use in floor/ceiling assemblies not previously tested with a hinged door sheet-metal damper shall be evaluated to the requirements of the Standard for Fire Tests of Building Construction and Materials, UL 263.

8 Fire Endurance Test

8.1 Test assembly

8.1.1 The ceiling damper or ceiling air diffuser shall be installed in a ceiling of a type previously tested in a rated fire resistive floor-ceiling or roof-ceiling assembly. Each test assembly shall include a reference hinged-door type damper installed in a floor-ceiling test construction identical to that used with the ceiling damper or ceiling air diffuser installation. The ceiling compartments containing the reference hinged-door damper and the ceiling damper or ceiling air diffuser shall be separated by means of an insulated wall or barrier to prevent heat transfer from one ceiling compartment to the other during the fire test.

8.1.2 The duct outlet provided with the reference hinged-door damper is to be representative of the smallest duct outlet size for which comparative performance data is desired. The comparative performance data shall apply to hourly rated assemblies incorporating hinged-door sheet metal type dampers protecting duct outlets of the size tested and larger.

8.1.3 The area of each ceiling construction exposed to fire shall not be less than 48 ft^2 (4.5 m^2), with neither dimension less than 70 inches (1.8 m). The dimensions of the ceiling incorporating the reference hinged-door damper and the dimensions of the ceiling with the ceiling damper or ceiling air diffuser shall be identical.

8.1.4 Ceiling dampers and ceiling air diffusers tested in ceilings with exposed grid suspension systems are eligible for installation in ceilings of rated assemblies with exposed or concealed grid suspension systems or with "hard" ceilings of gypsum wallboard or plaster. Ceiling dampers and ceiling air diffusers tested in ceilings with concealed grid suspension systems are eligible for installation only in ceilings of rated assemblies with concealed grid suspension systems or with "hard" ceilings of gypsum wallboard or plaster. Ceiling dampers and ceiling air diffusers tested in "hard" ceilings of gypsum wallboard or plaster are only eligible for installation in rated assemblies with "hard" ceilings. The ceiling dampers or ceiling air diffusers shall be tested in a ceiling incorporating the least number of ceiling hanger wire supports in the vicinity of the air-handling opening as specified for the rated assemblies in which the ceiling damper or ceiling air diffuser is intended to be installed.

8.1.5 The floor is to consist of cellular steel floor units topped with structural or non-structural concrete or sand. The cellular steel floor units shall be provided with steel hanger tabs for the attachment of ceiling hanger wires. Insulation shall be placed between the floor and the top of the dividing wall separating the ceiling compartments to prevent heat transfer between adjacent compartments. The ceiling shall be located 16 to 22 inches (406 to 559 mm) below the underside of the floor.

8.1.6 The steel ducts and duct drops used with the reference hinged-door damper and with ceiling dampers shall be fabricated from galvanized sheet steel having a nominal thickness of 0.034 inch (0.86 mm). The duct shall be rectangular in shape, and shall be 6 inches (152 mm) larger in width than the width or diameter of the duct drop. The duct shall not be less than 6 feet (1.8 m) in length and the ends are to be capped. The duct drop shall be centered under each duct and extended 7 to 7-1/4 inches (178 to 184 mm) below the duct.

8.1.7 The steel ducts are to be supported by means of trapeze supports consisting of steel channels and steel hanger wires. The trapeze supports shall be located adjacent to each side of the duct drop and near each end of the duct. The duct is to be centered within its compartment.

8.1.8 The reference hinged-door damper is to be fabricated from 0.075-inch (1.91-mm) thick sheet steel, with 1/16-inch (1.6-mm) thick ceramic fiber paper adhered to both faces, with a sodium silicate adhesive or equivalent. The damper is to be sized to lap 1 inch (25 mm) beyond all sides of the duct drop.

8.1.9 The reference hinged-door damper shall be installed in the duct and centered over the duct outlet. A minimum of three steel sheet metal screws, equally spaced, are to be used to attach the steel air diffuser to the reference hinged-door damper duct drop.

8.1.10 The ceiling damper shall be installed in its duct drop and located at the maximum height above the ceiling as specified in the manufacturer's installation instructions.

8.1.11 The ceiling air diffuser shall be installed in the center of the ceiling in accordance with the manufacturer's installation instructions. Any Class 0 or Class 1 air duct connector used with the ceiling air diffuser shall be reliably supported, independent of the ceiling, with the end capped opposite its connection to that ceiling air diffuser.

8.2 Conditioning of test specimen

8.2.1 Prior to conducting the fire test, the concrete floor is to have achieved a moisture content corresponding to drying to equilibrium with air in the range of 50 to 75 % relative humidity at 73 ±5 °F (23 ±3 °C).

8.2.2 The method for determining the relative humidity within hardened concrete by use of electric sensing elements is described in Appendix 1 of a paper by Carl A. Menzel, "A Method for Determining the Moisture Content Condition of Hardened Concrete in Terms of Relative Humidity," Proceedings, ASTM, Volume 55, Page 1085 (1955). A similar procedure with electric sensing can be used to determine the relative humidity within a structure or joint system made of materials other than concrete.

8.2.3 Prior to the start of the fire test, the reference hinged-door damper shall be placed in the closed position and the ceiling damper or ceiling air diffuser is to be placed in the fully open position.

8.3 Time-temperature curve

8.3.1 The conduct of the fire tests of ceiling dampers and ceiling air diffusers shall be controlled by the standard time-temperature curve shown in Figure 8.1. The point on the curve that determine its character are:

50 to 90 °F (10 to 32 °C).....at 0 minutes

1000 °F (538 °C).....at 5 minutes

1300 °F (704 °C).....at 10 minutes

1550 °F (843 °C).....at 30 minutes

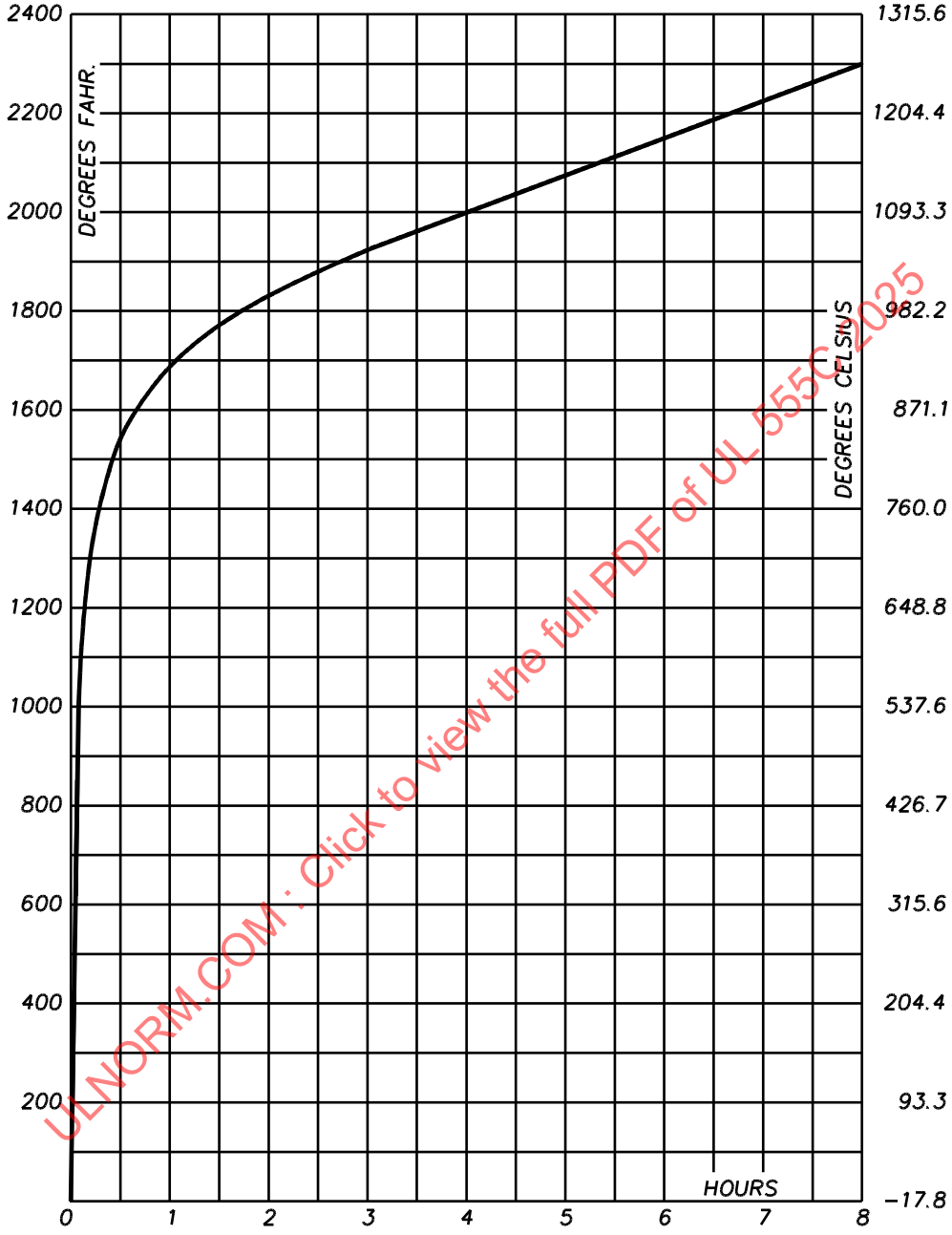
1700 °F (927 °C).....at 1 hour

1850 °F (1010 °C).....at 2 hours

2000 °F (1093 °C).....at 4 hours

Figure 8.1

Time-Temperature Curve



8.3.2 The measured temperature to be compared with the standard time-temperature curve shall be the average temperature obtained from the readings of not less than nine thermocouples symmetrically disposed and distributed to show the temperature near all parts of the test assembly.

8.3.3 Each furnace thermocouple shall be enclosed in a sealed protection tube. The exposed length of the protection tube and thermocouple in the furnace chamber is not to be less than 12 inches (305 mm).

8.3.4 The time constant of the protected thermocouple assembly shall be within the range of 5.0 – 7.2 minutes. A typical thermocouple assembly complying with this time constant can be fabricated by fusion-welding the twisted ends of 18 AWG (0.82 mm^2) chromel-alumel wires, mounting the leads in porcelain insulators and inserting the assembly into a standard weight 1/2-inch (130-mm) outside-diameter black wrought iron, black wrought steel, or Inconel pipe, and sealing the end of the pipe that is inside the furnace. The thermocouple junction is to be inside the pipe, 1/2 inch (13 mm) from the sealed end.

8.3.5 The junction of each thermocouple shall be placed 12 inches (305 mm) away from the exposed face of the ceiling at the beginning of the test and during the test, shall not touch the assembly as a result of assembly deflection.

8.3.6 The temperatures shall be read at intervals not exceeding 1 minute throughout the fire test.

8.3.7 The furnace temperature shall be controlled so that the area under the time-temperature curve, obtained by averaging the results from the furnace temperature readings, is within the following percentages of the corresponding area under the standard time-temperature curve shown in Figure 8.1:

15 % for $5 < t \leq 10$

[15-0.5(t-10)] % for $10 < t \leq 30$

[5-0.083(t-30)] % for $30 < t \leq 60$

2.5 % for $t > 60$

where t is time in minutes

8.3.8 At any time after the first 10 minutes of the test, the temperature recorded by any thermocouple in the furnace shall not differ from the corresponding temperature of the standard temperature curve by more than 212 °F (100 °C).

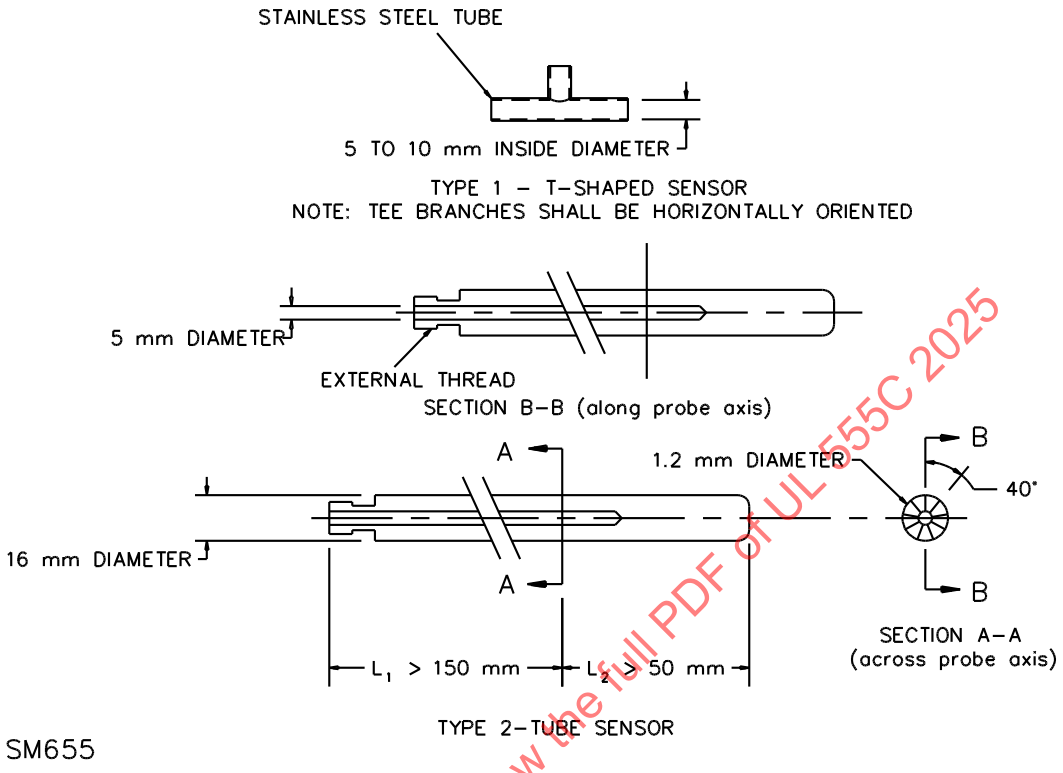
8.4 Furnace pressure

8.4.1 The pressure in the furnace chamber with respect to atmospheric pressure is to be calculated based on measurements taken near the vertical centerline of two opposing furnace walls and based on the linear pressure gradient of the furnace. The linear pressure gradient of the furnace is to be determined by the difference in measured pressure of at least two pressure sensors separated by a vertical distance in the furnace. The pressure sensors are to be located where they will not be subjected to direct impingement of convection currents. Tubing connected to each pressure sensor is to be horizontal both in the furnace and at its egress through the furnace wall such that the pressure is relative to the same elevation from the inside to the outside of the furnace.

8.4.2 The pressure sensors are to be either of the "T" type or the "tube" type as illustrated in Figure 8.2 and are to be manufactured from stainless steel or other suitable material.

Figure 8.2

Pressure Sensors



8.4.3 The differential pressure is to be measured by means of a manometer or equivalent transducer capable of reading pressure in increments of 0.01 in-water (2.5 Pa) with a measurement precision of 0.005 in-water (1.25 Pa). The differential pressure measuring instrument is to be located to minimize "stack" effects caused by vertical runs of pressure tubing between the furnace probe and instrument locations.

8.4.4 After the initial 10 minutes of the fire test, the furnace pressure 8 inches (200 mm) below the exposed surface of the ceiling shall be maintained as nearly equal to atmospheric pressure as possible.

8.4.5 Pressure readings are to be taken at intervals not exceeding 1 minute throughout the fire test.

8.5 Concealed space temperatures

8.5.1 The temperatures of the concealed space above the ceiling of each compartment are to be measured with at least nine thermocouples. The wires for the thermocouples are not to be heavier than 18 AWG (0.82 mm^2). The thermocouples are to be installed in a 24 by 24 inch (610 by 610 mm) grid over the ventral 48 by 48 inch (1219 by 1219 mm) area of each ceiling with the thermocouple grid centered over the air-handling opening. Each thermocouple is to be located 3 inches (76 mm) below the underside of the floor.

8.5.2 Temperature readings are to be taken at intervals not exceeding 1 minute throughout the fire test.

8.6 Conduct of fire test

8.6.1 The test assembly is to be sealed against the furnace with an insulating gasket between the test assembly and the furnace.

8.6.2 The test equipment and test assembly are to be protected from any condition of wind or weather that might influence the test results. The ambient air temperature at the beginning of the test is to be within range of 50 – 90 °F (10 – 32 °C). The velocity of the air moving horizontally across the unexposed surface of the test sample, measured immediately before the test begins, is not to exceed 4.4 ft/s (1.3 m/s) as determined by an anemometer placed at right angles to the unexposed surface. If mechanical ventilation is employed during the test, an air stream is not to be directed across the surface of the sample.

8.6.3 Observations of the exposed and unexposed surfaces of the test assembly are to be made throughout the fire test. All significant observations, such as disruption of the ceiling membrane, are to be recorded.

8.6.4 The fire test shall be continued until failure occurs or until the ceiling damper or ceiling air diffuser assembly has withstood the test conditions and has complied with 8.7.1 and 8.7.2 for a period of time equal to the maximum fire resistance rating of the fire resistive floor-ceiling assembly and/or roof-ceiling assembly in which the ceiling damper or ceiling air diffuser is intended to be installed.

8.7 Conditions of acceptance

8.7.1 The closing of the ceiling damper or ceiling air diffuser is not to cause disruption of the ceiling membrane during the fire test.

8.7.2 The average temperatures of the concealed space above the ceiling in the assembly in which the ceiling damper or ceiling air diffuser is located shall not exceed the average temperatures of the concealed space above the ceiling in the assembly in which the reference hinged-door damper is located after 30 minutes of the fire test for the same intervals of time throughout the rating period.

9 Closing Reliability Test

9.1 Closing reliability of static ceiling dampers and static ceiling air diffusers is evaluated on the basis that air-conditioning and ventilation systems are automatically shut down when a fire occurs as described in the various provisions of the Standard for the Installation of Air Conditioning and Ventilating Systems, NFPA 90A. Therefore, the ratings are applicable to static ceiling dampers and static ceiling air diffusers installed in systems where air movement is effectively stopped at the start of a fire. Closing reliability of dynamic ceiling dampers and dynamic ceiling air diffusers is also evaluated per Section 14. Ratings for dynamic ceiling dampers and ceiling air diffusers are also applicable in static systems where air movement is stopped at damper closure.

9.2 A ceiling damper or ceiling air diffuser shall close and latch automatically (when a latch is provided) from the open position during each of 250 operations and shall, throughout this test, show no evidence of damage which impairs the fire performance of the ceiling damper or ceiling air diffuser.

9.3 A ceiling damper or ceiling air diffuser intended for use with an actuator (that is, electric, pneumatic, or hydraulic device used to operate it) shall function as intended after being mechanically operated for 20,000 full-stroke (that is, closed and reopen) operations, or 100,000 full-stroke operations when the ceiling damper is also intended for use as a volume control damper, while using the specified ceiling damper or ceiling air diffuser actuator and while under static conditions (that is, no or negligible airflow).

9.4 Alternatively, when the damper is intended for use as a volume control damper it is permitted to be cycled 20,000 full-stroke cycles as described in 9.3 and then perform 100,000 repositioning cycles. A “repositioning cycle” is a minimum rotation of the damper actuator of 5 ±2° or 10 % in one direction and in the reversed direction. The repositions shall be achieved in one of two ways:

a) The actuator on the damper shall be moved forward 10 ±2° and then move back 5 ±2°. This sequence of movements shall be considered one reposition. Once the damper and actuator reach

the full-open position the same series of movements shall be performed to move the damper and actuator back to the full close position. This shall be repeated until 100,000 repositions have been achieved; or

b) The actuator on the damper shall be moved from the 0 % position (full-closed) to the 10 % position and then back to the 0 % position. This sequence of movements shall be considered one reposition. That same series of movements shall be performed for 10,000 repositions. Another 10,000 repositions shall then be performed between the 10 % and 20 % positions, the 20 % and 30 % positions, the 30 % and 40 % positions, the 40 % and 50 % positions, the 50 % and 60 % positions, the 60 % and 70 % positions, the 70 % and 80 % positions, the 80 % and 90 % positions, and finally the 90 % and 100 % positions for a total of 100,000 repositions.

9.5 Ceiling dampers and ceiling air diffusers shall be tested in a horizontal plane and shall not depend on installation in an inclined position for intended operation.

10 Salt-Spray Exposure Test

10.1 A ceiling damper or ceiling air diffuser shall close and latch automatically latch (if a latch is provided) following exposure to salt spray for a period of 5 days when tested as described in 10.2 – 10.7.

10.2 Prior to the test, all grease or oil is to be removed from the test sample using organic solvents.

10.3 The test sample is to be installed in a test chamber with the damper open and is to be supported in the position of intended use and then exposed to salt spray for 120 hours. The temperature of the test sample and the test chamber is to be maintained at 95 °F +2 or −3 °F (35 °C +1 or −2 °C) throughout the test period.

10.4 The apparatus to be used for the salt-spray (fog) testing is to consist of:

a) A fog chamber having a salt solution reservoir;

b) A supply of conditioned compressed air;

c) A dispersion tower for producing a salt fog;

d) Specimen supports;

e) A provision for heating the chamber; and

f) necessary means of control.

The dispersion tower is to be located in the center of the chamber and it to be supplied with salt solution and with warmed, humidified air at a pressure of 17 – 19 psig (117 – 129 kPa) so as to disperse the salt solution in the form of a fine mist or fog throughout the interior of the chamber.

10.5 The salt solution is to consist of 20 % common salt (sodium chloride) by weight and distilled water. The pH value of this solution, as collected after spraying in the test apparatus, is to be between 6.5 and 7.2 and the specific gravity between 1.126 and 1.157 at 95 °F (35 °C).

10.6 At the conclusion of the test, the test sample is to be removed from the chamber and allowed to dry for a minimum of 24 hours at room temperature. The sample is then to be placed in its intended mounting position and tested for closing and latching (if a latch is provided).

10.7 In cases where the salt solution has created excessive build-up of zinc chloride due to a reaction with galvanized steel coatings, such parts may be painted and a second sample subjected to the test.

11 Spring Closing Force Test

11.1 A spring-operated ceiling damper or ceiling air diffuser is to employ a spring or springs capable of exerting a force of 2-1/2 times that required to close and automatically latch (if a latch is provided) the ceiling damper or ceiling air diffuser. The damper used for the spring closing force test is to be the damper previously subjected to the Closing Reliability Test, Section 9.

11.2 All springs are to be disconnected and the ceiling damper or ceiling air diffuser placed in the intended operating position.

11.3 The force required to close and latch the ceiling damper or ceiling air diffuser is to be measured at each of a series of positions assumed by the ceiling damper or ceiling air diffuser from fully open to closed (latched). The force is to be applied through, and at the point of connection of, the spring to the ceiling damper or ceiling air diffuser blade or operating arm.

11.4 Three samples of each spring employed for closing and latching are to be tested for force exerted over the range of extension or compression required for the motion involved in the assembly. The force available from the action of the spring or springs is to be 2-1/2 times that required for the closing and latching (if a latch is provided) of the ceiling damper or ceiling air diffuser at any position of travel from fully open to closed (latched).

12 Long Term Holding Test

12.1 This test is intended to measure the ability of an actuator to return to its resting (non-powered) position after being held in a nominal (powered) position for six months.

12.2 When tested as specified in 12.3 – 12.10, all actuators are to return to their resting position within the time specified by the manufacturer.

12.3 A sample set is to consist of 10 actuators of the same design family.

12.4 Each actuator in the sample set shall be tested in an environment at a temperature between 77 °F ±27 °F (25 °C ±15 °C).

12.5 Each actuator in the sample set shall be positioned to represent mounting to a horizontal damper shaft.

12.6 At the beginning of the test, each actuator in the sample set shall have no applied external load.

Exception: Actuators with external springs shall be adjusted so that the minimum spring force specified by the manufacturer is applied to the actuator.

12.7 Each actuator in the sample set shall be powered as specified in Table 12.1, at the rated frequency.