

Northbrook, Illinois • (708) 272-8800
 Melville, New York • (516) 271-6200
 Santa Clara, California • (408) 985-2400
 Research Triangle Park,
 North Carolina • (919) 549-1400



Subjects 1978A (1978)
 (In reply, refer to Subject 1978A)

12 Laboratory Drive
 Research Triangle Park, NC 27709
 June 10, 1996

TO: Fire Council of Underwriters Laboratories Inc.,
 Subscribers to UL's Standards Service for Grease Ducts
 Subscribers to UL's Listing Services for Grease Ducts
 Subscribers to UL's Classification Service for Duct Enclosures

SUBJECT: Request for Comments on Proposed Outline of Investigation for Grease Duct Systems
 for Installation Without Continuous Enclosures, Subject 1978A

SUMMARY OF TOPICS

This bulletin proposes the following new Outline of Investigation for Grease Duct Systems for Installation Without Continuous Enclosures.

COMMENTS DUE: July 26, 1996

Attached as Appendix A for your review and comment are proposed requirements for Subject 1978A. Questions regarding interpretation of requirements should be directed to the responsible UL Staff. Please see Appendix B of this bulletin regarding designated responsibility for the subject product category.

Please note that proposed requirements are of a tentative and early nature and are for review and comment only. Current requirements are to be used to judge a product until these requirements are published in final form.

RATIONALE

Currently, Listed Grease Ducts are investigated in accordance with the requirements contained in the Standard for Grease Ducts, UL 1978. These ducts are intended for installation in accordance with the Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96. The ducts are to be installed with a continuous fire-rated enclosure when installed in buildings greater than one story in height. The enclosure must extend from the lowest fire-rated ceiling or floor above the exhaust hood, through any concealed spaces.

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UL has been approached by manufacturers to develop an Outline of Investigation for Grease Duct Systems that may be installed without a continuous fire-rated enclosure at zero clearances to combustible materials. These Grease Duct Systems are factory-built using the Listed Grease Duct construction per UL 1978 and incorporates thermal insulation which is intended to serve as a continuous thermal barrier from combustible materials.

To address the additional concern for the risk of fire due to the reduced clearances to the building structure or its contents, the assembly is to be subjected to both a 500°F and a 2000°F Flue Gas Temperature Test. These tests represent a fire being supported within the grease duct system and limits the resulting temperature rises on the combustible material that is located at zero clearance to the system.

To address the concern for the structural failure of the system if exposed to an external source, the assembly is to be subjected to the Fire Engulfment and Hose Stream Tests. These tests, conducted in accordance with the requirements contained in the Standard for Fire Tests of Building Construction and Materials, UL 263, exposes the system in its entirety to a standard time-temperature fire source based on the intended rating of the grease duct system. After the completion of these tests, the system shall not be damaged such that it does not continue to function as intended, and shall not develop a through opening anywhere within the grease duct system.

To differentiate these systems from Listed Grease Ducts (YYGQ) or Grease Duct Enclosures (YYET), a new product category has been established entitled "Grease Duct Systems Without Continuous Enclosures (YYMH)." This product category covers the complete system that is intended for use with restaurant cooking appliances including the insulated grease duct, insulated grease duct elbows and tees, the through-penetration firestop system, and the grease duct system's intended support hardware.

IMPACT

If adopted, UL will work with manufacturers to bring Listed Grease Duct Systems into compliance.

Subjects 1978A (1978)

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REQUEST FOR COMMENTS ON PROPOSALS

Please provide your comments concerning the proposed requirements.

Written comments should be sent to the attention of Deborah Prince at UL's Research Triangle Park office, 12 Laboratory Drive, Research Triangle Park, NC 27709-3995. Please reference all correspondence to Subject 1978A.

All comments should be sent by July 26, 1996.

Unless specifically requested to do so, UL will not acknowledge comments indicating concurrence with these proposals.

UNDERWRITERS LABORATORIES INC.

Deborah Prince

DEBORAH PRINCE
Project Engineer
Standards Department
RESEARCH TRIANGLE PARK OFFICE
(919) 549-1460

REVIEWED BY:

Robert Zimmerman Jr prep

ROBERT ZIMMERMAN JR. (Ext. 43129)
Engineering Associate
Engineering Services 415A
NORTHBROOK OFFICE
(847) 272-8800

SR:SMB

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PROPOSED REQUIREMENTS ARE OF A TENTATIVE AND EARLY NATURE AND ARE FOR REVIEW AND COMMENT ONLY. CURRENT REQUIREMENTS ARE TO BE USED TO JUDGE A PRODUCT UNTIL THESE REQUIREMENTS ARE PUBLISHED IN FINAL FORM.

A P P E N D I X A

PROPOSED OUTLINE OF INVESTIGATION FOR
GREASE DUCT SYSTEMS FOR INSTALLATION
WITHOUT CONTINUOUS ENCLOSURES,
SUBJECT 1978A

JUNE DRAFT

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INTRODUCTION

1 Scope

1.1 These requirements cover grease duct systems intended for installation without the use of a continuous fire-rated enclosure, and intended for installation at zero clearance to combustible materials.

1.2 These requirements do not cover grease duct enclosure systems which are investigated in accordance with the acceptance criteria of the International Conference of Building Officials (ICBO), Uniform Mechanical Code or the Compliance Guide of the Southern Building Code Congress International (SBCCI) Standard Building Code and Standard Mechanical Code.

1.3 Each grease duct system shall include a through-penetration firestop assembly evaluated as specified in the Standard for Fire Tests of Through-Penetration Firestops, UL 1479, and shall have a fire rating consistent with the required fire resistance rating of the grease duct system. The through-penetration firestop assembly shall cover the complete range of duct configurations (shape, size, and construction) being evaluated.

2 General

2.1 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.

2.2 If a value for measurement is followed by a value in other units in parentheses, the first stated value is the requirement.

3 Glossary

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

3.2 **COMBUSTIBLE MATERIAL** — Material made of or surfaced with wood, compressed paper, plant fibers or other materials that ignite and burn, whether flame-proofed or not, or whether plastered or unplastered.

3.3 **GREASE DUCT SYSTEM** — A complete, insulated containment system for the transportation of air and grease vapors, designed and installed to reduce the accumulation of combustible condensation and the occurrence of damage when a fire occurs within the system. The system includes all the necessary parts and supports to be field assembled and installed at zero clearance to combustible materials.

3.4 **NON-COMBUSTIBLE MATERIAL** — A material of which no part ignites and burns, when tested in accordance with ASTM E136, the Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

3.5 **THROUGH-PENETRATION FIRESTOP** — A specific construction consisting of:

- a) The wall or floor assembly being penetrated;
- b) The penetrating item, such as a duct and pipe; and
- c) Material(s) used to close opening surrounding penetration;

that are intended to reduce the risk of a spread of fire.

CONSTRUCTION

4 General

4.1 The grease duct system and its related parts shall comply with the construction and performance requirements as described in the Standard for Grease Ducts, UL 1978.

4.2 These assemblies are intended to be installed without an additional fire-rated enclosure surrounding the assembly, and are intended to be installed with a through penetration protection system complying with the Standard for Grease Ducts, UL 1978, equivalent to the fire resistance rating of the assembly being penetrated.

4.3 These assemblies are intended to be installed in accordance with the manufacturer's installation instructions.

4.4 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;
- c) The thermal insulation shall not show evidence of softening, melting, or other evidence of deterioration; and
- d) The thermal insulation shall be noncombustible and shall not come in contact with grease-laden vapors, either from within the duct or from the enclosure.

PERFORMANCE

5 General

5.1 The following factors are to form the basis of the performance tests of a grease duct system intended for installation without continuous enclosures:

- a) The maximum grease duct cross-sectional size; and
- b) The assembly's intended fire resistance rating.

5.2 When the grease duct system is tested in accordance with these requirements, the temperature limits specified in Section 6 shall be maintained.

5.3 After being subjected to the Temperature Test specified in Section 6, a grease duct system shall comply with the following:

- a) No part of the grease duct system shall be damaged such that it does not continue to function as intended;

Exception: Distortion of the grease duct system that does not impair its function or its structural integrity (such as ruptures or broken welds) shall be determined as being capable 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 when 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
- g) The effectiveness of insulating material shall not be reduced.

5.4 After being subjected to the Fire Engulfment and Hose Stream Tests described in Section 7, a grease duct system shall comply with the following:

- a) No part of the grease duct system shall be damaged such that it does not continue to function as intended.

Exception: Distortion of the grease duct that does not impair its function or its structural integrity (such as ruptures, broken welds, or loosening of mechanical fasteners) shall be determined as being capable for future use.

- b) The grease duct system shall not develop a through opening by evidence of water accumulation in the duct, flame entering the duct, or by visual inspection.

6 Flue Gas Temperature Test

6.1 General

6.1.1 The Temperature Test structures are to be erected within a room having ventilation capable of preventing 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 is to 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 room temperature does not increase by more than 40°F (22°C) above the room temperature recorded at the beginning of the test.

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

6.1.3 A gas-fired flue gas generator as illustrated in Figure 6.1 is to be used to supply flue gasses to the grease duct system being tested. The generator is to produce temperatures specified:

- a) In 6.3 for the 500°F (260°C) Flue Gas Temperature Test; and
- b) In 6.4 for the 2000°F (1093°C) Flue Gas Temperature Test.

Figure 6.1
Flue-gas generator

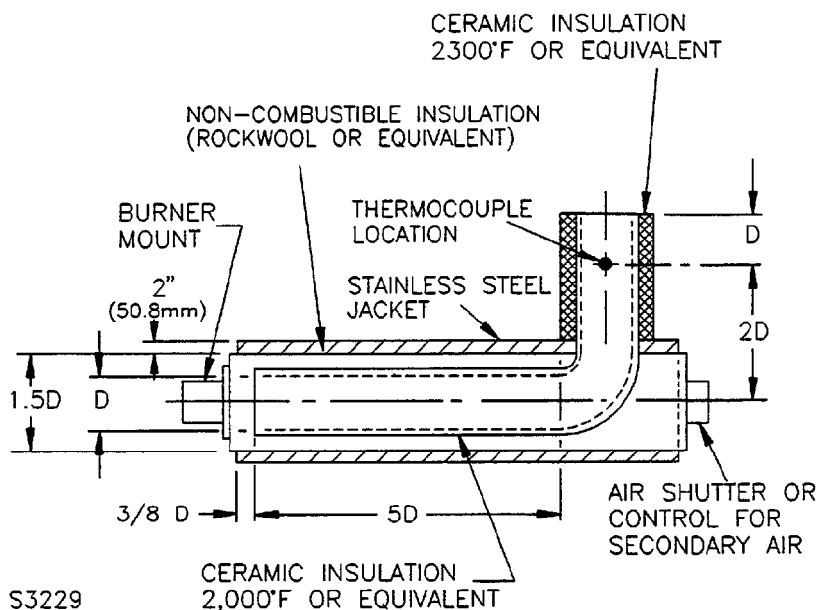


Table 6.1
Flue-gas generator inputs

Equivalent nominal diameter of grease duct (D)		Minimum input to flue-gas generator, BTU per hour (kW)			
Inches	(mm)	Column 1		Column 2	
6	(150)	26,100	(7.6)	114,400	(33.5)
7	(180)	35,600	(10.3)	155,800	(45.6)
8	(200)	46,500	(13.6)	203,500	(59.5)
9	(230)	58,700	(17.1)	257,200	(75.3)
10	(250)	72,600	(21.2)	318,000	(93.1)
12	(300)	104,500	(30.6)	457,600	(134.0)
14	(360)	142,300	(41.6)	623,300	(182.5)
16	(410)	185,900	(54.4)	814,000	(238.3)
18	(460)	235,150	(68.8)	1,028,500	(301.4)
20	(510)	290,400	(85.0)	1,271,700	(372.3)
22	(560)	351,500	(102.0)	1,539,000	(450.6)
24	(610)	418,400	(122.5)	1,831,800	(536.4)
26	(660)	491,100	(143.8)	2,150,150	(629.6)
28	(710)	508,500	(166.7)	2,493,600	(730.2)
30	(760)	653,800	(191.4)	2,862,500	(838.2)
36	(900)	841,200	(275.6)	4,122,100	(1207)

6.1.4 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 system by means of a stainless steel pipe having a diameter equivalent to that of the grease duct system inlet. The connection is to be made so as to provide an uninsulated flue gas passage length equivalent to two inside diameters of the system along the pipe centerline from the generator outlet to the point of entry into the system.

6.1.5 The general form of a test structure for the grease duct system is illustrated in Figure 6.1.

6.1.6 The grease duct system is to be totally enclosed for its full height within all stories. The assembly is to be tested with the combustible construction installed at zero clearance to the system. The enclosure material is to be 3/8 inch (9.5 mm) thick plywood and is to be sealed at each floor-joist level.

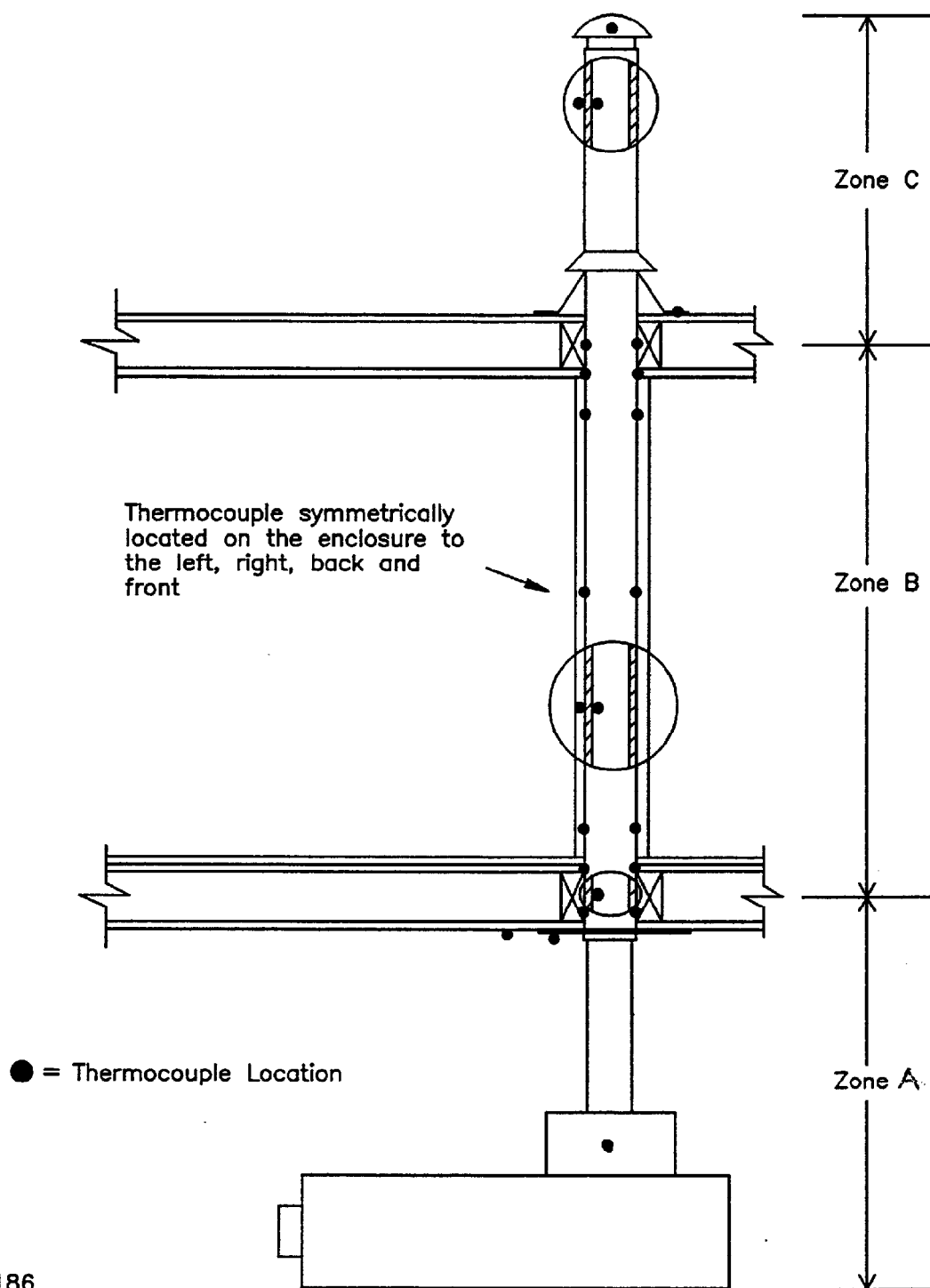
6.1.7 The test enclosure's floor joists are to be constructed of trade size 2 by 10 or 2 by 8 inches [nominal 1-1/2 by 9-1/2 or 1-1/2 by 7-1/2 inches (38 by 235 mm or 38 by 184 mm)] lumber, forming a box placed at zero clearance to the duct system sections.

6.1.8 Plywood used for the test enclosure is to be 3/8 inch (9.5 mm) thick. All wall and ceiling surfaces at the inlet to the system, and all plywood surfaces, are to be painted flat black on the side in contact with the test assembly.

6.1.9 The following are to be sealed with plastic-coated or film-faced pressure-sensitive tape lapping the joint by a minimum of 1 inch (25.4 mm) on each side:

- a) Openings between the floor/ceiling and the test enclosure; and
- b) Openings between the flashing and roof.

Figure 6.2
Typical thermocouple locations

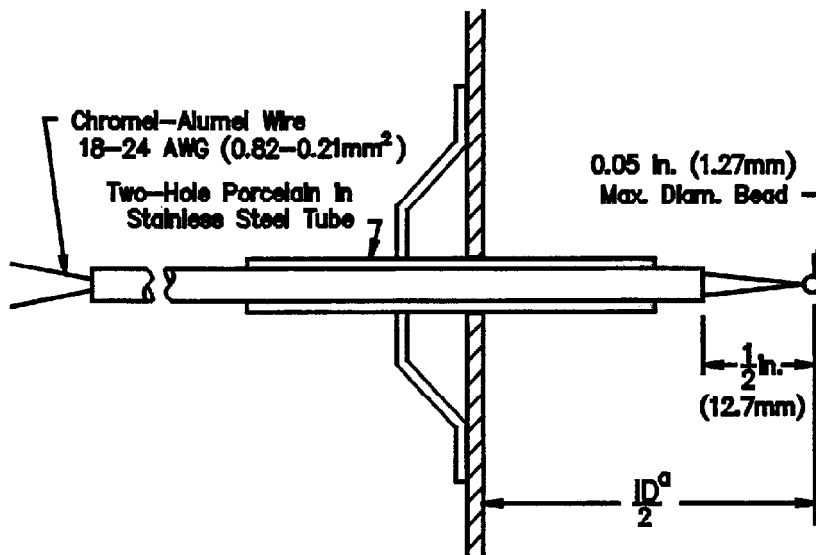


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6.2 Temperature measurement

6.2.1 Flue gas temperatures are to be determined for the Flue Gas Temperature Tests by a thermocouple, as illustrated in Figure 6.3. The thermocouple is to be located within the insulated outlet of the flue gas generator as illustrated in Figure 6.1. The thermocouple is to be a Type K (chromel-alumel) of Nos. 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 6.3
Flue-gas thermocouple and support bracket



^aID = Internal Diameter of Flue Pipe

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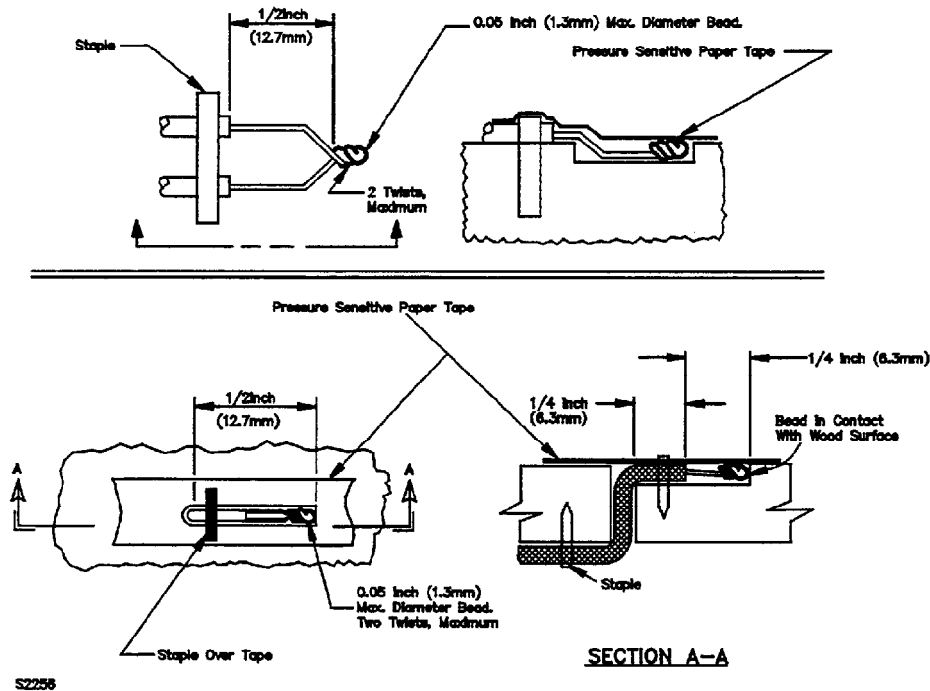
6.2.2 The flue gas thermocouple is to be inserted at the center of the insulated generator outlet using the entry tube parallel to the long generator axis.

6.2.3 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 No. 24 AWG (0.21 mm^2). Thermocouples are to be:

- Attached to combustible wood enclosure elements having a surface adjacent to the grease duct system parts so as to have $1/2$ inch (12.7 mm) of wire exposed; and
- Secured to wood surfaces by staples placed over the insulated portion of the wires.

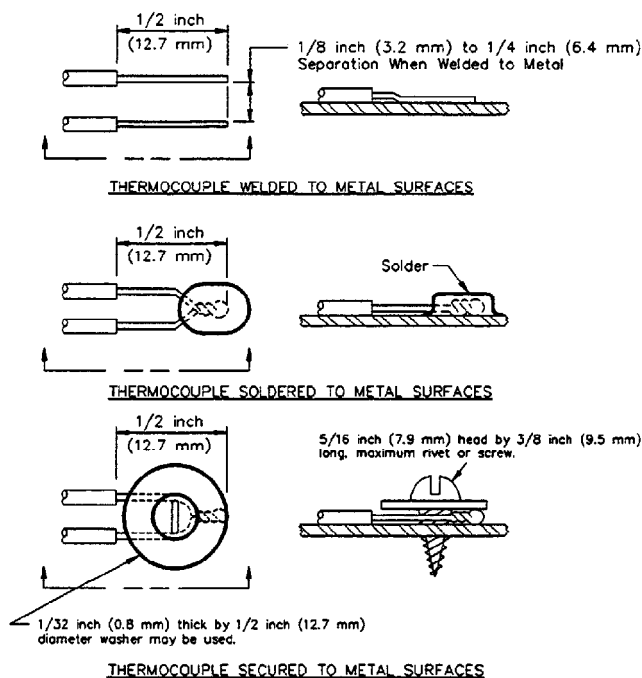
The thermocouple insulation and tip are to be depressed for a length of $1/2$ inch (12.7 mm) into the wood so as to be flush with the wood surface at the point of measurement, and held in thermal contact with the surface at the point by the use of flat black pressure-sensitive paper tape. See Figure 6.4.

Figure 6.4
Thermocouple installation methods on wood surfaces



6.2.4 Temperatures attained by surfaces of parts of the grease duct system 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 6.5. 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 are to be placed at other locations that are in contact with or subject to radiation from surfaces of the grease duct system.

Figure 6.5
Thermocouple installation methods on metal surfaces



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6.2.5 Ambient temperature of Zone A in Figure 6.2 is to be determined by a shielded thermocouple located centrally within a vertically oriented 6 inch (150 mm) length of 2 inch (50.8 mm) steel pipe (ASME B36.10M), aluminum painted and open at both ends. The steel pipe is to be located 2 feet (0.6 m) from the center of the vertical length of the grease duct system. The shield is to be located in a manner to avoid direct radiation to the thermocouple.

6.2.6 Ambient temperature of Zone B and C above Zone A in Figure 6.2 is to be determined by a thermocouple located 2 feet (610 mm) away from the front centerline of the enclosure and 4 feet (1.2 m) above the floor.

6.3 500°F (260°C) Flue Gas Temperature Test

6.3.1 The maximum temperatures on surfaces of the enclosure shall not be more than 90°F (32°C) above room temperature when the flue gas temperature is maintained as specified in 6.3.3.

6.3.2 The temperature of the flue gases entering the grease duct is to be regulated by an "air shutter" shown in Figure 6.1. This regulates dilution air introduced into the generator.

6.3.3 The test is to be started with the grease duct and the test structure at room temperature. The flue gas generator is to be fired at the input specified in Column 1 of Table 6.1 and regulated to produce flue gas at a temperature of 430°F (239°C) above room temperature within 15 minutes at the flue gas thermocouple shown in Figure 6.1.

6.3.4 Temperatures at all points of measurement are to be recorded at intervals not exceeding 30 minutes until it is apparent that maximum temperatures have been attained. Maximum temperature are considered to have been attained when three successive readings taken at 30 minute intervals show no change or show a decrease.

6.4 2000°F (1093°C) Flue Gas Temperature Test

6.4.1 The maximum temperature attained on the test structure, such as ceilings and enclosures, shall be not more than 250°F (121°C) above ambient temperature when the flue gas temperature is maintained as specified in 6.4.3.

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

6.4.3 After equilibrium temperatures are attained under the test conditions specified in 6.3.4, the temperature of the flue gases entering the grease duct system is to be increased to the input specified in Column 2 of Table 6.1 and regulated to produce flue gases within 15 minutes at a temperature of 1930°F (1089°C) above room temperature at the flue gas thermocouple in Figure 6.1.

6.4.4 The test period shall begin after the flue gas temperature entering the assembly is stabilized at 1930°F (1089°C) above room temperature and continue for a period of 30 minutes. Temperatures at all points of measurement are to be recorded at intervals not exceeding 15 minutes. At the end of the 30 minutes, the flue gas generator shall be shut off and the temperatures are to be continued to be recorded at 5 minute intervals until a decrease in temperatures of the entire assembly is recorded.

7 Fire Engulfment and Hose Stream Test

7.1 Fire Engulfment Test

7.1.1 Each representative grease duct system shall be subjected to the Fire Endurance and Hose Stream Tests described in 7.2 in accordance with the Standard for Fire Tests of Building Construction and Materials, UL 263.

7.1.2 A sample is to be assembled consisting of complete sections of the grease duct system, including an elbow and all of the necessary supports per the manufacturer's installation instructions. The test sample is to be 12 ft (3.6 m) long, and approximately 4 ft (1.21 m) high. The assembly is to be insulated and capped at the horizontal end of the sample and the vertical termination is to be open to the atmosphere, as shown in Figure 7.1.

7.1.3 The test assembly is to be installed in a minimum 14 ft (4.2 m) furnace capable of providing temperatures in accordance with Figure 7.2 and Table 7.1. The test assembly is to be centered in the furnace with a minimum distance of 12 inches (304 mm) between the sample and the furnace wall.

7.1.4 The test assembly is to be installed using the manufacturer's suspension system and the installation instructions. The test assembly is to be suspended from a Floor/Ceiling assembly having a fire resistance rating greater than the intended rating of the grease duct system. The assembly shall incorporate either a Through-Penetration Firestop, complying with the Standard for Grease Ducts, UL 1978, or one provided by the manufacturer.

7.1.5 The Fire Engulfment Test is to be continued until failure occurs or until the test assembly has withstood the test conditions for a period equal to the desired rating.

Figure 7.1

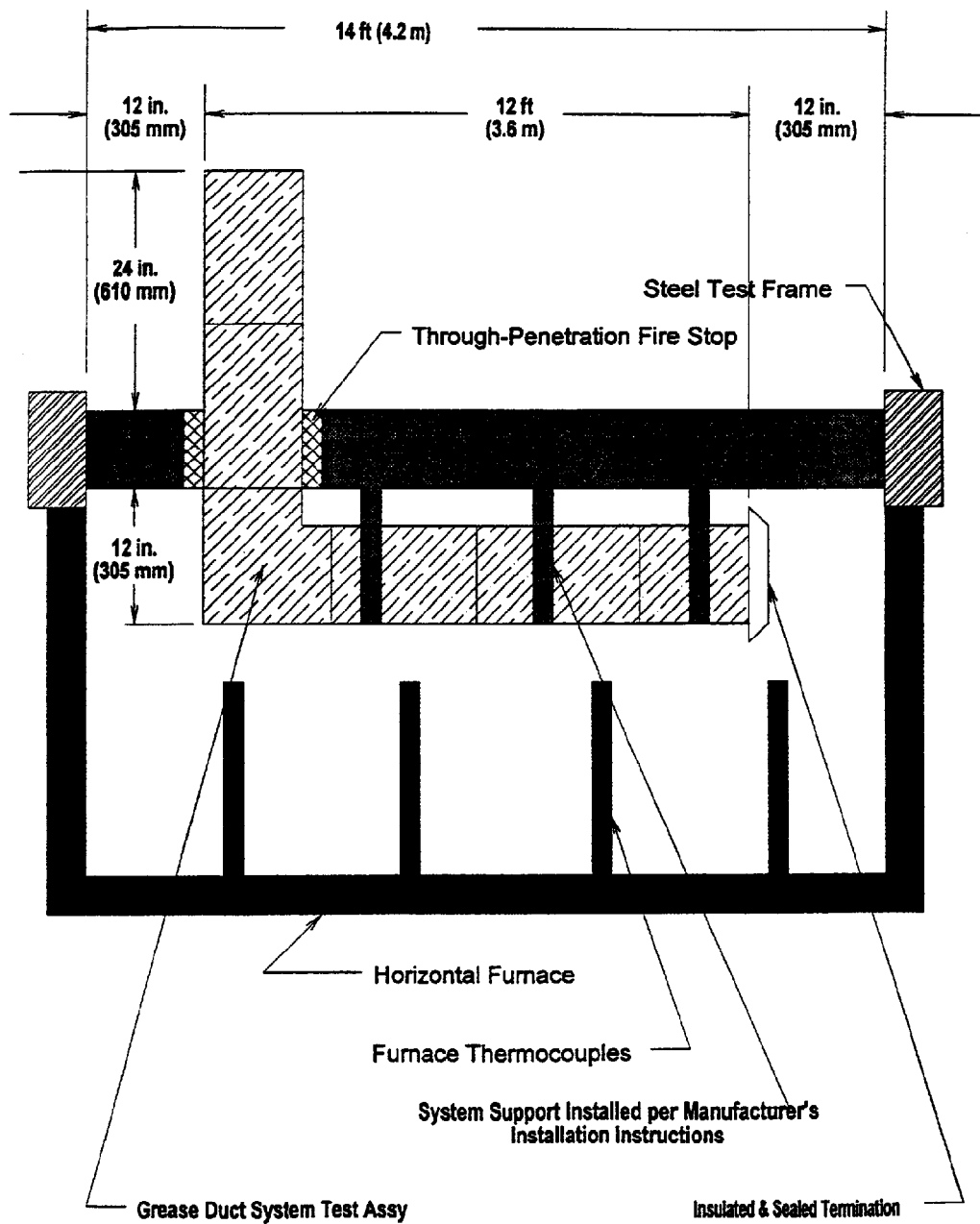


Figure 7.2
Time-temperature curve

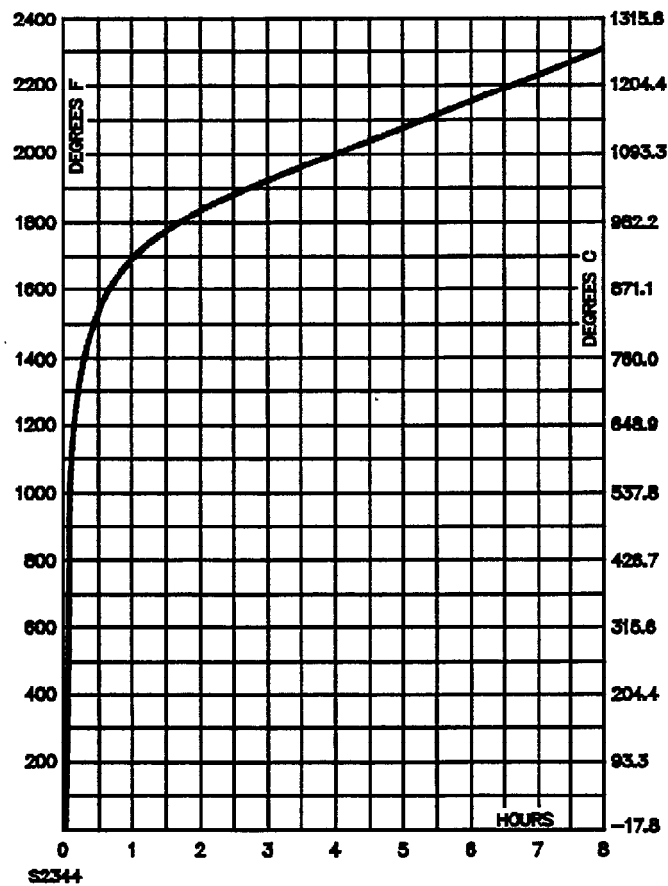


Table 7.1
Standard time-temperature curve for control of fire tests

Time, hr: min.	Temperature, degrees F.	Area above 68°F base degrees F.	degrees F	Temperature degrees C.	Area above 20°C base degrees, C	degrees, C
0:00	68	00	0	20	00	0
0:05	1 000	2 330	39	538	1 290	22
0:10	1 300	7 740	129	704	4 300	72
0:15	1 399	14 150	236	760	7 860	131
0:20	1 462	20 970	350	795	11 650	194
0:25	1 510	28 050	468	821	15 590	260
0:30	1 550	35 360	589	843	19 650	328
0:35	1 584	42 860	714	862	23 810	397
0:40	1 613	50 510	842	878	28 060	468
0:45	1 638	58 300	971	892	32 390	540
0:50	1 661	66 200	1 103	905	36 780	613
0:55	1 681	74 220	1 237	916	41 230	687
1:00	1 700	82 330	1 372	927	45 740	762
1:05	1 718	90 540	1 509	937	50 300	838
1:10	1 735	98 830	1 647	946	54 910	915
1:15	1 750	107 200	1 787	955	59 560	993
1:20	1 765	115 650	1 928	963	64 250	1 071
1:25	1 779	124 180	2 070	971	68 990	1 150
1:30	1 792	132 760	2 213	978	73 760	1 229
1:35	1 804	141 420	2 357	985	78 560	1 309
1:40	1 815	150 120	2 502	991	83 400	1 390
1:45	1 826	158 890	2 648	996	88 280	1 471
1:50	1 835	167 700	2 795	1 001	93 170	1 553
1:55	1 843	176 550	2 942	1 006	98 080	1 635
2:00	1 850	185 440	3 091	1 010	103 020	1 717
2:10	1 862	203 330	3 389	1 017	112 960	1 882
2:20	1 875	221 330	3 689	1 024	122 960	2 049
2:30	1 888	239 470	3 991	1 031	133 040	2 217
2:40	1 900	257 720	4 295	1 038	143 180	2 386
2:50	1 912	276 110	4 602	1 045	153 390	2 556
3:00	1 925	294 610	4 910	1 052	163 670	2 728
3:10	1 938	313 250	5 221	1 059	174 030	2 900
3:20	1 950	332 000	5 533	1 066	184 450	3 074
3:30	1 962	350 890	5 848	1 072	194 940	3 249
3:40	1 975	369 890	6 165	1 079	205 500	3 425
3:50	1 988	389 030	6 484	1 086	216 130	3 602
4:00	2 000	408 280	6 805	1 093	226 820	3 780
4:10	2 012	427 670	7 128	1 100	237 590	3 960
4:20	2 025	447 180	7 453	1 107	248 430	4 140
4:30	2 038	466 810	7 780	1 114	259 340	4 322
4:40	2 050	486 560	8 110	1 121	270 310	4 505
4:50	2 062	506 450	8 441	1 128	281 360	4 689
5:00	2 075	526 450	8 774	1 135	292 470	4 874
5:10	2 088	546 580	9 110	1 142	303 660	5 061
5:20	2 100	566 840	9 447	1 149	314 910	5 248
5:30	2 112	587 220	9 787	1 156	326 240	5 437
5:40	2 125	607 730	10 129	1 163	337 630	5 627
5:50	2 138	628 360	10 473	1 170	349 090	5 818
6:00	2 150	649 120	10 819	1 177	360 620	6 010
6:10	2 162	670 000	11 167	1 184	372 230	6 204
6:20	2 175	691 010	11 517	1 191	383 900	6 398
6:30	2 188	712 140	11 869	1 198	395 640	6 594
6:40	2 200	733 400	12 223	1 204	407 450	6 791
6:50	2 212	754 780	12 580	1 211	419 330	6 989
7:00	2 225	776 290	12 938	1 218	431 270	7 188
7:10	2 238	797 920	13 299	1 225	443 290	7 388
7:20	2 250	819 680	13 661	1 232	455 380	7 590
7:30	2 262	841 560	14 026	1 239	467 540	7 792
7:40	2 275	863 570	14 393	1 246	479 760	7 996
7:50	2 288	885 700	14 762	1 253	492 060	8 201
8:00	2 300	907 960	15 133	1 260	502 420	8 407

7.2 Hose Stream Test

7.2.1 As a continuation of the Fire Engulfment Test, the sample if subjected to an hour or greater Fire Engulfment Test, shall be subjected to the impact, erosion and cooling effects of a Hose Stream, as described in 7.2.2 – 7.2.4. The Hose Stream Test is not required for grease duct systems having a fire rating less than one hour.

7.2.2 Immediately following the Fire Engulfment Test, the floor/ceiling assembly and the test assembly is to be removed from the furnace, manually inspected, and subjected to a hose stream in accordance with Table 7.2.

7.2.3 The stream is to be delivered through 2-1/2 inch (63.5 mm) hose and discharged through play pipe constructed in accordance with the Standard for Play Pipes for Water Supply Testing in Fire-Protection Service, UL 385. The play pipe is to be equipped with a 1-1/8 inch (28.6 mm) discharge tip of the standard-taper, smooth-bore pattern without a shoulder at the orifice. The water pressure and duration of application are to be as specified in Table 7.2.

7.2.4 The nozzle orifice is to be 20 feet (6.1 m) from the center of the exposed surface of the test specimen if the nozzle is so located that, when directed at the center, its axis is normal to the surface of the test specimen. If otherwise located, its distance from the center is to be less than 20 feet (6.1 m) by an amount equal to 1 foot (305 mm) for each 10 degrees of deviation from the normal.

Table 7.2
Pressure and duration of Hose Stream Test

Resistance period	Water pressure at base of nozzle,		Duration of application,	
	PSIG	(kPa)	minutes per 100 square feet of exposed area	(minutes per square meter)
8 hours and over	45	(310)	6	(0.65)
4 hours and over, when less than 8	45	(310)	5	(0.54)
2 hours and over, when less than 4	30	(207)	2-1/2	(0.27)
1-1/2 hours and over, when less than 2	30	(207)	1-1/2	(0.16)
1 hour and over, when less than 1-1/2	30	(207)	1	(0.11)

MARKING AND INSTRUCTIONS

8 Marking

8.1 Each individual grease duct system part, such as a grease duct section, tee, support or elbow, shall be permanently marked with the following:

- Manufacturer's or private labeler's name or identifying symbol;
- Distinctive part or model designation;

c) "Install and Use Only in Accordance With (Manufacturer's or Private Labeler's Name) Installation and Maintenance Instructions," or equivalent; and

d) The fire-resistance rating of the system.

8.2 The exterior surface of each grease duct section shall also be permanently marked with the statement: "For Grease Duct System Installed Without A Continuous Fire-Rated Enclosure, An Evaluated Through-Penetration Firestop Assembly Shall Be Used."

8.3 When a manufacturer produces grease duct system parts at more than one factory, each individual part shall have a distinctive marking to identify it as the product of a particular factory.

8.3 A marking required to be permanent shall be molded, die-stamped, paint-stenciled, stamped, or etched metal that is permanently secured to the grease duct assembly, or indelibly stamped on a pressure-sensitive label. Usage, handling, and storage of the products are to be evaluated in determining the permanence of the marking. Adhesive attached marking and labeling systems shall comply with the Standard for Marking and Labeling Systems, UL 969.

9 Installation Instructions

9.1 A copy of the installation instructions shall be furnished with the samples submitted for investigation and is to be used as a reference in the examination and test of the grease duct system and through-penetration firestop assembly, for this purpose, it does not be in final printed form.

9.2 A copy of the Installation Instructions shall be packed with an essential part of the grease duct system and through-penetration firestop assembly.

9.3 The instructions shall be illustrated and shall include particular details concerning:

- a) The parts required and the step-by-step process for installing the grease duct system and through-penetration firestop assembly, including the methods of grease duct system support and the securement of the support assemblies. Nails, lugs, bolts or other fastening means needed to secure parts shall be specified.
- b) Limitations with respect to installation and use of the grease duct system, such as maximum height, joining of two or more parts to constitute the intended assembly, the required installation clearances to combustible and non-combustible materials, and the fire-resistance rating of the system.
- c) The methods and parts to be employed for maintaining ventilation and air circulation where required while installing the grease duct system.
- d) Through-penetration firestop assembly systems to be used with these types of grease duct system.

9.4 The installation instructions shall include the statement, "Contact Local Building or Fire Officials About Restrictions and Installation Inspections in Your Area, Prior to Beginning Installation."

9.5 The instructions shall make reference to the manufacturer's or private labeler's specific catalog designation or equivalent for the grease duct system and through-penetration firestop assembly and related parts and shall include the manufacturer's or private labeler's name and address.