UL 1978

STANDARD FOR SAFETY

Grease Ducts

UL Standard for Safety for Grease Ducts, UL 1978

Fourth Edition, Dated December 13, 2010

Summary of Topics

This revision of ANSI/UL 1978 dated October 11, 2021 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 August 20, 2021.

No Text on This Page

DECEMBER 13, 2010
(Title Page Reprinted: October 11, 2021)

ANSI/UL 1978-2013 (R2021)

UL 1978

Standard for Grease Ducts

First Edition – March, 1995
Second Edition – June, 2002
Third Edition – January, 2005

Fourth Edition

December 13, 2010

This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through October 11, 2021.

The most recent designation of ANSI/UL 1978 as a Reaffirmed American National Standard (ANS) occurred on October 11, 2021. 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.

No Text on This Page

CONTENTS

INTRODUCTION

CONSTRUCTION

PERFORMANCE

MARKINGS

INSTRUCTIONS

APPENDIX A

No Text on This Page

INTRODUCTION

1 Scope

1.1 These requirements cover factory-built grease ducts, and grease duct assemblies that are intended to be installed at reduced clearances where 18 inch (457 mm) clearance is specified in the Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96, and the International Mechanical Code.

1.2 These requirements also cover modular grease duct assemblies, unwelded connections between adjoining duct parts, fittings, access doors, and the like intended for use with grease ducts installed in accordance with NFPA 96 and the International Mechanical Code.

1.3 These requirements do not address NFPA 96 and the International Mechanical Code requirements for grease duct enclosures. Grease ducts covered only by these requirements are intended to be installed in a fire resistive enclosure when required by NFPA 96 or the IMC.

1.4 Requirements used to evaluate the effectiveness of the combination of a grease duct and an enclosure as a fire rated enclosure system and through penetration firestop system, as well as the enclosure's effect on the grease duct are contained in Standard for Tests of Fire Resistive Grease Duct Enclosure Assemblies, UL 2221, and ASTM E 2336, Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components used in the products covered by this standard.

2.2 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.

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

2.4 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.

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.

5 Terminology

5.1 The term "grease duct" as used in these requirements refers to all grease ducts and grease duct assemblies and any part thereof covered by these requirements unless specifically noted otherwise.

6 Glossary

6.1 For the purpose of these requirements, the following definitions apply.

6.2 ACCESS DOOR – A door or cover plate that when opened provides a means for cleaning the grease duct.

6.3 CAPPED TEES – A part of a grease duct shaped like a "T" that supports, connects, or both, the duct to the hood or vertical section. An access door or cap is provided to facilitate cleaning.

6.4 COMBUSTIBLE MATERIAL – Material made of or surfaced with wood, compressed paper, plain fibers, or other material that will ignite and burn, as applied to materials adjacent to or in contact with heat-producing appliances, grease duct and vent connectors, steam and hot water pipes, and warm air ducts. Such material shall be considered as combustible even though flameproofed, fire-retardant treated, or plastered.

6.5 FITTINGS – Components of the grease duct system such as tees, elbows, and wyes.

6.6 GREASE TRAP – A cup-like or U-shaped part provided on a grease duct that is intended to accumulate grease for removal by personnel.

6.7 NONCOMBUSTIBLE MATERIAL – A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. Materials that are reported as passing ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C are considered noncombustible materials.

6.8 THIMBLE – The part of a grease duct that is intended to provide a means for routing the grease duct assembly through a combustible wall.

CONSTRUCTION

7 Materials

7.1 A grease duct part shall be made of noncombustible corrosion-resistant materials. Metals shall not be used in combinations at any location within the assembly that are capable of causing galvanic action.

7.2 The minimum thickness of sheet metal, including any coatings, and of other materials shall comply with Table 7.1.

Table 7.1
Minimum thickness of sheet metal

	Minimum thickness of sheet metal	
	inches	(mm)
Aluminum alloys (1100, 3003)	0.018	(0.46)
Steel	0.0598	(1.52)
Galvanized steel (G90 coating class)	0.018	(0.46)
Aluminum-coated steel [0.40 ounce per square foot (0.12 kg/m^2)]	0.018	(0.46)
Stainless steel	0.012	(0.30)
Porcelain-coated steel-base metal	0.026	(1.35)

7.3 Parts of a grease duct or conduit subject to contact by grease-laden vapors shall be of stainless steel or porcelain-coated steel of the minimum thickness specified in Table 7.1.

7.4 An outer casing or other structural part shall be of stainless steel, galvanized steel, or aluminum-coated steel when:

a) Deterioration or corrosion would cause the grease duct system to collapse or otherwise increase the risk of injury to persons; or

b) It is subject to condensation.

7.5 Components of a grease duct, or subassemblies, shall be of materials and thicknesses as specified in Table 7.1.

7.6 A painted part made of steel not less than 0.053 inch (1.35 mm) thick, or of cast iron not less than 0.125 inch (3.18 mm) thick, and for use only in the interior of buildings, is corrosion resistant provided that coatings remain intact at the maximum temperatures obtained on the part during the tests specified in these requirements.

7.7 Thermal insulation material shall be noncombustible.

7.8 Thermal insulation shall not come into contact with the grease-laden vapors.

7.9 Thermal insulation that is not self-supporting shall be applied to solid surfaces so that the insulation does not sag. An adhesive or cement used to attach such material shall retain its adhesive qualities at any temperature the adhesive may attain when tested in accordance with these requirements and at 0°F (minus 18°C).

7.10 A water-absorbing insulating material shall not be subject to wetting by condensation or rain when installed as intended.

7.11 Asbestos material shall not be used.

8 Assembly

8.1 A grease duct shall consist of all the essential parts necessary for the intended installation of a complete grease duct assembly. Each part of the assembly shall be constructed for ready attachment of one to the other without requiring alteration by the installer, such as by cutting, threading, drilling, or similar tasks.

Exception: An assembly or component part intended to be cut to length or to be fitted by the installer may be provided if means are furnished for joining any altered part to a companion part or assembly. All fasteners required to complete the assembly shall be provided with the product by the manufacturer. Drilling is acceptable if:

a) The drilling operation does not weaken the assembly or penetrate into the inner casing of the grease duct; and

b) The size of the required drill bit is specified and the instructions clearly describe the locations to be drilled, such as by the use of drawings, descriptions, templates, or the like. Field welding of grease duct parts such as for connection to the exhaust hood is permitted.

8.2 Two or more parts or subassemblies that bear a definite relationship to each other in the intended application shall:

a) Be arranged and constructed so that they are capable of being incorporated in to the complete assembly without need for alteration or alignment and only in the correct relationship with each other; or

b) Be assembled and shipped from the factory as one unit.

8.3 Each part, such as a grease duct section or length, tee, or support component, shall be completely assembled by the manufacturer at the factory.

8.4 To comply with the requirements of 8.3, a grease duct section comprised of the inner casing of the grease duct, formed insulation or other intermediate assembly, and an outer jacket, all of which may be separable, shall be preassembled and packaged as one unit. In such cases, each separable part shall be completely formed, including the joining of all seams.

8.5 After being installed in accordance with the manufacturer's instructions, a grease duct shall be positioned securely, and shall be resistant to damage. See Vertical Support Test, Section 17; and Strength Test, Section 18.

8.6 The construction of a grease duct shall not void the firestopping required between spaces of a building when the grease duct is installed in accordance with the manufacturer's instructions.

8.7 Any access doors, and penetrations shall employ a liquid-tight continuous weld.

Exception: This requirement does not apply to access doors and fittings that have been subjected to the Fire and Leakage Tests of Grease Duct Access Doors and Fittings, Section 19.

9 Joints

9.1 Parts of a grease duct shall be joined and secured so that they do not disengage when tested in accordance with these requirements.

9.2 When screws are employed to join assemblies during installation, the assemblies to be joined shall provide for use of screws without being punched or drilled, except as referenced in 8.1. When a joint sealant material is employed for this purpose, the installation instructions shall specify the cure time for the joint sealant material. A screw shall not extend into an inner casing of the duct.

9.3 A joint shall not retain grease vapors nor permit grease-laden vapors to flow from the interior to the exterior of the inner casing of the grease duct.

9.4 A joint between sections of the inner casing of the grease duct, fabricated in accordance with the manufacturer's instructions, shall not permit passage of a 1/32 inch (0.81 mm) diameter rod.

9.5 A joint shall not reduce the capacity of the grease duct to the extent that it interferes with venting.

9.6 A grease duct joint shall be constructed to resist the entrance of rain such that moisture will not flow from the exterior of the grease duct section to the interior of a lower section.

10 Support Assembly

10.1 A support assembly, such as a ceiling or floor support, shall establish and maintain the minimum required clearance between a grease duct section and combustible construction.

10.2 A support assembly shall sustain a load equivalent to four times the weight imposed upon it by all grease duct parts it is intended to support. See Vertical Support Test, Section 17.

10.3 A support assembly intended to be secured by nails or screws shall be arranged so that the load on such holding means will be a shear load.

PERFORMANCE

11 General

11.1 The following factors shall be the basis of the performance tests of a grease duct:

a) The maximum grease duct cross-sectional size and the maximum width-to-height ratio; and

b) The manufacturer's recommended minimum clearance to combustible construction. Temperature tests conducted on the maximum cross-sectional size duct will cover smaller duct sizes for the same minimum clearance (between the duct and combustible material) that was tested. When a lesser clearance is desired for the smaller size ducts, additional temperature tests using the largest size duct to be covered for the lesser clearance will need to be conducted.

11.2 When a grease duct is tested in accordance with these requirements, the temperature limits specified in 14.1 shall be maintained.

11.3 After being subjected to the tests specified in Sections 14 – 21, a grease duct assembly shall comply with the following:

a) No part of the grease duct or grease duct assembly shall be damaged such that it will not continue to function as intended;

Exception: Distortion of the grease duct that does not impair its function or its structural integrity (such as rupture, broken welds, etc.) shall be determined as acceptable for future use.

b) The effectiveness of any required protective coating or finish on metal parts shall not be reduced;

c) A ceramic material shall not show evidence of cracking, disintegration, or spalling such that serviceability of any part of an assembly is impaired;

d) Cracks shall not be observable in porcelain enamel used as a required protective coating when the surface is examined under a microscope of 60 magnification;

e) The reflectivity of a surface shall not be impaired if the reflectivity is utilized to reduce the risk of fire;

f) Burning or scaling of metal parts shall not be evident upon visual observation; and

Exception: Scaling of grease duct inner casing material that does not impair the function or structural integrity (such as a rupture or broken welds) of the grease duct is acceptable after the Abnormal Temperature Test, Section 15.

g) The effectiveness of insulating material shall not be reduced.

11.4 Thermal insulation shall comply with the following:

a) The insulating material shall remain in its intended position;

b) The thermal conductivity of the insulating material shall not be increased; and

c) The thermal insulation shall not show evidence of softening, melting, or other evidence of deterioration.

12 Test Installations

12.1 The temperature test structure is to be erected within a room having ventilation capable of maintaining the buildup of carbon monoxide to less than 50 parts per million throughout the period of any tests. The room is to be free of extraneous drafts and the grease duct is to exhaust into the same space or into a space freely communicating with the space from which the combustion air is taken. The temperature of the entire test structure shall be between 60 and 90°F (16 and 32°C) at the beginning of the temperature tests. The room is to be such that during any one test the ambient temperature does not increase by more than 40°F (22°C) above the ambient temperature recorded at the beginning of the test.

12.2 A grease duct is to consist of an assembly composed of standard grease duct sections and other furnished parts erected according to the manufacturer's installation instructions. Other functional parts of the grease duct, such as a support tee, are to be used during a test.

12.3 A gas-fired flue gas generator as illustrated in Figure 12.1 or Figure 12.2 is to be used to supply flue gasses to the grease duct being tested. The generator is to produce temperatures specified:

a) In 14.3 for the 500°F (260°C) Flue Gases Temperature Test; and

b) In 15.4 for the Abnormal Temperature Test.

Figure 12.1

Round flue-gas generator

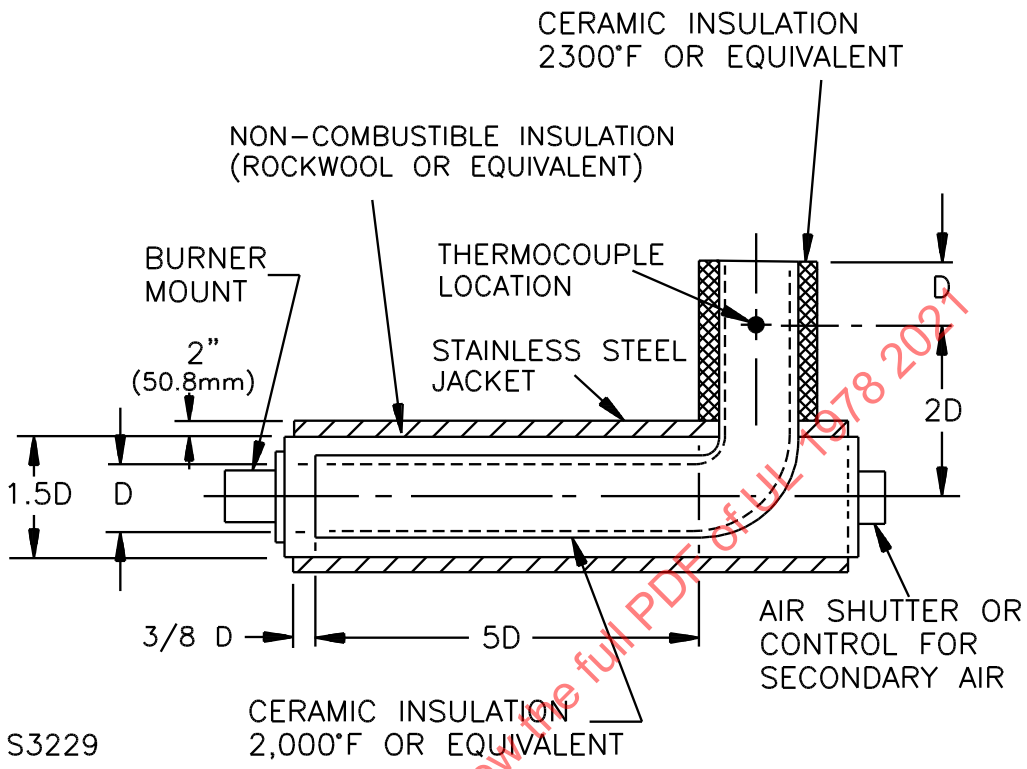
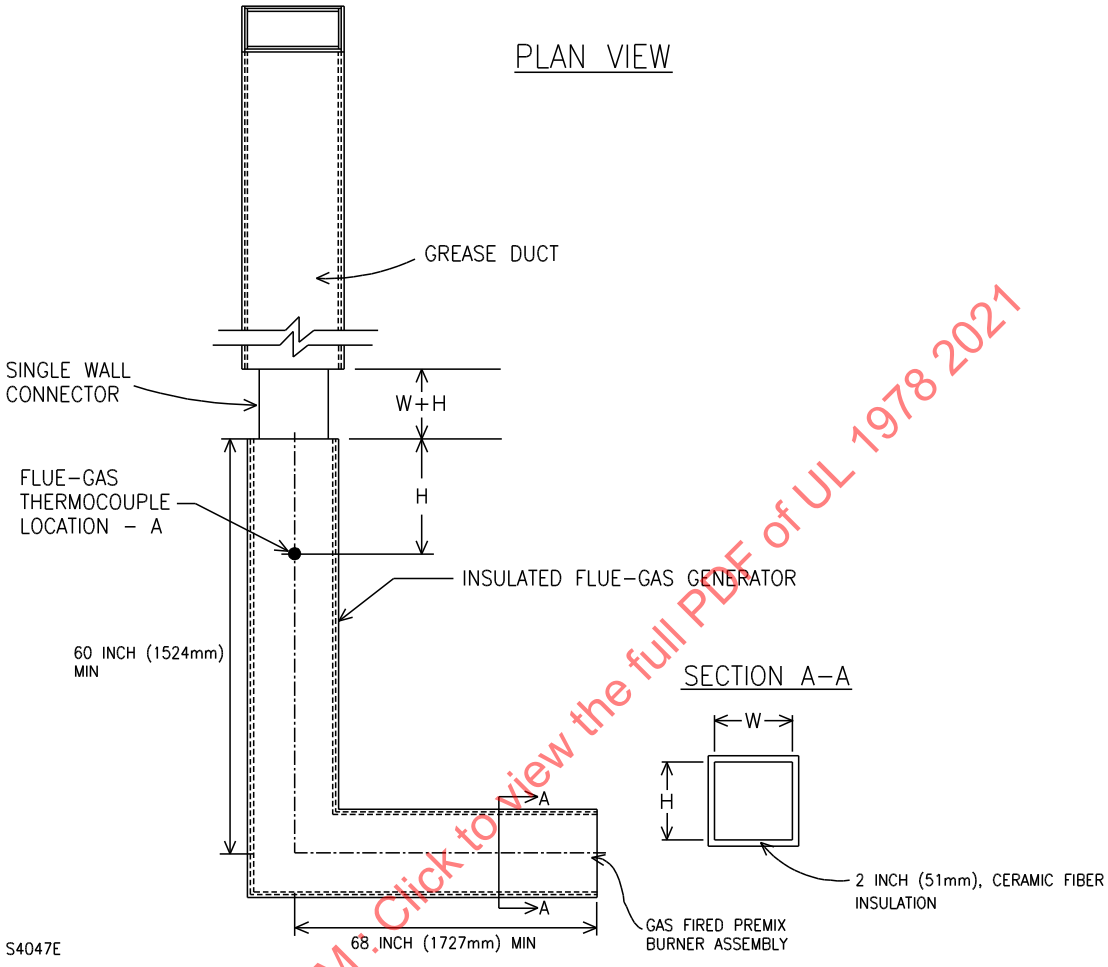


Figure 12.2

Square flue-gas generator



12.4 For a flue gas generator, a premix type burner assembly, such as an Eclipse brand, or the equivalent, capable of supplying a stoichiometric air-gas mixture is to be used. Combustion is to be complete within the horizontal straight length of the generator combustion chamber. The insulated flue gas generator outlet is to be connected to the inlet of the test grease duct by means of a stainless steel pipe having a diameter equivalent to that of the grease duct inlet. The connection is to be made so as to provide an uninsulated flue gas passage length equivalent to two grease duct diameters or width plus height along the pipe centerline from the generator outlet to the point of entry into the grease duct.

12.5 A typical setup for temperature and leakage tests is to consist of:

a) An assembly measuring 9 feet – 0 ±12 inches (2.74 m – 0 ±304.8 mm) long, consisting of horizontal sections of the duct of the maximum size and width-to-height ratio to be covered, having at least two joints and one or more access openings;

b) An assembly measuring 4 feet – 6 ±6 inches (1.37 m – 152.4 ±152.4 mm) consisting of vertical sections of the duct;

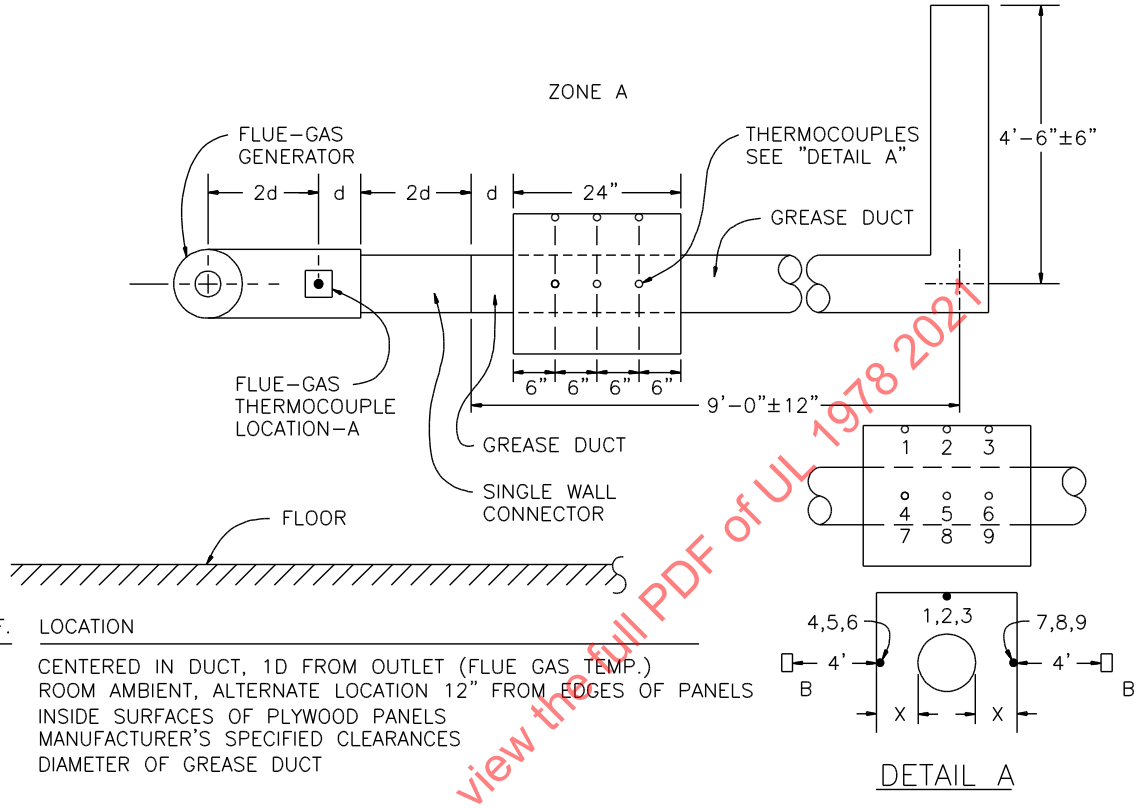
c) A connection of the horizontal and vertical sections, using a tee with a cap or an access panel for cleanout or an elbow section; or

d) Combustible material consisting of 3/4 inch (18 mm) thick by 2 feet (0.6 m) wide plywood panels enclosing the top and sides of the duct as shown in Figure 12.3 at the manufacturer's specified minimum clearance. All plywood surfaces are to be painted flat black on the side facing the test assembly.

e) The plywood panels are to initially be located 1 diameter or 0.5 (width + height) downstream from the beginning of the grease duct assembly as indicated in Figure 12.3. If higher duct-surface temperatures are produced farther downstream, the plywood panels are to be relocated adjacent to the higher surface temperature along the horizontal assembly.

Figure 12.3

Temperature and leakage test



T.C. REF.	LOCATION
A	CENTERED IN DUCT, 1D FROM OUTLET (FLUE GAS TEMP.)
B	ROOM AMBIENT, ALTERNATE LOCATION 12" FROM EDGES OF PANELS
1–9	INSIDE SURFACES OF PLYWOOD PANELS
X=	MANUFACTURER'S SPECIFIED CLEARANCES
d=	DIAMETER OF GREASE DUCT

(1 foot = 0.3 m)
(1 inch = 25.4 mm)

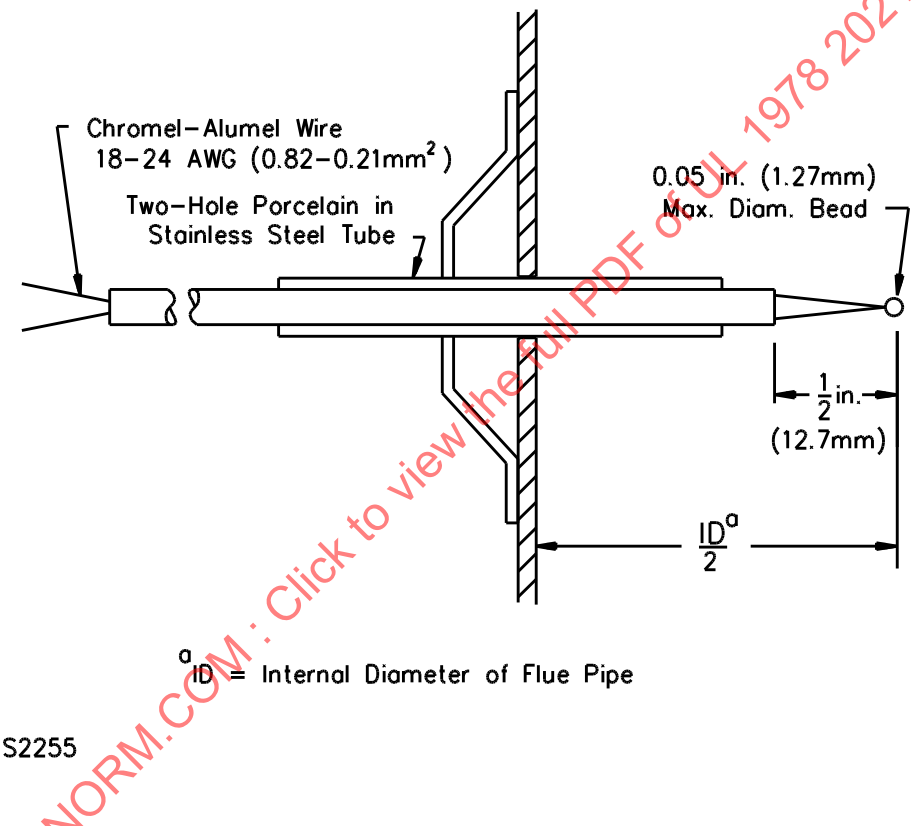
S3474D

13 Temperature Measurement

13.1 Flue gas temperatures are to be determined for the Temperature Test – 500°F (260°C) Flue Gases, Section 14, and the Abnormal Temperature Test, Section 15, by a thermocouple, as illustrated in Figure 13.1. The thermocouple is to be located within the insulated outlet of the flue gas generator as illustrated in Figure 12.1 and Figure 12.2. The thermocouple is to be a Type K (chromel-alumel) of 18 to 24 AWG (0.82 to 0.21 mm^2) wire with an untwisted welded bare bead junction not more than 0.050 inch (1.27 mm) diameter.

Figure 13.1

Flue-gas thermocouple and support bracket



13.2 The flue gas thermocouple is to be inserted at the center of the insulated generator outlet using the entry tube parallel to the long generator axis.

13.3 The gas burner then is to be operated as for the Temperature Test – 500°F (260°C) Flue Gases, Section 14, and the dilution air is to be regulated so that the temperature indicated by the centerpoint flue gas thermocouple is approximately 430°F (239°C) above ambient temperature. The dilution air adjustments are to be set as necessary to obtain the specified flue gas temperatures for the individual test as measured by the thermocouple located as specified in 13.2.

13.4 Temperatures, other than those of flue gases and metal surfaces, are to be measured using either Type K (chromel-alumel) or Type J (iron-constantan) thermocouples not larger than 24 AWG (0.21 mm^2). For combustible test panels in contact with grease duct parts, junctions of thermocouples are to be placed on the grease duct part surfaces, except that at a point or line contact of a spacer not over 1/8 inch (3.2 mm) diameter, or width, thermocouples are to be placed on the test panel at points 1/2 inch (12.7 mm) from the center line of such point or line contact. Thermocouples are to be:

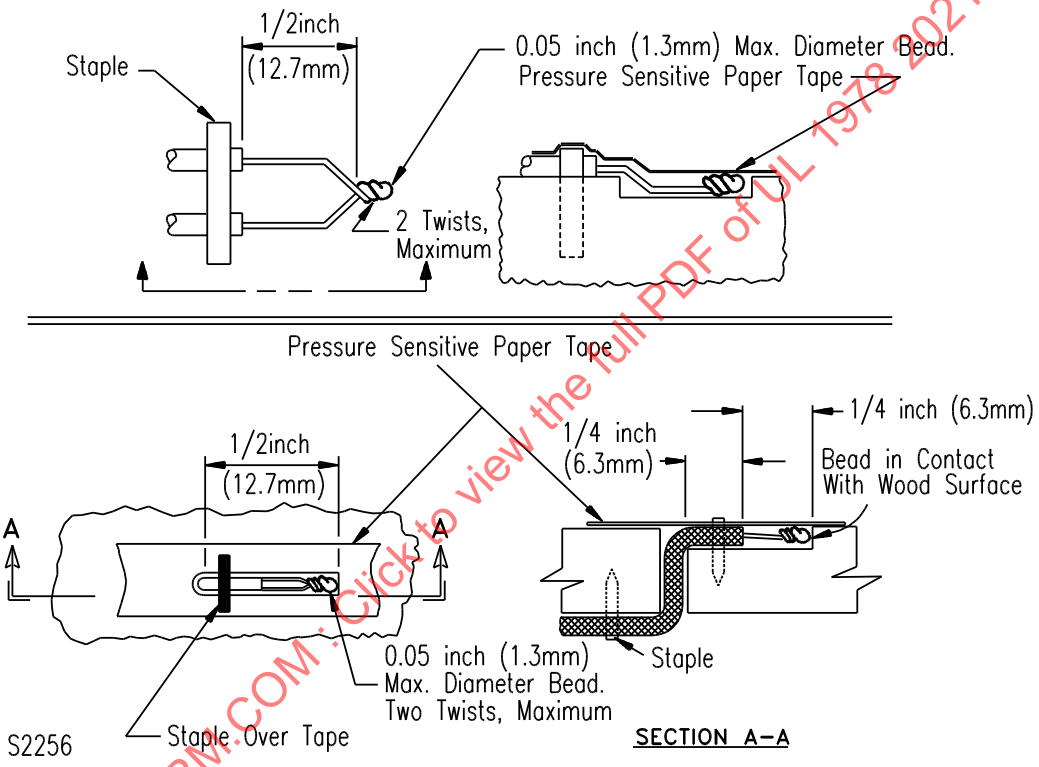
a) Attached to combustible wood enclosure elements having a surface adjacent to the grease duct parts so as to have 1/2 inch (12.7 mm) of wire exposed; and

b) Secured to wood surfaces by staples placed over the insulated portion of the wires.

The thermocouple insulation and tip are to be depressed for a length of 1/2 inch (12.7 mm) into the wood so as to be flush with the wood surface at the point of measurement, and held in thermal contact with the surface at the point by the use of flat black pressure-sensitive paper tape. See Figure 13.2.

Figure 13.2

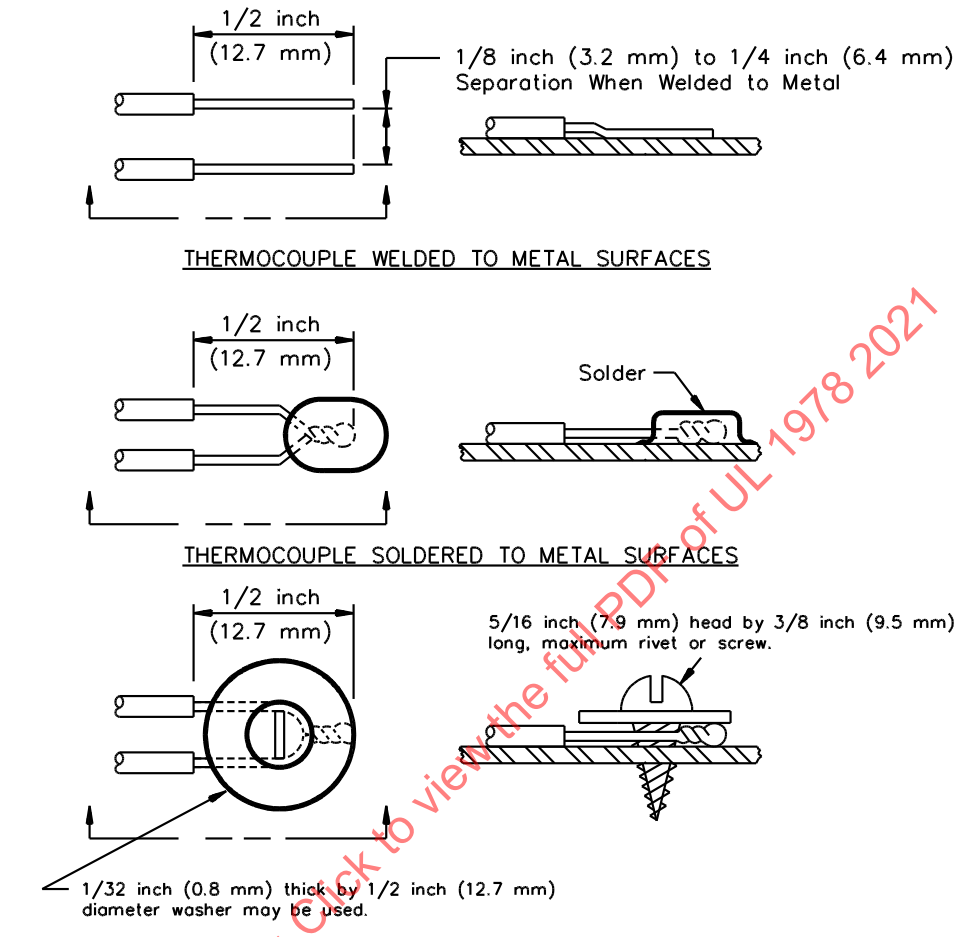
Thermocouple installation methods on wood surfaces



13.5 Temperatures attained by surfaces of parts of the grease ducts are to be obtained by means of thermocouples applied to the parts. Thermocouples are to be attached to metal surfaces by screws, rivets, silver soldering, brazing, or welding of the tip to the metal surface as shown in Figure 13.3. Thermocouples to be attached to surfaces of nonmetallic or nonwood parts are to have junctions and at least 1 inch (25 mm) of the lead wires imbedded flush with the surface of the material. Furnace cement is to be smoothed over such indentations to maintain thermal contact. Such thermocouples are to be located at points attaining maximum temperatures. Additional thermocouples may be placed at other locations that are in contact with or subject to radiation from surfaces of the grease duct.

Figure 13.3

Thermocouple installation methods on metal surfaces



13.6 Ambient temperature of zone A in Figure 12.3 is to be determined by a shielded thermocouple located centrally within a vertically oriented 6 inch (150 mm) length of aluminum painted 2 inch (50.8 mm) steel pipe open at both ends. The ambient temperature is to be determined by a shielded thermocouple located 2 feet (0.6 m) from the center of the horizontal length of the grease duct assembly or combustible panel. The shield shall be located in a manner to avoid direct radiation to the thermocouple.

13.7 For the purpose of determining temperature rises on grease duct parts, on the enclosure, and on the test structure, the temperatures are to be referenced to ambient temperature as determined in 13.6.

13.8 During the Temperature Test – 500°F (260°C) Flue Gases, Section 14, and the Abnormal Temperature Test, Section 15, temperature rises are to be based on the ambient temperature recorded at the end of the firing period specified for the test.

14 Temperature Test – 500°F (260°C) Flue Gases

14.1 The maximum temperatures on surfaces of the enclosure in Figure 12.3 shall be not more than 117°F (65°C) above ambient temperature when the flue gas temperature is maintained as specified in 14.3. The maximum temperatures on surfaces of the enclosure when in direct contact with the duct system shall not be more than 90°F (50°C) above ambient temperature when the flue gas temperature is maintained as specified in 14.3. The temperature on any part of the grease duct shall not exceed the maximum temperature specified in Table 14.1 for the materials used.

Table 14.1
Maximum temperature rises

Material	Maximum rise above room temperature	
	°F	(°C)
1. Aluminum alloys:		
1100 (2S)	330	(183)
3003 (3S)	430	(239)
2014, 2017, 2024, 5052[a]	530	(294)
2. Galvanized steel[b]	480	(267)

NOTE – The inclusion of a temperature limit for a material in this table is not indicative of the compliance of the material if it does not otherwise conform to these requirements.

[a] These and other alloys containing more than 1.0 percent magnesium shall not be used when the reflectivity of the material is utilized to reduce the risk of fire.

[b] The specified maximum temperature rise shall apply if the galvanizing is required as a protective coating or if the reflectivity of the surface is utilized to reduce the risk of fire.

14.2 The temperature of the flue gases entering the grease duct is to be regulated by introducing dilution air into the generator. Dilution air is to be regulated by the "air shutter" referenced in Figure 12.1 or by symmetrical openings between the burner and flue-gas generator in Figure 12.2.

14.3 The test is to be started with the grease duct and the test structure at ambient temperature. The flue gas generator is to be fired at a minimum input of 925 Btu/hr per square inch of the cross-sectional area of the grease duct and regulated to produce flue gas at a temperature of 430°F (239°C) above ambient temperature within 15 minutes at the flue gas thermocouple location "A" designated in Figure 12.2 and Figure 12.3. The test is to be continued until equilibrium temperatures are attained on surfaces of the grease duct parts and the enclosure. Equilibrium is determined when three successive readings taken at minimum 5-minute intervals show no temperature rise.

14.4 For rectangular ducts, the cross-sectional area shall be modified when determining the minimum heat input specified in 14.3 and 15.4. For rectangular ducts, an equivalent diameter (D_E) shall be determined and the cross-sectional area (in square inches) would equal $3.14(D_E/2)^2$, where:

$$D_E = 1.30(ab)^{0.625} / (a+b)^{0.25}$$

in which:

a = length of one side of the duct

b = length of adjacent side of the duct

14.5 Temperature data shall be recorded at maximum 5-minute intervals until temperature equilibrium is recorded. After equilibrium, the temperatures shall be recorded at intervals not exceeding 30 seconds.

15 Abnormal Temperature Test

15.1 The maximum temperature attained on the test structure, such as ceilings and enclosures, shall be not more than 175°F (97°C) above ambient temperature when tested as specified in 15.3 and 15.4.

15.2 A grease duct shall comply with the requirements specified in 11.3 and 11.4 after being tested in accordance with 15.3 and 15.4.

15.3 The test is to be a continuation of the 500°F (260°C) Temperature Test.

15.4 After equilibrium temperatures are attained under the test conditions specified in 14.3, the input of the flue gases entering the grease duct is to be increased to a minimum of 4025 Btu/hr per square inch of the cross-sectional area of the grease duct and the dilution air regulated to produce flue at a temperature of 1930°F (1072°C) above ambient temperature at the flue gas thermocouple location "A" designated in Figure 12.2. The time to reach 1930°F (1072°C) above ambient temperature shall not exceed 15 minutes. The test period shall be 30 minutes after the initial temperature of 1930°F (1072°C) above ambient temperature is reached. At the end of the test period the flue gas generator is to be shut off. And the test considered terminated.

16 Leakage Test

16.1 No flame, leakage of grease, or grease vapor should occur through or around the joints when the assembly is tested as specified in 16.3 – 16.6.

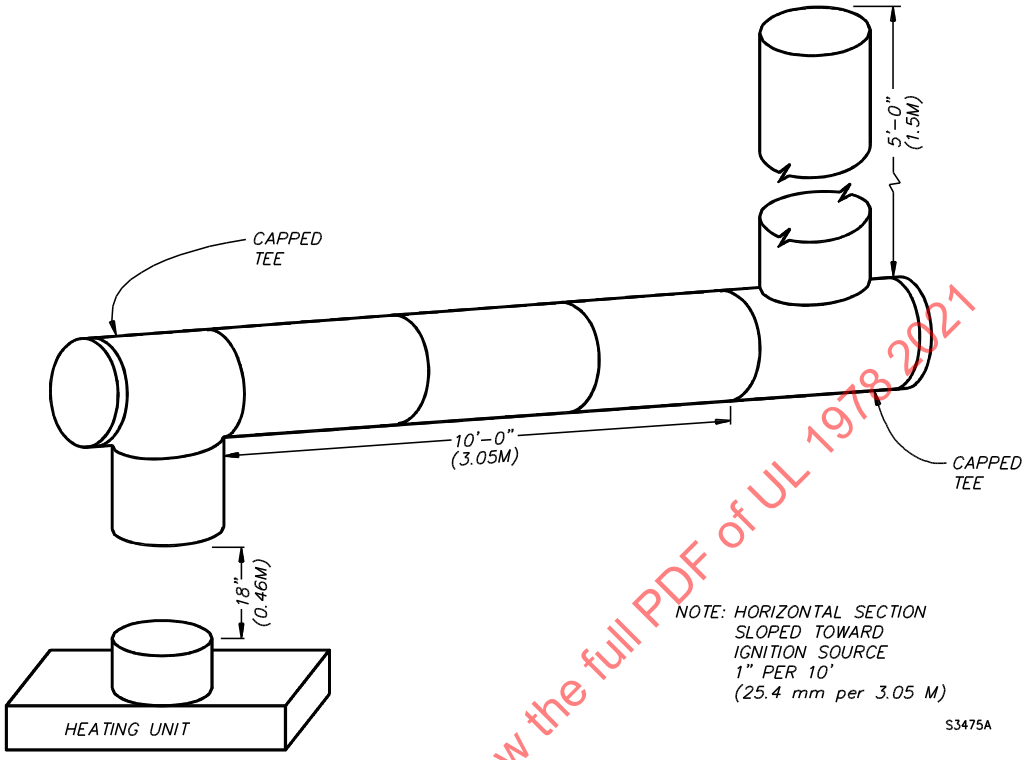
16.2 A grease duct shall comply with the requirements specified in 11.2 – 11.4 after being tested in accordance with 16.3 – 16.6.

16.3 Access doors (when provided) shall be installed as intended.

16.4 The horizontal section of the ducts, as evaluated during the Temperature Tests, is to be coated with refined pork lard in the amount of 0.3 pounds per square foot (1.5 kg/m^2) of surface area. The duct is to be connected to a capped tee and a heating unit, capable of heating refined pork lard to 600°F (315°C), and is to be placed under the capped tee duct inlet as shown in Figure 16.1.

Figure 16.1

Leakage test setup



16.5 A shallow pan with a surface area equal to at least 50 percent of the area of the duct is to be placed on the surface of the heating unit under the center of the duct inlet at a distance of 18 inches (45.7 mm) below the opening as shown in Figure 16.1.

16.6 Approximately 2 pounds (0.90 kg) of refined pork lard per square foot of pan area is to be placed in the shallow pan and heated to approximately 600°F (315°C) and ignited. Following the ignition, no attempt is to be made to extinguish the fire and the fire is to be allowed to burn out normally. Observations are to be made and recorded relative to any leakage of grease occurring at joints or the access door in the duct.

17 Vertical Support Test

17.1 An assembly intended to support the grease duct shall not be damaged nor shall the security of its attachment to the building structure be impaired when tested as specified in 17.2.

17.2 The support assembly is to be installed as described in the manufacturer's installation instructions and in a framework simulating a typical installation. A section of the grease duct is to be placed on the support, and the assembly is to be loaded by means of weights or by a machine. The maximum static load applied is to be equal to four times the load imposed by the heaviest grease duct that the support will be required to sustain in service. The load is to be applied for a minimum of 60 minutes.

18 Strength Tests

18.1 General

18.1.1 A grease duct or its parts shall not break, disassemble, or become damaged to the extent that they are inappropriate for further use when subjected to three impacts of a sand bag applied as specified in 18.2.1 – 18.2.4.

18.1.2 Grease duct parts shall not break, disassemble, or become damaged to the extent that they are inappropriate for further use when subjected to a longitudinal force of 100 pounds (445 N) applied as specified in 18.3.1 and 18.3.2.

18.1.3 A support for an elbow shall sustain a load equivalent to four times the weight of the longest grease duct section between adjacent supports. See 18.4.1.

18.1.4 A grease duct joint of an offset grease duct shall sustain a load equivalent to four times the weight of the vertical portion of the grease duct length between the supports applied as specified in 18.5.1.

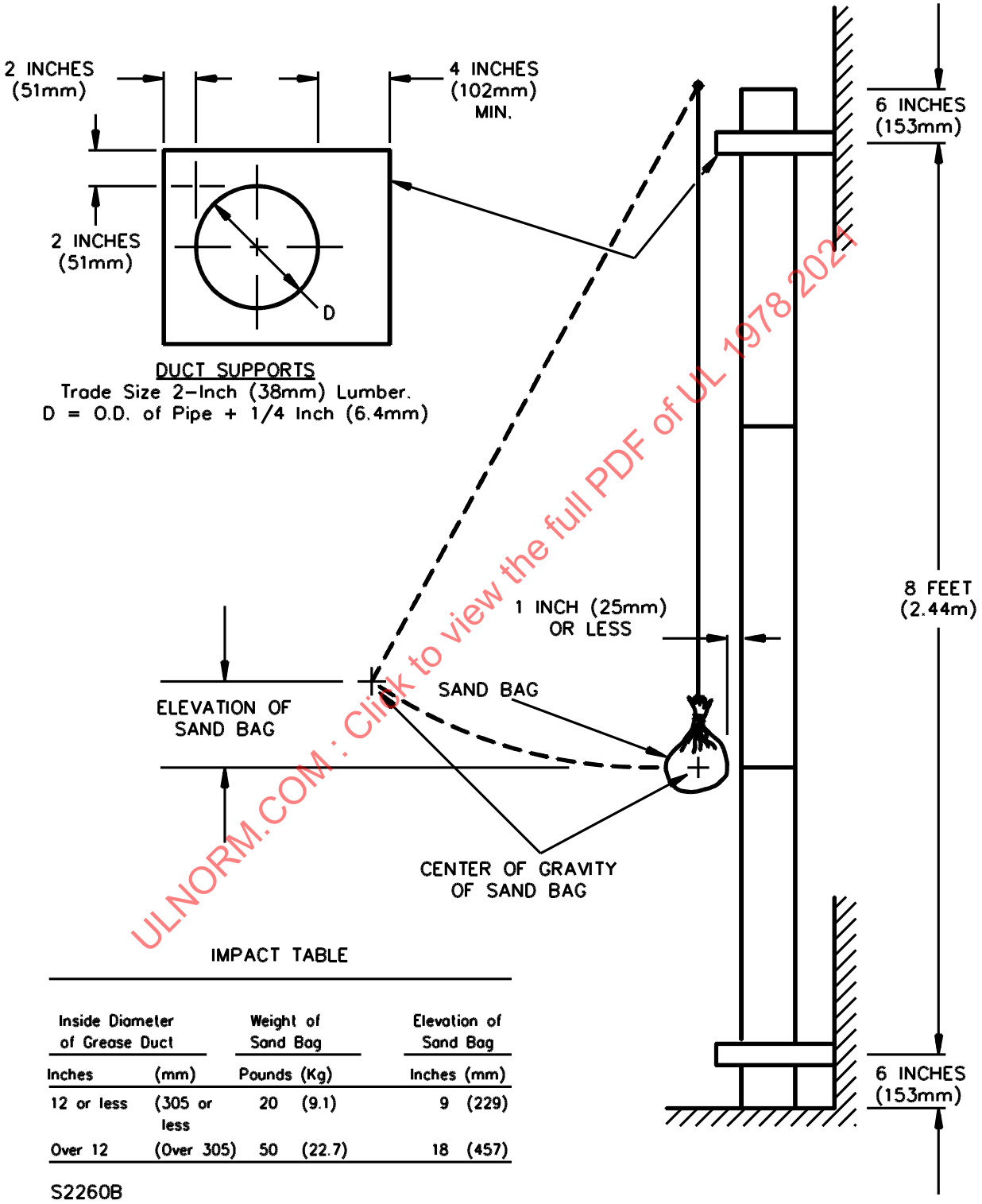
18.1.5 Grease duct parts shall not separate or disengage when subjected to torsional forces exerted by cleaning brushes as specified in 18.6.1.

18.2 Impact test

18.2.1 With reference to the requirements in 18.1.1, the impact is to be applied to an unenclosed grease duct installed as shown in Figure 18.1. Tests shall be conducted on representative grease duct sizes. Each section is to be joined together as specified by the manufacturer. When cemented joints are included in an assembly, the cement is to be allowed to dry before the test is conducted.

Figure 18.1

Strength test



IMPACT TABLE

Inside Diameter of Grease Duct		Weight of Sand Bag		Elevation of Sand Bag	
Inches	(mm)	Pounds	(Kg)	Inches	(mm)
12 or less	(305 or less	20	(9.1)	9	(229)
Over 12	(Over 305)	50	(22.7)	18	(457)

S2260B

18.2.2 The impact is to be produced by a pendulum consisting of a rope suspending a cloth bag filled with sand and having the weight as shown in Figure 18.1. The bag is to be formed by tightly drawing up all sides and corners of a flat section of canvas around the sand and tying the excess canvas. The bag is to have an at-rest position with not more than 1 inch (25.4 mm) distance between the edge of the bag and the surface of the grease duct. The point of impact is to be on the same horizontal plane as the center of gravity of the bag at rest. The distance of swing is to be that required to raise the center of gravity of the bag to the elevation specified in Figure 18.1 above the center of gravity of the bag at its at-rest position.

18.2.3 The length of the pendulum may vary, depending upon the intended point of impact.

18.2.4 The three impacts are to be made successively at the following points:

a) At the level of a joint;

b) At the level halfway above the first joint tested and the next joint; and

c) At the same level as in (b), but rotated around the axis of the grease duct by 90 degrees from the impact in (b).

18.3 Longitudinal force test

18.3.1 With reference to the requirements in 18.1.2, the longitudinal force is to be applied on a number of grease duct assemblies, as required to provide for representative samples of each size of part intended to be field-joined together. The force is to be exerted on the assembly in a direction tending to pull the assembly apart. When cemented joints are included in an assembly, the cement is to be dry before the test is conducted.

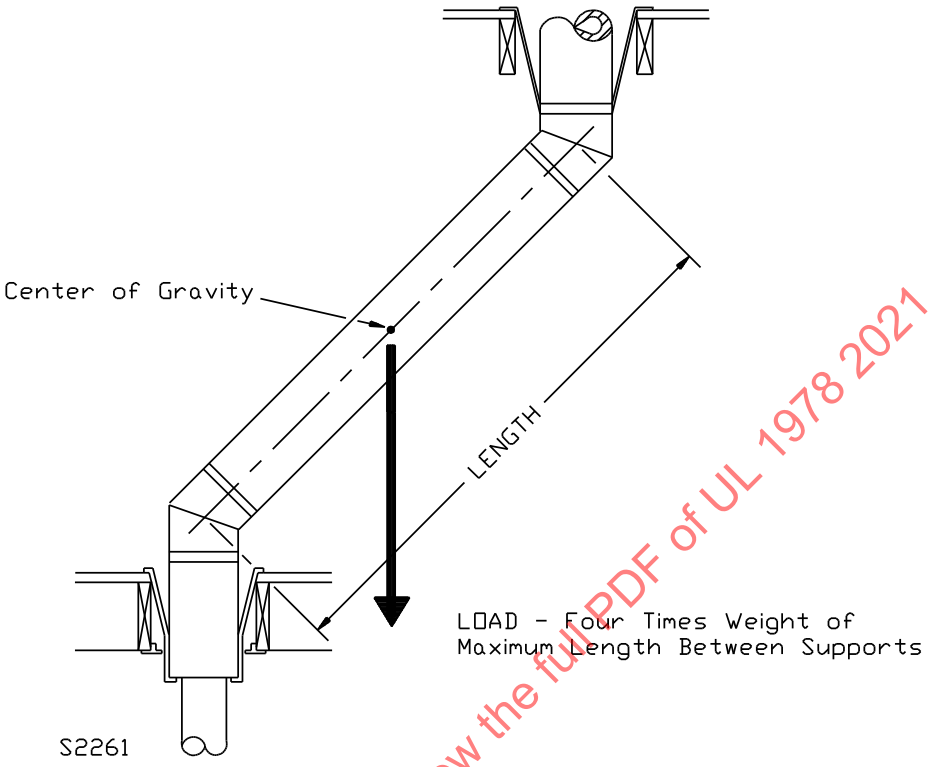
18.3.2 Two or more companion parts are to be joined in accordance with the manufacturer's instructions. A longitudinal force of 100 pounds (445 N) is to be applied first to the inner casing, then to the outer jacket or casing. The force is to be sustained for 5 minutes.

18.4 Load test for grease duct elbows

18.4.1 The test to determine compliance with the requirements of 18.1.3 is to be performed as illustrated in Figure 18.2. Elbows are to be tested using an elbow grease duct section having the greatest angle from the vertical specified by the manufacturer and installed directly on the grease duct section. A vertical load, equivalent to four times the weight of the longest supported section of the grease duct that is intended to be attached to the elbow, is to be applied through the center of gravity of the section. The load is to be sustained for 5 minutes.

Figure 18.2

Load test for grease duct elbows



18.5 Grease duct joint load test

18.5.1 The test to determine compliance with the requirements of 18.1.4 is to be performed as illustrated in Figure 18.3. The maximum inclined length of the grease duct between supports is to be assembled and installed on supports as shown. A vertical load, equal to four times the weight of the length of the grease duct between supports, is to be applied at the joint located centrally between the supports. The load is to be sustained for 5 minutes.