NFPA®

285

Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components

2019

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ISBN: 978-145592241-3 (PDF)
ISBN: 978-145592242-0 (eBook)

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NFPA® 285

Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components

2019 Edition

This edition of NFPA 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*, was prepared by the Technical Committee on Fire Tests. It was issued by the Standards Council on November 5, 2018, with an effective date of November 25, 2018, and supersedes all previous editions.

This edition of NFPA 285 was approved as an American National Standard on November 25, 2018.

Origin and Development of NFPA 285

The 1998 edition was the first for this standard. It established a test method, developed through a consensus process, for determining the flammability characteristics of exterior non-load-bearing wall assemblies or panels. The Committee's intention was to establish a standard that could be adopted or referenced by other applicable documents, such as the model building codes. The standard was introduced to regulate and address the introduction of combustible materials into exterior walls of all construction types.

The 2006 edition included a complete editorial rewrite for compliance with the *Manual of Style for NFPA Technical Committee Documents*. Further organizational and editorial changes were made to improve the application of the test method, and the scope and purpose of the document were revised to clarify the document's intent. Technical changes addressed details about the test specimen, documentation of the fire test, and testing instrumentation. Historical information describing the development of NFPA 285 was also added as annex material.

The 2012 edition included organizational, editorial, and technical changes that addressed clarifications and corrections of both requirements and figures. The changes provided consistency throughout the document and updated the standard to reflect current construction and testing practices. Technical changes included new requirements, acceptance criteria, and diagrams for thermocouple locations for new types of wall systems.

The 2019 edition includes many substantial changes. The document has been revised to include both bearing and non-load-bearing assemblies. Additionally, the scope has been expanded to apply to buildings of any construction type. New sections were added in Chapter 5 to address joint and seam locations and window header construction.

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NFPA 285

Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components

2019 Edition

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex B. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration

1.1* Scope.

Δ **1.1.1*** This standard provides a test method for determining the fire propagation characteristics of exterior wall assemblies and panels used as components of curtain wall assemblies that are constructed using combustible materials or that incorporate combustible components.

1.1.2* The fire propagation characteristics are determined for post-flashover fires of interior origin.

Δ **1.2 Purpose.** The purpose of this standard is to provide a standardized fire test procedure for evaluating the suitability of exterior wall assemblies and panels used as components of curtain wall assemblies that are constructed using combustible materials or that incorporate combustible components for installation on buildings.

1.3 Application.

Δ **1.3.1** This standard shall be used to evaluate the fire propagation characteristics of exterior wall assemblies and panels used as components of curtain wall assemblies that are constructed using combustible materials or that incorporate combustible components within the wall assemblies as specified in the following:

(1) The ability of the wall assembly to resist flame propagation over the exterior face of the wall assembly
(2) The ability of the wall assembly to resist vertical flame propagation within the combustible components from one story to the next
(3) The ability of the wall assembly to resist vertical flame propagation over the interior surface of the wall assembly from one story to the next
(4) The ability of the wall assembly to resist lateral flame propagation from the compartment of fire origin to adjacent compartments or spaces

Δ **1.3.2** The application of this standard to actual field installations of exterior wall assemblies and panels used as components of curtain wall assemblies shall not limit the use of the methods and materials employed to seal the gap between the edge of the second floor slab and the interior surface of the test specimen during the test, provided approved sealing methods and materials are used in the field.

1.3.3 This standard requires both visual observations made by laboratory personnel conducting the test and temperature data recorded during the test.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 259, *Standard Test Method for Potential Heat of Building Materials,* 2018 edition.

2.3 Other Publications.

2.3.1 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM C1396/C1396M, *Specification for Gypsum Board*, 2017.

ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, 2018.

ASTM E136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, 2016a.

ASTM E2652, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750°C*, 2016.

ASTM E2965, *Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter*, 2017.

Δ **2.3.2 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, 2008, revised 2017.

2.3.3 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 5000®, Building Construction and Safety Code®, 2018 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4 Shall. Indicates a mandatory requirement.

3.2.5 Should. Indicates a recommendation or that which is advised but not required.

3.2.6 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase "standards development process" or "standards development activities," the term "standards" includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Combustible Insulation. Combustible material used as insulation.

3.3.2 Combustible (Material). A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn; a material that does not meet the definition of noncombustible or limited-combustible. [**5000,** 2018]

3.3.3* Exterior Wallcovering. A material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resisting barrier or insulation or for aesthetics.

Δ **3.3.4 Limited-Combustible (Material).** See Section 4.2.

Δ **3.3.5 Noncombustible Material.** See Section 4.1.

Δ **3.3.6 Test Specimen.** The exterior wall assembly to be tested in accordance with this fire test method.

Chapter 4 Test Facility and Apparatus

N **4.1 Noncombustible Material.** A material that complies with any one of the following shall be considered a noncombustible material:

(1) The material, 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.
(2) The material is reported as passing ASTM E136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*.
(3) The material is reported as complying with the pass/fail criteria of ASTM E136 when tested in accordance with the test method and procedure in ASTM E2652, *Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer at 750°C*. [**5000:**7.1.4.1.1]

N **4.2 Limited-Combustible Material.** A material shall be considered a limited-combustible material where both of the following conditions of 4.2(1) and 4.2(2), and the conditions of either 4.2.1 or 4.2.2 are met:

(1) The material does not comply with the requirements for a noncombustible material in accordance with Section 4.1.
(2) The material, in the form in which it is used, exhibits a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg), when tested in accordance with NFPA 259. [**5000:**7.1.4.2]

N **4.2.1** The material shall have a structural base of noncombustible material with a surfacing not exceeding a thickness of ⅛ in. (3.2 mm) where the surfacing exhibits a flame spread index not greater than 50 when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*. [**5000:**7.1.4.2.1]

N **4.2.2** The material shall be composed of materials that in the form and thickness used, neither exhibit a flame spread index greater than 25 nor evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723 and are of such composition that all surfaces that would be exposed by cutting through the material on any plane would neither exhibit a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723. [**5000:** 7.1.4.2.2]

N **4.2.3** Materials shall be considered limited-combustible materials where tested in accordance with ASTM E2965, *Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Combustion Calorimeter,* at an incident heat flux of 75 kW/m^2 for a 20-minute exposure, and both the following conditions are met:

(1) The peak heat release rate shall not exceed 150 kW/m^2 for longer than 10 seconds.
(2) The total heat released shall not exceed 8 MJ/m^2.
[**5000:**7.1.4.2.3]

4.3 Test Facility.

4.3.1 The test apparatus described in Section 4.4 shall be located inside a test facility.

4.3.2 The test facility shall have minimum dimensions of 30 ft wide × 30 ft deep × 23 ft high (9.1 m × 9.1 m × 7.0 m).

4.3.3 The test facility shall have provisions for supplying combustion makeup air taken from the outside during the test.

4.3.4 The test facility shall be constructed to allow for the exhaust of the combustion by-products during the test while not inducing an airflow on the exterior face of the test specimen.

4.3.5 The test facility shall protect the test apparatus and test specimen from exposure to wind and precipitation.

4.4 Test Apparatus.

4.4.1 The test apparatus shall consist of a two-story structure having a height of 15 ft 8 in. ± 1 in. (4.8 m ± 25 mm) with a test room on each story.

4.4.2 Each test room shall have unfinished inside dimensions of 10 ft ± 0.5 in. wide × 10 ft ± 0.5 in. deep (3.05 m ± 13 mm × 3.05 m ± 13 mm) with an unfinished floor-to-ceiling height of 7 ft ± 0.5 in. (2.13 m ± 13 mm).

4.4.3* The test apparatus shall be constructed in accordance with Figure 4.4.3.

4.4.4 The slabs shall be constructed of reinforced concrete.

4.4.5 The upper two slabs shall be supported by steel columns designed to support the loads, and the columns shall not be located inside the test rooms.

4.4.6 The thickness of the concrete slabs shall be as follows:

(1) The first-story slab shall be not less than 6 in. (152 mm) thick.
(2) The second-story slab shall be 8 in. ± 0.5 in. (203 mm ± 13 mm) thick.
(3) The top slab shall be not less than 6 in. (152 mm) thick.

4.4.7 The three permanent walls (one rear wall and two side walls) that form each test room shall be constructed of nominal 8 in. (203 mm) concrete block or equivalent construction.

4.4.8 The interior surfaces of the first-story test room shall be protected as follows:

(1) The walls and ceiling shall be covered with one layer of nominal $\frac{5}{8}$ in. (16 mm) thick Type X gypsum wallboard conforming to ASTM C1396/C1396M, *Specification for Gypsum Board*, and one layer of nominal 1.5 in. (38 mm) thick nominal 8 lb/ft^3 (128 kg/m^3) density ceramic fiber insulation on the interior face.

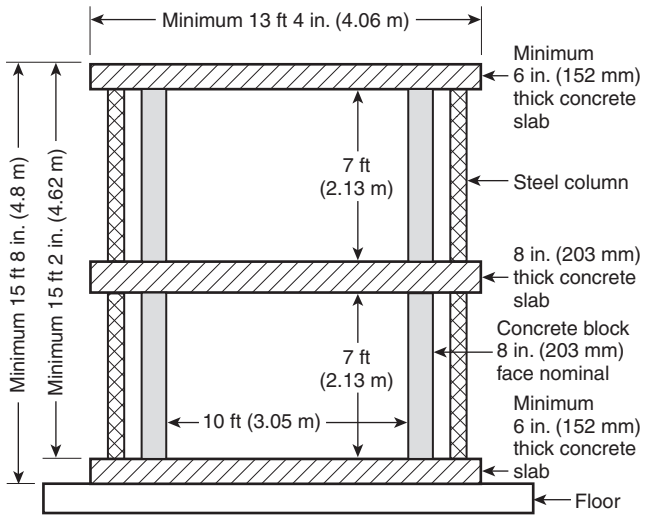


FIGURE 4.4.3 Front View of Test Apparatus Structure (not to scale). For exact dimensions, see 4.4.1 through 4.4.7.

(2) The slab shall be covered with two layers of nominal $\frac{5}{8}$ in. (16 mm) thick gypsum wallboard.

4.4.9 Insulation shall not be required in the second-story test room.

4.4.10 Each story shall have one access opening approximately 3.5 ft wide × 6.75 ft high (1.1 m × 2.1 m).

4.4.11 The first-story access opening shall be located in one of the side walls, and the second-story access opening shall be located in the rear wall of the test room.

4.4.12 The access door opening for the first-story test room shall be capable of being closed during the fire test.

4.4.13 Additional access openings shall be permitted in the second-story test room walls for instrumentation and video recording.

4.5 Movable Test Frame.

4.5.1 The movable test frame shall comply with 4.5.1.1 through 4.5.1.3.

4.5.1.1 The frame shall be designed such that the nominal 4 in. × 4 in. × $\frac{3}{16}$ in. (102 mm × 102 mm × 5 mm) angles meet at the top of the respective floor lines on the test apparatus.

4.5.1.2 The frame shall be constructed to prevent racking or movement of the wall assembly during movement of the frame and fastening of the frame to the test apparatus.

4.5.1.3 The frame shown in Figure 4.5.1.3 shall be used to determine the minimum size of the wall assembly.

4.6 Burners.

4.6.1 The burner arrangement shall consist of two gas-fired burners.

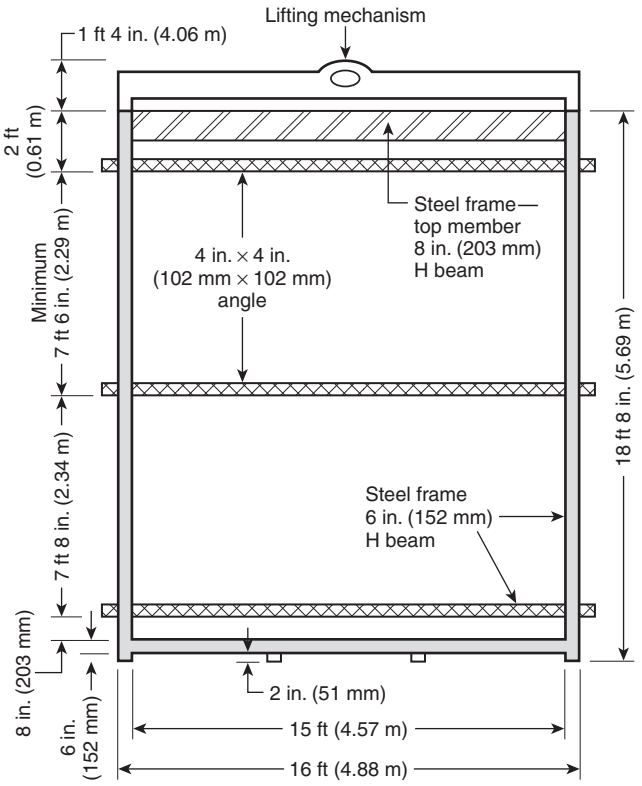


FIGURE 4.5.1.3 Front View of Movable Wall Frame (not to scale).

4.6.2 One burner shall be placed inside the first-story test room, and the other burner shall be placed near the top of the first-story window opening of the test specimen, as required by Chapter 7.

4.6.3 The test room burner shall comply with 4.6.3.1 through 4.6.3.6.

4.6.3.1 The test room burner shall be constructed of nominal 2 in. (51 mm) outside diameter steel pipe with nominal ⅛ in. (3 mm) diameter holes spaced a nominal 1 in. (25 mm) on center.

4.6.3.2 The burner holes shall be located along the top surface of the pipe.

4.6.3.3 The first hole shall be located 3.5 ft ± 1 in. (1.06 m ± 25 mm) from the rear wall on both sides of the gas supply pipes and continue across the front gas supply pipe.

4.6.3.4 The gas supply pipe located within the test room shall be wrapped with a single layer of nominal 1 in. (25 mm) thick nominal 8 lb/ft^3 (128 kg/m^3) density ceramic fiber blanket.

4.6.3.5 The burner shall be positioned with its centerline 2.5 ft ± 1 ft (0.8 m ± 0.3 m) above the floor surface of the test facility.

4.6.3.6* Figure 4.6.3.6 shall be used to determine the design of the first-story test room burner.

4.6.4 The window gas burner shall consist of a 60 in. ± 0.5 in. (1520 mm ± 13 mm) length of nominal 2 in. (51 mm) outside diameter pipe having a 0.5 in. ± 0.06 in. wide × 44 in. ± 0.5 in. long (13 mm ± 1.5 mm × 1118 mm ± 13 mm) slot.

4.6.5 The burner shall be supplied with gas at both ends through nominal 1 in. (25 mm) outside diameter pipe.

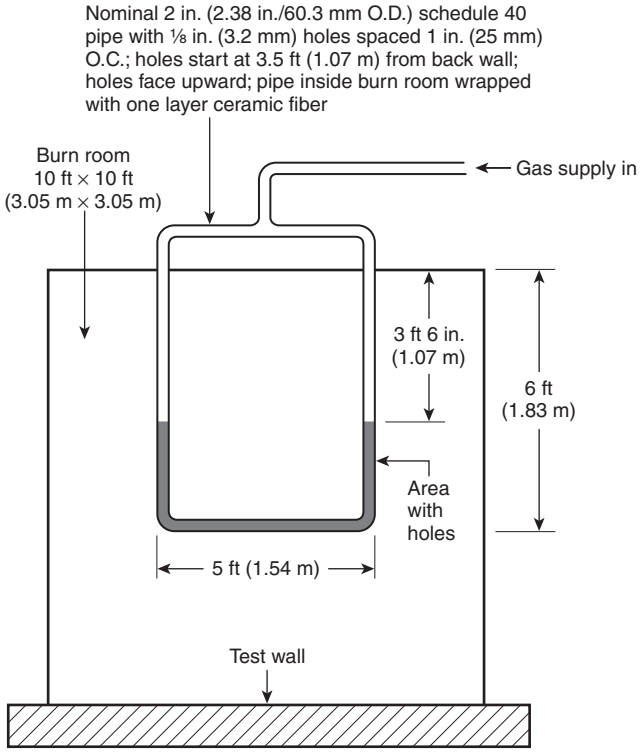
4.6.6 Figure 4.6.6 shall be used to determine the design of the window burner.

4.6.7 The window burner shall be wrapped with a layer of nominal 1 in. (25 mm) thick nominal 8 lb/ft^3 (128 kg/m^3) density ceramic fiber blanket.

4.6.8 The burner shall be permitted to be mounted on a movable trolley.

4.6.9 During the fire test, the burner shall be positioned so the slot is located on the top surface of the pipe and centered horizontally in the first-story test room window opening.

4.6.10 The horizontal centerline of the burner shall be positioned 9 in. ± 0.5 in (230 mm ± 13 mm) below the bottom surface of the window opening header.



Δ FIGURE 4.6.3.6 Burn Room Burner — Plan View (not to scale).

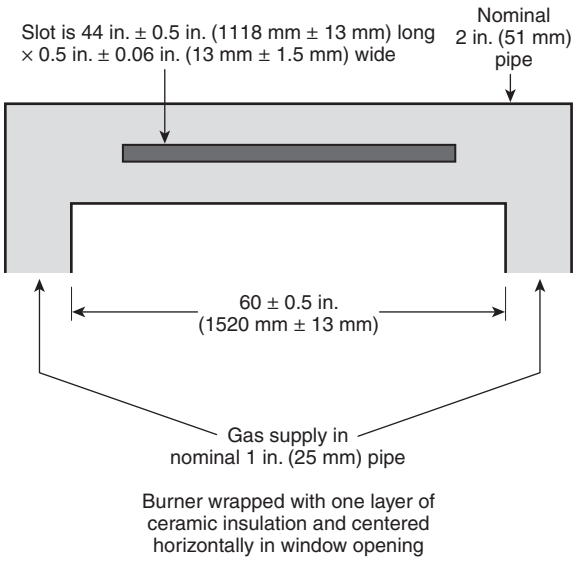


FIGURE 4.6.6 Plan View of Window Burner (not to scale).

4.6.11 The vertical centerline of the burner shall be positioned between 0 in. and 5 in. (0 mm and 130 mm) from the exterior face of the wall assembly.

4.6.12 The final position of the window burner from the exterior face of the wall assembly shall be determined from the calibration procedure.

4.6.13* The burners shall be fired during the fire test according to the calibration gas flow rates shown in Table 4.6.13.

4.6.14 Each burner shall attain its prescribed gas flow rate within 15 seconds of each specified change in the gas flow rate. •

Table 4.6.13 Calibration Gas Flow Rates (Based on Natural Gas)

Time Interval	Room Burner				Window Burner			
	SCFM	m^3/min	kW	Btu/min	SCFM	m^3/min	kW	Btu/min
0:00–5:00	38.0	1.08	687	39,064	0.0	0.00	0	0
5:00–10:00	38.0	1.08	687	39,064	9.0	0.25	163	9,252
10:00–15:00	43.0	1.22	777	44,204	12.0	0.34	217	12,336
15:00–20:00	46.0	1.30	831	47,288	16.0	0.45	289	16,448
20:00–25:00	46.0	1.30	831	47,288	19.0	0.54	343	19,532
25:00–30:00	50.0	1.42	904	51,400	22.0	0.62	398	22,616

Chapter 5 Test Specimens

5.1 Location of Test Specimens. The test specimens shall be constructed on the front face of the test apparatus or on the movable test frame specified in 4.5.1.

5.2 Specimen Mounting. Figure 5.2(a) through Figure 5.2(c) shall be used to determine the test specimen mounting on the front face of the test apparatus.

5.3 Size of Test Specimen. The test specimen shall be not less than 17.5 ft high × 13.3 ft wide (5.3 m high × 4.1 m wide).

5.4 Position of Test Specimen.

5.4.1 The edges of the test specimen shall be positioned on the test apparatus as follows:

(1) Below the top of the first-story slab, not less than 2 in. (51 mm)
(2) Above the top of the top slab, not less than 2 ft (0.6 m)
(3) Beyond the outside face of each side wall, not less than 1 ft (0.305 m)

5.4.2 The test specimen shall completely cover the front face of the test apparatus except for a window opening located in the test specimen at the first story.

5.5 Window Opening.

5.5.1 The window opening shall be 30 in. ± 0.5 in. high × 78 in. ± 0.5 in. wide (760 mm ± 13 mm high × 1980 mm ± 13 mm wide), with a sill height of 30 in. ± 0.5 in. (760 mm ± 13 mm) above the top of the first-story test room slab.

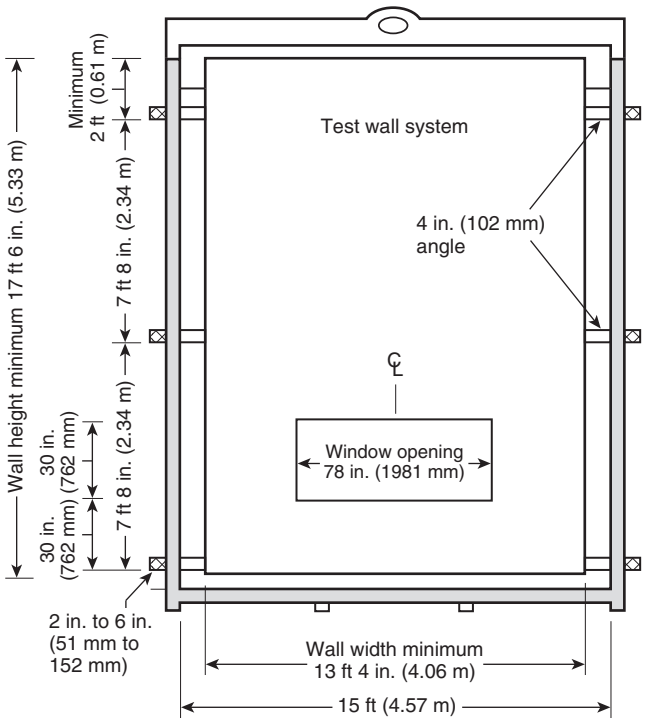


FIGURE 5.2(b) Front View of Test Specimen in Movable Test Frame (not to scale).

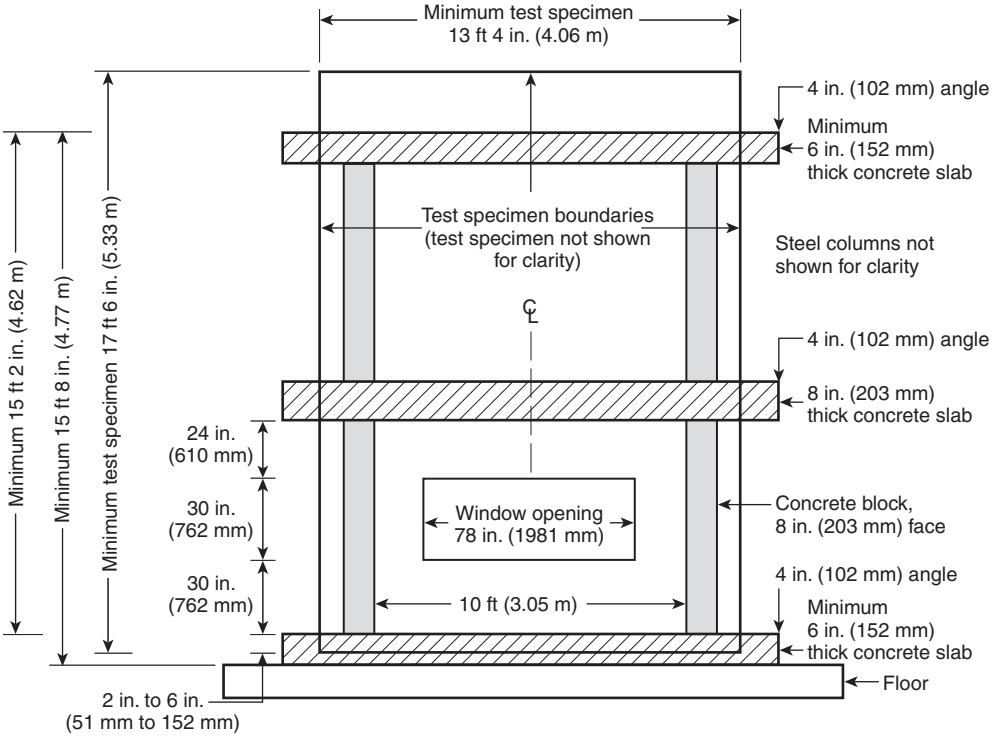


FIGURE 5.2(a) Front View of Test Specimen Superimposed over Test Apparatus (not to scale).

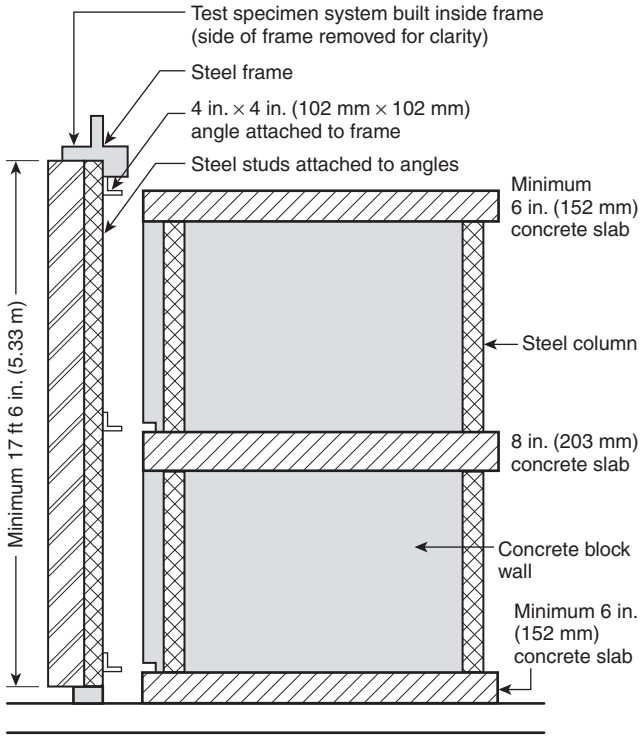


FIGURE 5.2(c) Side View of Test Apparatus with Test Specimen in Movable Test Frame (not to scale).

5.5.2 The window opening shall be centered horizontally with respect to the test room.

5.6 Securing Test Specimen to Test Apparatus.

5.6.1 The test specimen shall be secured to the test apparatus using a girt system of replaceable nominal 4 in. × 4 in. × $\frac{3}{16}$ in. (102 mm × 102 mm × 5 mm) steel angles.

5.6.2 A removable spandrel beam shall be mounted on the underside of the second-story floor slab where required for the attachment of the test specimen to the test apparatus.

5.6.2.1* Where used, the spandrel beam shall be a W8×21 (W200×31) wide flange steel beam.

5.6.2.2 Where used, the spandrel beam shall extend completely across the burn room compartment between the interior wall surfaces of the two side walls of the first-story test room.

5.6.2.3 Where used, the spandrel beam shall be either protected or unprotected at the discretion of the test laboratory or the client.

5.6.2.4 Where the spandrel beam is used and it has been determined that it will be protected, one layer of nominal 1 in. (25 mm) thick nominal 6 lb/ft^3 (96 kg/m^3) ceramic fiber blanket shall be used to protect the beam.

5.6.2.5 Outriggers and other connections provided to the spandrel beam shall not be protected.

5.7 Construction Details of Test Specimen.

***N* 5.7.1 General.**

5.7.1.1 The test specimen shall be constructed and secured to the test frame or apparatus using fastening and construction details representative of actual field installations in accordance with the manufacturer's instructions.

5.7.1.2* Details of the construction of the test specimen shall be representative of actual field installations in accordance with the manufacturer's instructions.

5.7.1.3* The framing system used to support the wall assembly that makes up the test specimen shall consist of steel studs or wood studs.

•

***N* 5.7.2 Joints and Seams.**

***N* 5.7.2.1 Horizontal Joints and Seams.**

***N* 5.7.2.1.1** At least one horizontal joint or seam in the exterior veneer extending the full width of the test specimen shall be installed in accordance with 5.7.2.1.2, 5.7.2.1.3, and 5.7.2.1.4.

***N* 5.7.2.1.2** The horizontal joint or seam shall be located between 1 ft (305 mm) and 3 ft (914 mm) above the top of the window opening unless otherwise permitted by 5.7.2.1.3 or 5.7.2.1.4.

***N* 5.7.2.1.3** The horizontal joint or seam shall not be required where one of the following criteria is met:

(1) Where the exterior veneer is exterior insulation finish systems (EIFS)
(2) Where the exterior veneer is $\frac{3}{4}$ in. (19 mm) thick or greater standard stucco veneer
(3) Where the actual design of the wall assembly to be used in the field will not have any horizontal joints

***N* 5.7.2.1.4** Where the wall assembly being tested is a replication of the design to be used in the field and that design will not have a horizontal joint at the location specified in 5.7.2.1, the joint shall be located as per the design.

***N* 5.7.2.2 Vertical Joints and Seams.**

***N* 5.7.2.2.1** At least one vertical joint or seam in the exterior veneer shall be installed in accordance with 5.7.2.2.2, 5.7.2.2.3, and 5.7.2.2.4.

***N* 5.7.2.2.2** The vertical joint or seam shall extend upward the full height of the exterior veneer from the top of the window opening and be located within ±12 in. (152 mm) of the window opening's center line unless otherwise permitted by 5.7.2.2.3 or 5.7.2.2.4.

***N* 5.7.2.2.3** The vertical joint or seam shall not be required where one of the following criteria is met:

(1) Where the exterior veneer is exterior insulation finish systems (EIFS)
(2) Where the exterior veneer is $\frac{3}{4}$ in. (19 mm) thick or greater standard stucco veneer
(3) Where the actual design of the wall assembly to be used in the field will not have any vertical joints
(4)* Where the actual design of the wall assembly to be used in the field will not have any continuous vertical joints

N **5.7.2.2.4** Where the wall assembly being tested is a replication of the design to be used in the field and that design will not have a vertical joint at the location specified in 5.7.2.2, the joint shall be located as per the design.

N **5.7.2.3*** Where joints or seams are required by 5.7.2, the installation of the joints and seams shall be representative of actual field installations and shall be in accordance with the manufacturer's instructions.

N **5.7.3 Window Headers.**

N **5.7.3.1** The window header, jambs, and sill shall be closed using aluminum sheet metal in accordance with 5.7.3.1.1 through 5.7.3.1.2.

N **5.7.3.1.1** The aluminum sheet metal shall conform to the following:

(1) Be a maximum thickness of 0.04 in. (1 mm)
(2) Provide a maximum 2 in. (51 mm) vertical leg on the interior face only
(3) Be flush with the exterior face

N **5.7.3.1.2** Fasteners used to attach the aluminum sheet metal to the window opening framing shall be spaced a minimum of 6 in. (152 mm).

N **5.7.3.2** No material shall be used to fill air gap cavities, if any, or further cap the header, jambs, and sill area.

N **5.7.3.3** As an option to 5.7.3.1, the window opening construction used in the test shall represent construction details provided by the client and installed per the manufacturers' instructions.

N **5.7.3.4** The window opening details, including drawings and descriptions, shall be included in the test report per Chapter 11.

5.8 Curing Period. Prior to the fire test, the test specimen shall be cured as required by the manufacturer.

5.8.1 In the case of cementitious coatings or materials, not less than 28 days shall elapse from completion of construction of the test specimen to fire testing the test specimen.

5.8.2 During the curing period, the wall assemblies shall be protected from exposure to the weather.

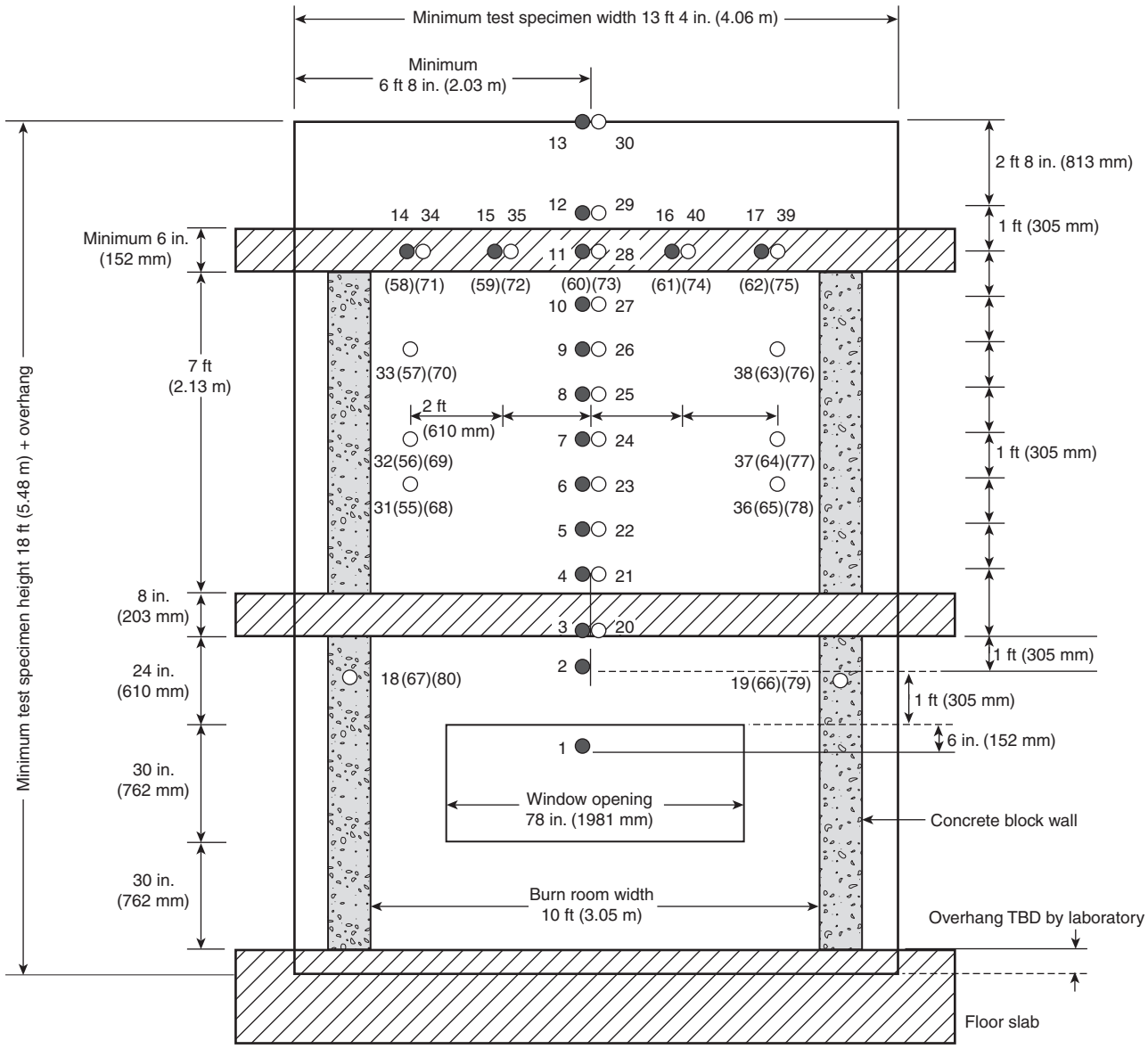
Chapter 6 Instrumentation

6.1* Temperature Measurements. Temperature measurements shall be taken at the following locations:

(1) Exterior wall surface of the test specimen, as shown in Figure 6.1(a)
(2) Combustible insulation in the exterior wall panel of the test specimen, where applicable, as shown in Figure 6.1(a) and in Figure 6.1(b), Details A and B
(3) Cavity air space within the test specimen, where applicable, as shown in Figure 6.1(a) and in Figure 6.1(b), Detail D and Details F through I
(4) Wall cavity insulation and stud cavity insulation, where applicable, as shown in Figure 6.1(a) and in Figure 6.1(b), Details B through I
(5) Interior surface of the test specimen, as shown in Figure 6.1(c)
(6) Below the first-story test room ceiling, as shown in Figure 6.1(d)
(7) For other locations, as shown in Figure 6.1(a) and in Figure 6.1(b), Details A through I, as applicable, for the test specimen construction being tested

6.2 Gas Flow Meters. Each burner shall have gas flow metering equipment to measure the expected flow rates for each burner to within 5 percent.

6.3 Thermocouples. Temperature measurements shall be made using 20-gauge Type K thermocouples, except that those used to measure the temperatures shown in Figure 6.1(d) shall be 18-gauge Type K thermocouples.



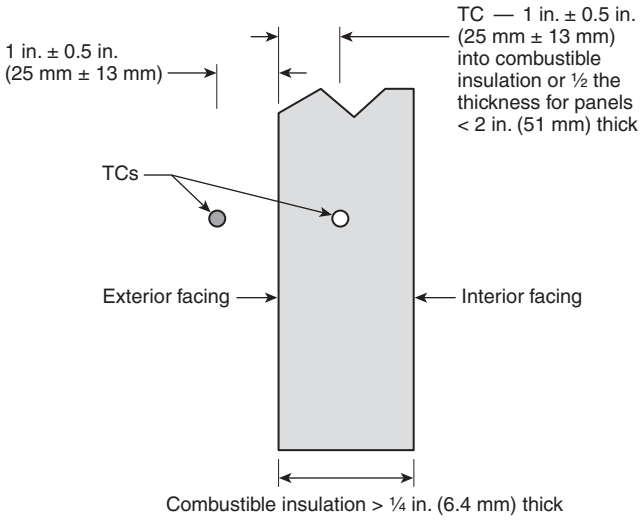
● Thermocouples — 1 in. (25 mm) from exterior wall surface

○ Thermocouples — In the wall cavity air space or the insulation, or both, as shown in Figure 6.1(b) Details A through I.

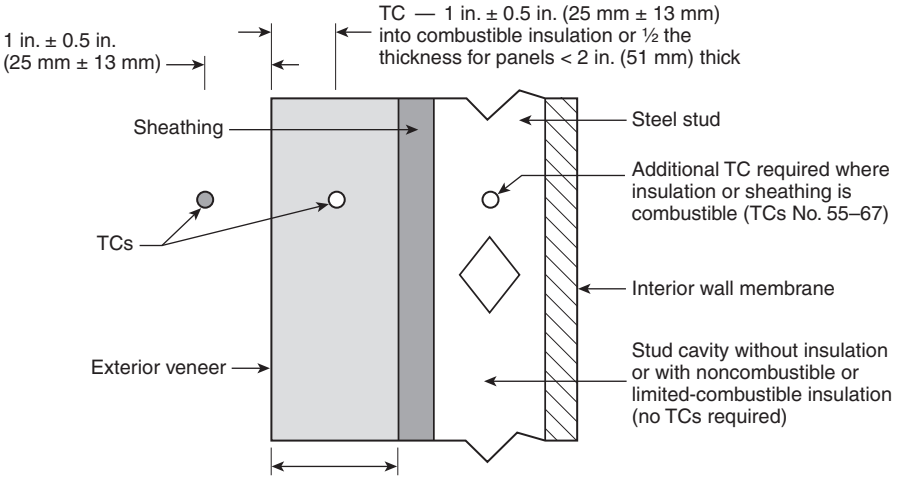
( ) Thermocouples — Additional thermocouples in the insulation or the stud cavity, or both, where required for the test specimen construction being tested, as shown in Figure 6.1(b) Details C through I.

Figure not to scale

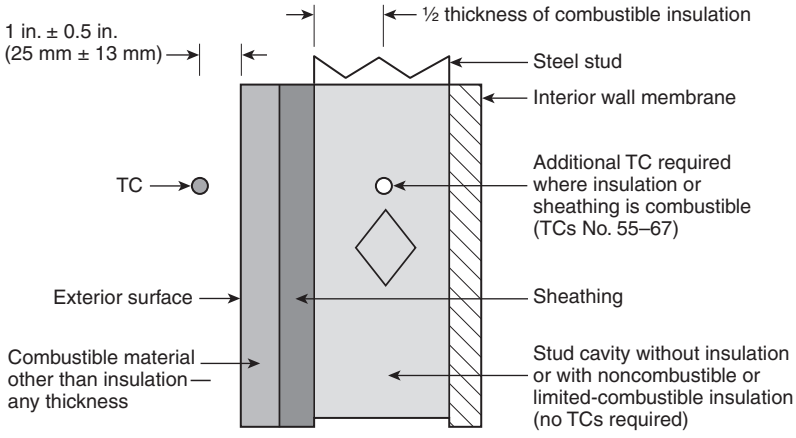
Δ FIGURE 6.1(a) Front View of Test Specimen Superimposed over Test Apparatus Thermocouple Locations.



Detail A

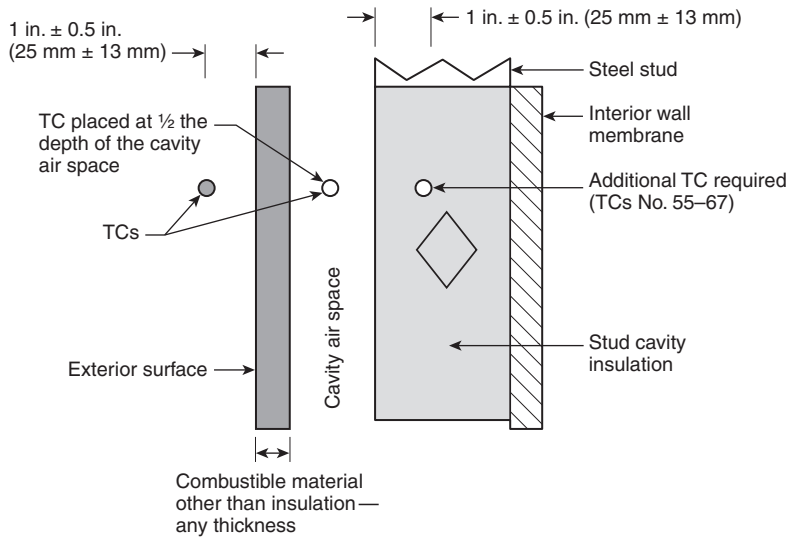


Detail B

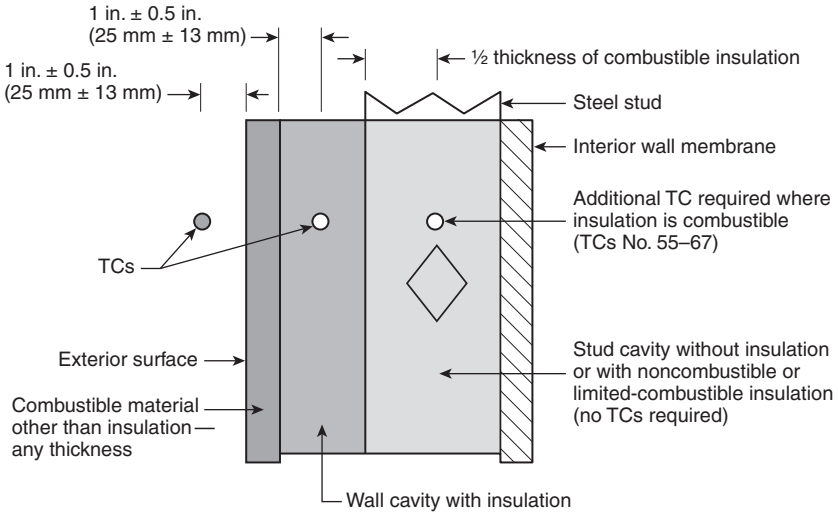


Detail C

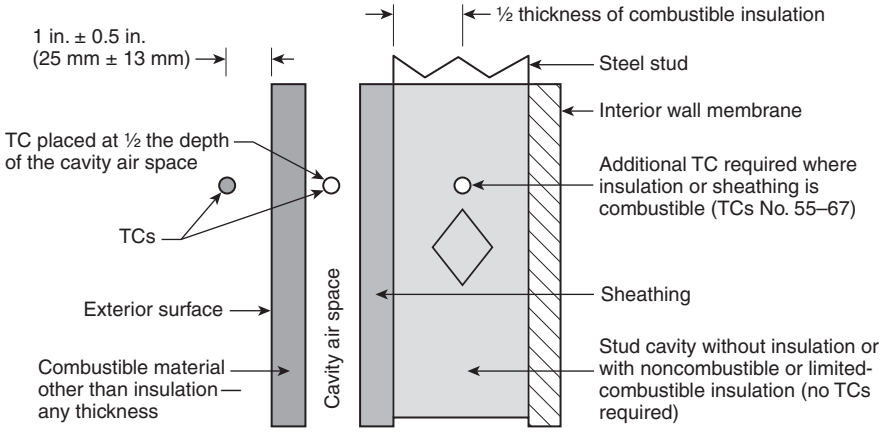
Δ FIGURE 6.1(b) Instrumentation Arrangement.



Detail D

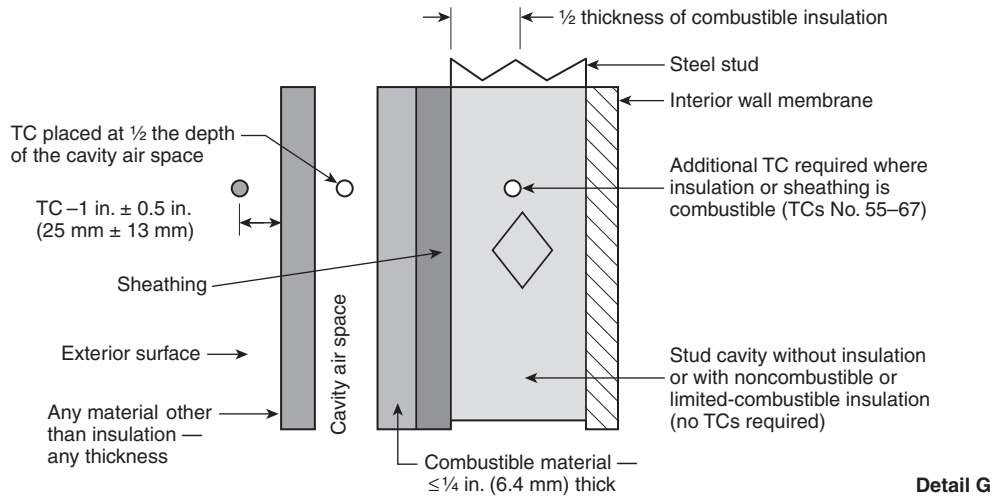


Detail E

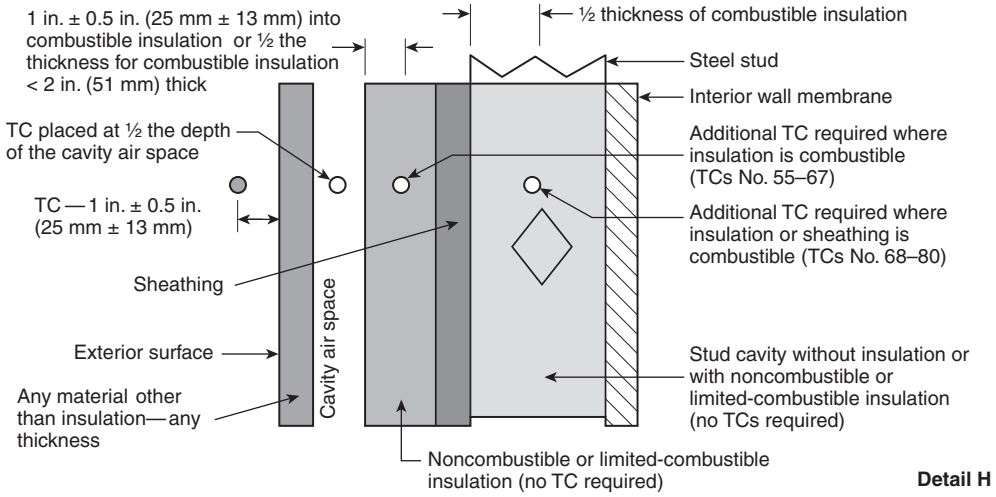


Detail F

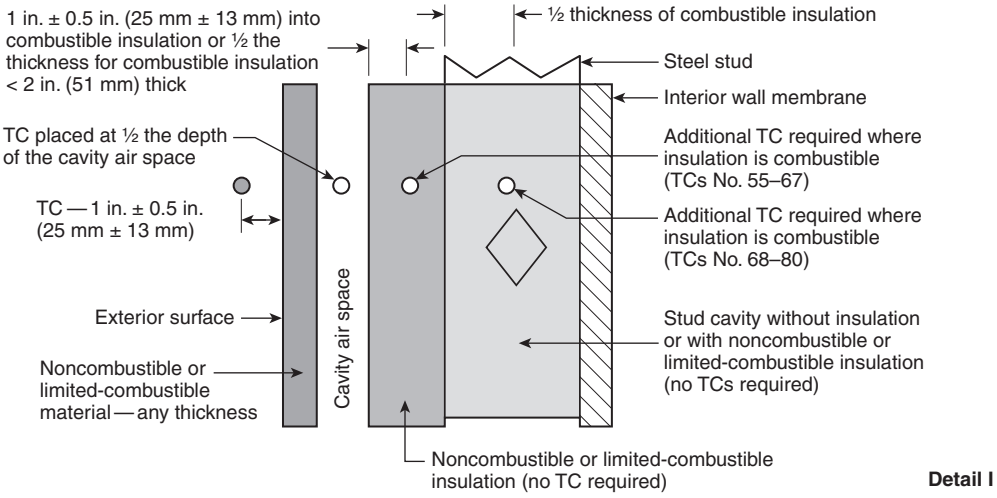
FIGURE 6.1(b) ***Continued***



Detail G

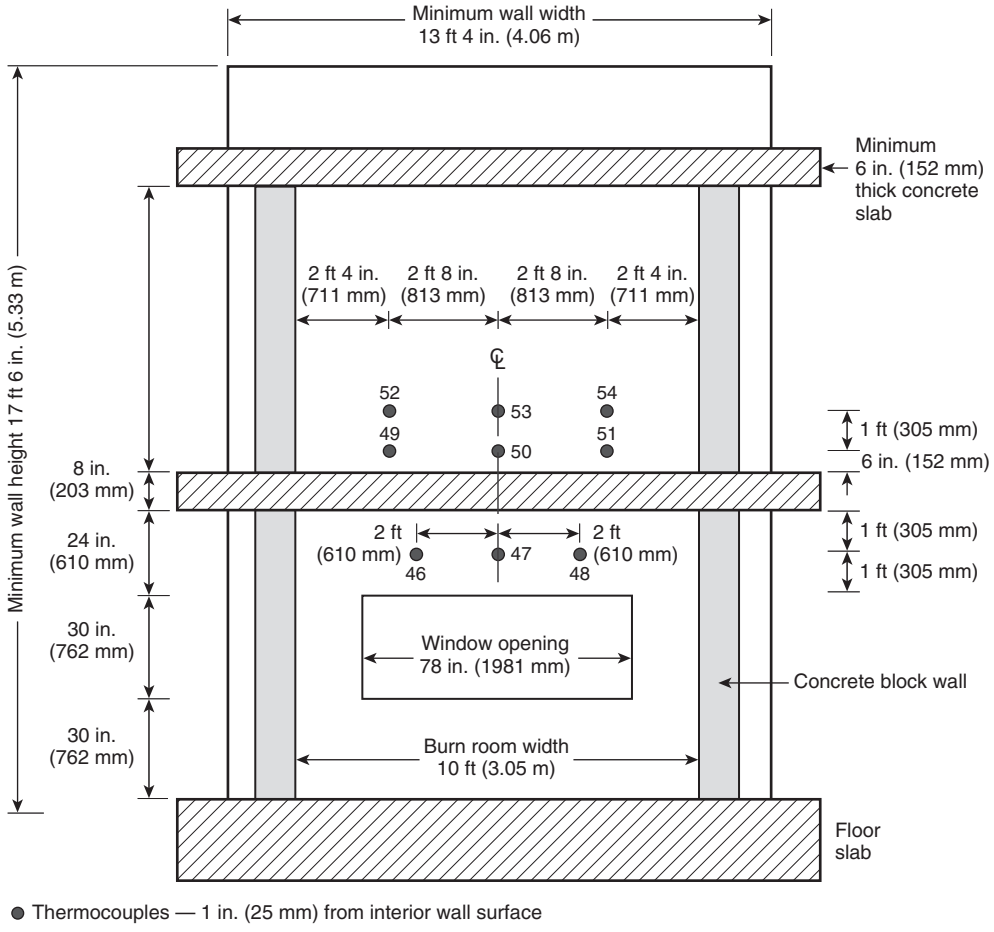


Detail H

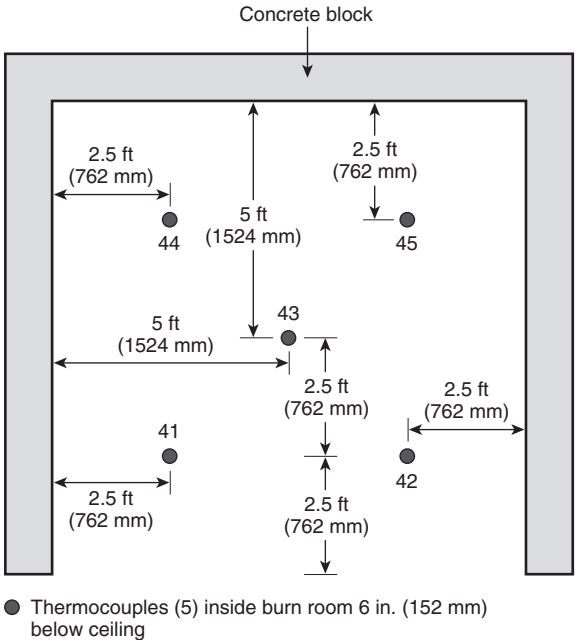


Detail I

FIGURE 6.1(b) ***Continued***



Δ FIGURE 6.1(c) Interior View of the Test Specimen. Instrumentation arrangement.



Δ FIGURE 6.1(d) Plan View — First-Story Test Room. Instrumentation arrangement.

Chapter 7 Calibration Procedure

7.1 Calibration Test Procedure. A calibration test shall be performed in accordance with this chapter to determine the gas flow rates of the gas burners to be used in the fire test procedure prescribed in Chapter 8.

7.1.1* The test specimen for the calibration test shall be constructed of two layers of nominal 5/8 in. (16 mm) thick Type X gypsum wallboard, conforming to ASTM C1396/C1396M, *Specification for Gypsum Board*, applied to both sides of nominal 18-gauge steel studs spaced 24 in. (610 mm) on center.

7.1.2 Joints shall be taped or caulked.

7.1.3 The test specimen shall have a height not less than 18 ft (5.5 m) above the floor surface of the test facility and shall have a width not less than 14 ft (4.3 m).

7.1.4 The perimeter of the window opening shall be completely covered with a layer of nominal 5/8 in. (16 mm) thick Type X gypsum wallboard.

7.1.5 A spandrel beam shall not be used.

7.1.6 Calibration instrumentation shall consist of not less than the following:

(1) Temperature measurements taken at the locations shown in Figure 7.1.6(a) and Figure 7.1.6(b) using nominal 20-gauge, Type K thermocouples, and those used to measure the temperatures at the locations shown in Figure 7.1.6(c) must be nominal 18-gauge, Type K thermocouples
(2) No fewer than three 0–5 W/cm^2 circular foil total heat flux gauges located as shown in Figure 7.1.6(a)
(3) Gas flow rate measurement equipment for each of the burners

7.1.7 Prior to the conduct of the calibration test, the paper facing of the gypsum wallboard on the exterior face of the calibration wall assembly shall be burned away by igniting both the room burner and the window burner and immediately adjusting the burners to their maximum flow rates as prescribed in Table 4.6.13 for not less than 5 minutes at these gas flow rates.

7.1.8 The calibration test shall be conducted with the gas burners supplied during the test according to the calibration gas flow rates prescribed in Table 4.6.13.

7.1.9 Each burner shall be flowing gas at its prescribed gas flow rate within 15 seconds of each prescribed change in the gas flow rate.

7.1.10 The initial calibration test shall be conducted with the window burner positioned such that the vertical centerline of the burner is flush with the exterior face of the wall assembly.

7.1.11* At the conclusion of the test, the data obtained shall be compared to the values specified in Table 7.1.11.

7.1.12 To prevent burner changes from affecting the data, the average values for each time period shall be determined using data from 15 seconds after the start of the period through 15 seconds before the end of the period.

Δ **7.1.13** The allowable values for the comparison to the specified average values in Table 7.1.11 shall be no lower than 10 percent below the degree F value and no higher than 20 percent above the degree F value shown in Table 7.1.11.

7.1.14 For the heat flux measurements, all the determined average values for the locations shown in Table 7.1.11 shall fall within the tolerances of those specified in Table 7.1.11.

7.1.15 The values for thermocouple nos. 1 and 8 through 14, as shown in Figure 7.1.6(a), shall be reported, but they shall not be used in the calibration determination.

7.1.16 If the actual test values are not within the allowable tolerances, then the calibration shall be repeated and the gas flows or window burner position adjusted until the determined values are within the allowable tolerances.

7.1.17 If it is demonstrated that the burners must follow different flow rates in order to attain the prescribed burn room and/or exterior temperatures and heat fluxes, then the flows derived from the calibration test shall be used.

7.1.18 If it is demonstrated that the window burner must be repositioned within 5 in. (127 mm) of the exterior face of the calibration wall to attain the prescribed exterior temperatures and heat fluxes, then the position derived from the calibration shall be used in all subsequent testing.

7.1.19 After the calibration test detailed in Chapter 7 has been successfully completed, the window burner shall be relocated to a minimum of 5 ft (1.52 m) away from the calibration test specimen, and the gas flow rate to the window burner used for the 5- to 10-minute calibration time period shall be reestablished and the burner ignited.

7.1.19.1 The average height of the fluctuating window burner flame shall be measured at the approximate midpoint of the burner slot and at points approximately 6 in. (153 mm) from each end of the burner slot.

7.1.19.2 The measurements shall be recorded.

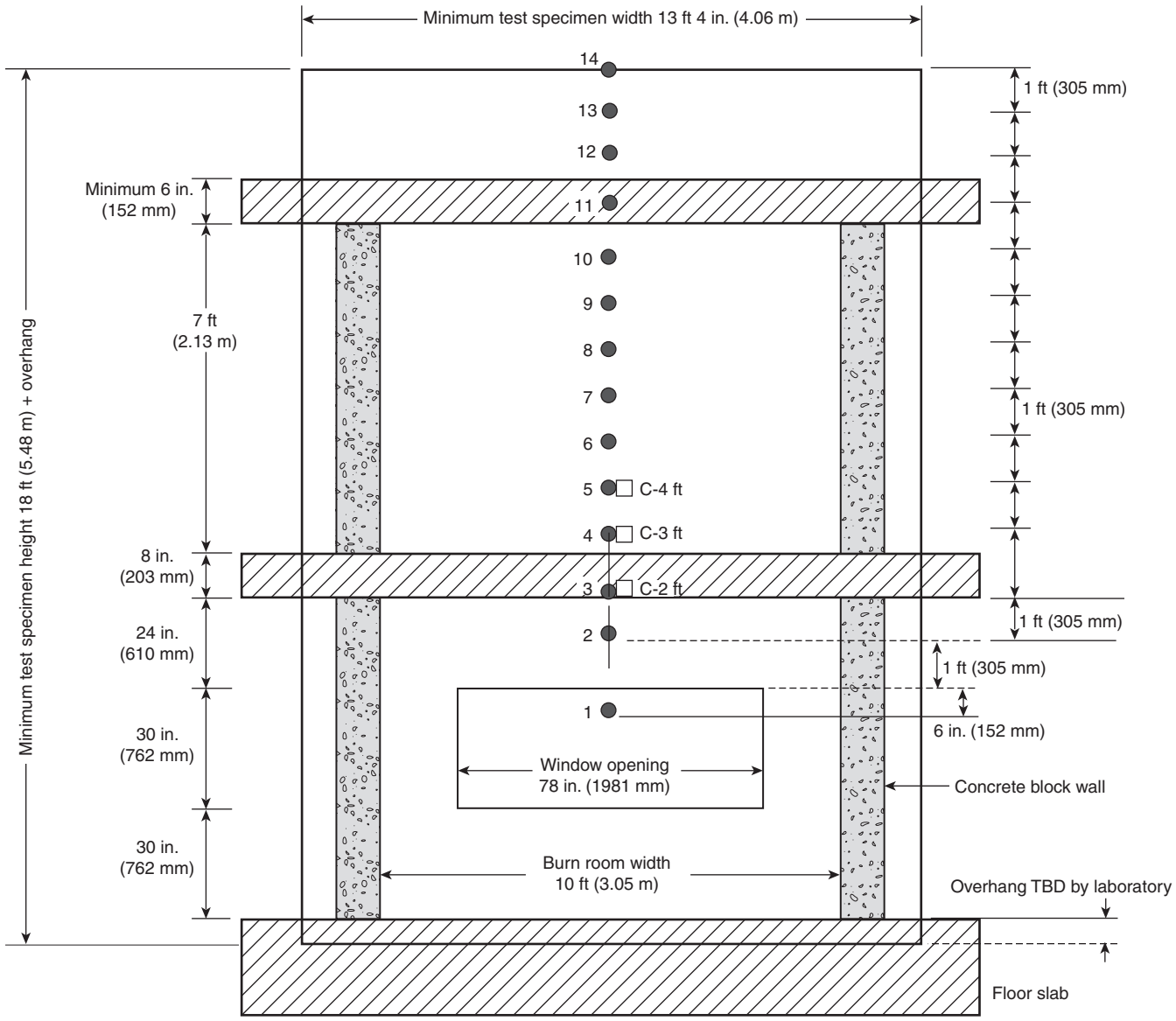
7.1.19.3 A video recording shall be made of the window burner flame during the 5- to 10-minute period for the purpose of using the video recording as a visual reference when the window burner is required by 7.1.20 to be recalibrated.

7.1.20 The window burner shall be recalibrated prior to the next test to be consistent with the flame height measurements and visual observations taken in 7.1.19 when any of the following occurs:

(1) The ceramic blanket covering the window burner is replaced.
(2) The burner output distribution has been adversely affected by the accumulation of burning or melting debris, causing a change in the flame geometry.
(3) The burner output distribution has been adversely affected by the impact of falling debris on the blanket, causing a change in the flame geometry.

7.1.20.1 The same flow rate as in the full-scale calibration test during the 5- to 10-minute time period shall be used.

7.1.20.2 The ceramic blanket shall be adjusted so that the flame heights at the three specified locations are measured to the same nominal height and look visually similar to that as measured and video recorded respectively in 7.1.19.



● Thermocouples — 1 in. (25 mm) from exterior wall surface

□ Calorimeters (C) in wall – flush with exterior wall surface

Figure not to scale

Δ FIGURE 7.1.6(a) Front View of Calibration Wall Assembly Superimposed over Test Apparatus. Calibration instrumentation locations (not to scale).

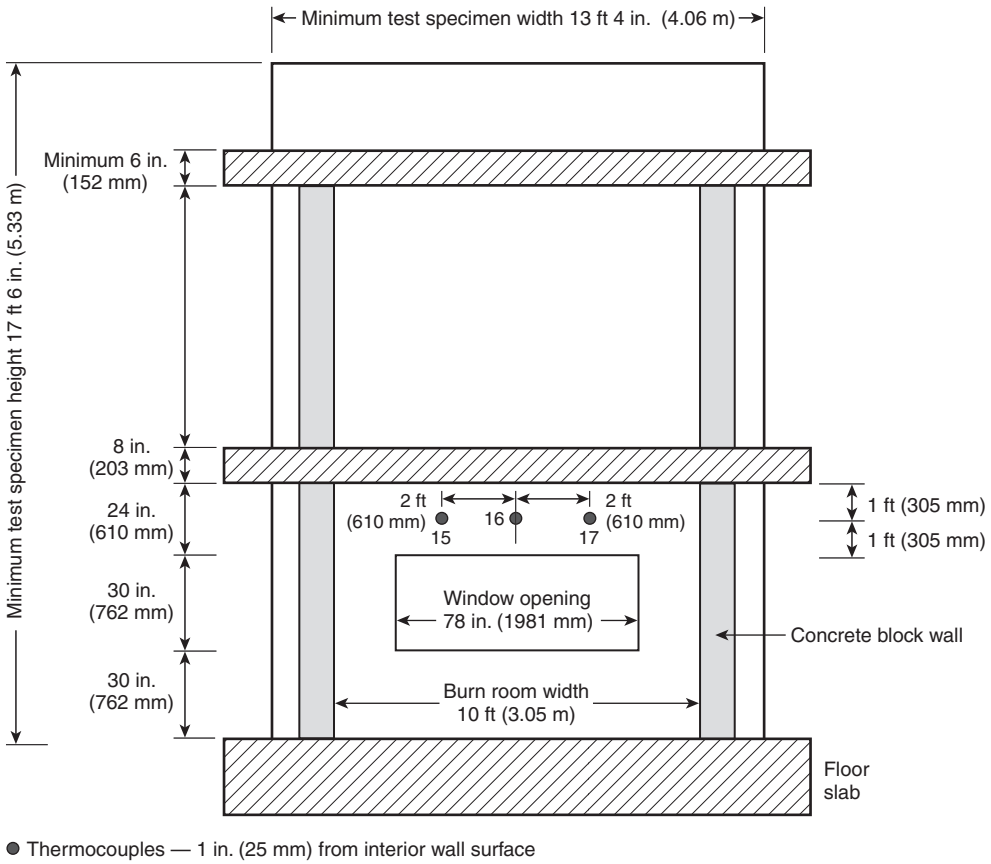


FIGURE 7.1.6(b) Interior View of the Calibration Wall Assembly. Thermocouple locations (not to scale).

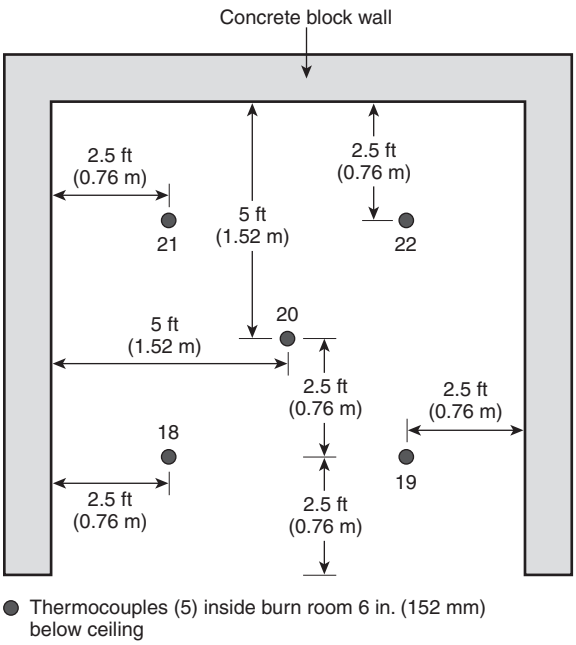


FIGURE 7.1.6(c) Plan View — First-Story Test Room. Thermocouple locations (not to scale).

Δ Table 7.1.11 Calibration Average Values for Time Periods Indicated

Thermocouple Location and Numbers	Temperature											
	0–5 min		5–10 min		10–15 min		15–20 min		20–25 min		25–30 min	
	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C
Test room ceiling: Nos. 18–22	1151	622	1346	730	1482	806	1600	871	1597	869	1648	898
Interior wall surface of test room: Nos. 15–17	1065	574	1298	703	1433	778	1578	859	1576	858	1655	902
1 ft (305 mm) above top of window opening: No. 2	602	317	870	466	952	511	992	533	1046	563	1078	581
2 ft (610 mm) above top of window opening: No. 3	679	359	1015	546	1121	605	1183	639	1245	674	1296	702
3 ft (914 mm) above top of window opening: No. 4	646	341	971	521	1096	591	1174	634	1245	674	1314	712
4 ft (1219 mm) above top of window opening: No. 5	577	302	858	459	982	528	1063	573	1135	613	1224	662
5 ft (1524 mm) above top of window opening: No. 6	521	272	765	407	875	469	949	509	1007	542	1106	597
6 ft (1829 mm) above top of window opening: No. 7	472	244	690	366	787	419	856	458	913	489	1010	543

Calorimeter Locations and Numbers	Heat Flux (W/cm²)					
	0–5 min	5–10 min	10–15 min	15–20 min	20–25 min	25–30 min
2 ft (610 mm) above top of window opening: Letter C–2ft	0.9 ± 0.2	1.9 ± 0.4	2.5 ± 0.5	2.9 ± 0.6	3.4 ± 0.7	3.8 ± 0.8
3 ft (914 mm) above top of window opening: Letter C–3ft	1.0 ± 0.2	2.0 ± 0.4	2.6 ± 0.5	3.2 ± 0.6	3.7 ± 0.7	4.0 ± 0.8
4 ft (1219 mm) above top of window opening: Letter C–4ft	0.8 ± 0.2	1.5 ± 0.3	2.0 ± 0.4	2.5 ± 0.5	3.0 ± 0.6	3.4 ± 0.7

7.2 Frequency of Calibration. Calibration shall be performed in the following circumstances:

(1) Initially, prior to the first wall assembly test
(2) When significant changes to the gas flow systems are made (e.g., flowmeters are new)
(3) Within 1 year prior to the test of an actual product wall assembly
(4) When the ceramic blankets covering more than 50 percent of the wall or ceiling surface in the burn room are replaced

Chapter 8 Fire Test Procedure

8.1* Fire Test Procedure.

8.1.1 The fire test procedure shall be in accordance with 8.1.2 through 8.1.13.

8.1.2 The thermocouples installed on the completed test specimen shall be checked to verify that they are operating correctly.

8.1.3 Prior to final positioning of the window burner, the window burner shall be fired and the resultant flame verified and adjusted as required. Verification of the flame shall consist of visual observation of a consistent flame height over the width of the burner.

8.1.4 The placement of the window burner shall be verified to be in accordance with 4.6.9 through 4.6.12 and 7.1.18.

8.1.5 Ambient conditions at the start of the fire test shall be as follows:

(1) The temperature of the air in the test facility shall be between 50°F and 90°F (10°C and 32°C).
(2) The relative humidity of the air in the test facility shall be between 20 percent and 80 percent.
(3) Airflow across the exterior face of the test specimen shall be less than 4.4 ft/sec (1.3 m/sec), as determined by an anemometer placed at a right angle to the exterior face and located within 3 ft (1 m) of the exterior face. The anemometer shall be of the hot wire or vane type and shall have an accuracy of 1 ft/min (305 mm/min).

8.1.6 The gas supply to the test room burner shall be turned on and the burner ignited.

8.1.7 The gas flow rates established in accordance with 4.6.13 through 4.6.14 and 7.1.17 shall be followed for test room burners and the window burner except as required in 8.1.8.

N **8.1.8** When it has been demonstrated during the calibration procedure that the burners must follow different gas flow rates to attain the prescribed test room and exterior face temperatures and heat fluxes, then the gas flows determined from the calibration tests within a tolerance of ±10 percent shall be used.

8.1.9 At 5 minutes ± 5 seconds after ignition of the test room burner, the gas supply to the window burner shall be turned on and the burner ignited.

8.1.10 At 30 minutes ± 5 seconds after ignition of the test room burner, the gas supply to both burners shall be shut off.

•

8.1.11 The access opening for the second-story test room shall remain open during the fire tests.

8.1.12 Any additional access openings in the second-story test room shall be closed during the fire test.

8.1.13 The window opening shall be the only opening permitted to be open in the first-story test room during the fire test.

Chapter 9 Data Collection and Observation

9.1 Duration.

9.1.1 Video recording and data collection shall be started not less than 1 minute prior to ignition of the test room burner.

9.1.2* Video recording, data collection, and visual observations shall be continued for the 30-minute test duration.

9.2 Data Recording. Measurements of the temperatures at the locations specified in Section 6.1 and the gas flows specified in 8.1.6 shall be recorded at intervals not to exceed 15 seconds.

9.3 Ambient Conditions. The ambient conditions specified in 8.1.4 shall be recorded at the start of the fire test.

9.4 Visual Observations.

N **9.4.1** Photographs or digital images shall be taken at the rate of not less than once every minute during the fire test.

9.4.2 Visual observation of the test specimen and its performance shall be recorded and documented as described by Section 9.4 and the following:

(1) Color photographs, digital images, or color video of the exterior face of the test specimen taken at the following times:
   (a) The end of the fire test
   (b) After the fire test
   (c) During the dissection of the test specimen post-fire-test period
   (d) After the dissection of the test specimen

(2)* Color video recording taken of the test specimen–floor intersection in the second-story test room during the fire test

(3) Color photographs or digital images taken of the interior face of the test specimen before and after the fire test

N **9.4.3** The color video and at least one photograph or digital image shall show the laboratory test report identification number and the test date.

Δ **9.4.4** The color video recordings shall include a clock or a timer.

9.4.5 The timer in 9.4.4 shall be integral to the video, unless a clock or timer that is clearly viewed throughout the fire test is used.

9.5 Determination of Extent and Depth of Damage. The test specimen shall be dismantled and dissected to determine the extent and the depth of damage within the combustible components and the condition of the test specimen's exterior wall panel facings.

Chapter 10 Conditions of Acceptance

10.1 Test Specimen. The performance of the test specimen shall be determined on the basis of visual observations both during and after the test in conjunction with the temperature data obtained during the fire test.

10.2 Performance Criteria. The test specimen shall be considered as passing the fire test when the performance criteria specified in 10.2.1 through 10.2.6 are met during the 30-minute fire exposure specified in Chapter 8.

10.2.1 Flame Propagation: Exterior Face of Test Specimen.

10.2.1.1 Flame propagation on the exterior face of the test specimen shall not occur either vertically or horizontally beyond the area of flame plume impingement by the window burner flames.

10.2.1.2 Flame propagation shall be determined to occur if any one of the following conditions is measured or observed:

(1) A temperature of 1000°F (538°C) is measured by any one of the thermocouples numbers 11 and 14 through 17, as shown in Figure 10.2.1.2.

(2) Flames emitting from the surface of the exterior face of the test specimen reach a height of 10 ft (3.05 m) or greater above the top of the window opening, as shown in Figure 10.2.1.2.

(3) Flames emitting from the surface of the exterior face of the test specimen reach a horizontal distance of 5 ft (1.52 m) or greater from the vertical centerline of the window opening, as shown in Figure 10.2.1.2.

10.2.2 Vertical Flame Propagation: Combustible Components and Insulation. Flame propagation shall not occur vertically through the combustible components or the combustible insulation installed within the test specimen, as determined in accordance with the following:

(1) For test specimens constructed of exterior wall panels greater than ¼ in. (6.4 mm) thick containing combustible components, temperatures in the combustible components shall not exceed 750°F (417°C) above their temperature as measured immediately after the start of the test by thermocouple nos. 28 and 31 through 40, as shown in Figure 6.1(a) and in Figure 6.1(b), Details A and B.

(2) For test specimens constructed of exterior wall panels containing combustible components and having a wall cavity with an air space as shown in Figure 6.1(a) and in Figure 6.1(b), Details C, E, F, and I, the following conditions shall be met:
   (a) Temperatures in the wall cavity air space shall not exceed 1000°F (538°C) as measured by thermocouples nos. 28 and 31 through 40.
   (b) Temperatures in the wall cavity and stud cavity insulation shall not exceed 750°F (417°C) above their temperature as measured immediately after the start of the fire test by thermocouples nos. 55 through 65 and 68 through 79, as applicable.

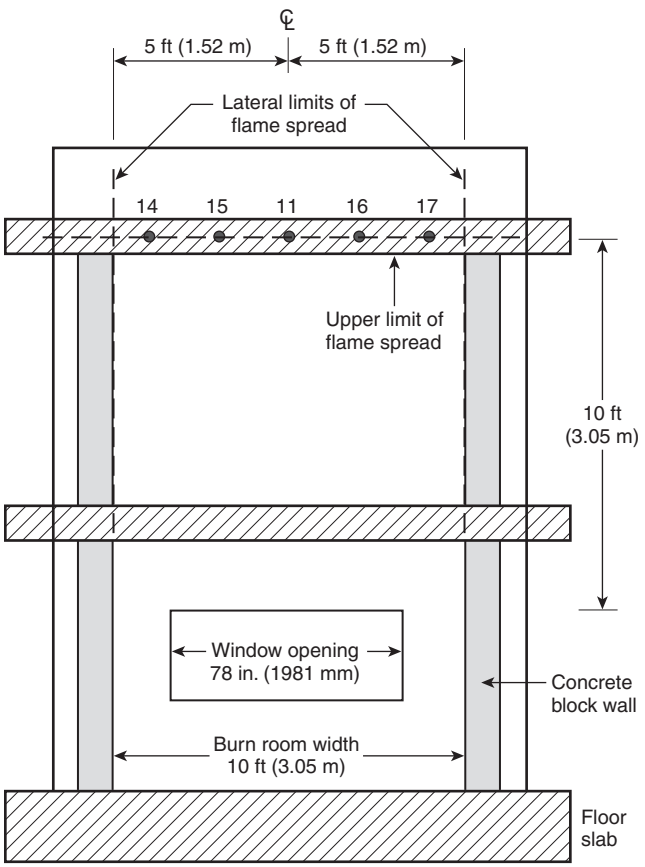


FIGURE 10.2.1.2 Limits of Flame Propagation — Exterior Surface of Test Specimen (not to scale).

(3) For test specimens constructed of exterior wall panels that are ¼ in. (6.4 mm) thick or less, containing combustible components and having a wall cavity without an air space, temperatures in the wall cavity and stud cavity insulation shall not exceed 750°F (417°C) above their temperature as measured immediately after the start of the fire test by thermocouples nos. 28, 31 through 40 and 55 through 65, as applicable, as shown in Figure 6.1(a) and in Figure 6.1(b), Detail D.

(4) For test specimens constructed of noncombustible or limited-combustible exterior wall panels and having a wall cavity with an air space as shown in Figure 6.1(a) and in Figure 6.1(b), Details G, H and I, the following conditions shall be met:

(a) Temperatures in the wall cavity air space shall not exceed 1000°F (538°C) as measured by thermocouples nos. 28 and 31 through 40.

(b) Temperatures in the wall cavity and stud cavity insulation shall not exceed 750°F (417°C) above their temperature as measured immediately after the start of the fire test by thermocouples nos. 55 through 65 and 68 through 78, as applicable.

10.2.3 Horizontal Flame Propagation: Combustible Components and Insulation.

Δ **10.2.3.1** Flame propagation shall not occur horizontally through the combustible components or the combustible insulation installed within the test specimen, as determined in accordance with the following:

(1) For test specimens constructed of exterior wall panels greater than ¼ in. (6.4 mm) thick containing combustible components, temperatures in the combustible components shall not exceed 750°F (417°C) above their temperature measured immediately after the start of the fire test by thermocouples nos. 18 and 19, as shown in Figure 6.1(a) and in Figure 6.1(b), Details A and B.

(2) For test specimens constructed of exterior wall panels containing combustible components and having a wall cavity with an air space as shown in Figure 6.1(a) and in Figure 6.1(b), Details C, E, F, and I, the following conditions shall be met:

(a) Temperatures in the wall cavity air space shall not exceed 1000°F (538°C) as measured by thermocouples nos. 18 and 19.

(b) Temperatures in the wall cavity and stud cavity insulation shall not exceed 750°F (417°C) above their temperature as measured immediately after the start of the fire test by thermocouples nos. 66, 67, 79, and 80, as applicable.

(3) For wall assemblies constructed of exterior wall panels that are ¼ in. (6.4 mm) thick or less containing combustible components and having a wall cavity without an air space, temperatures in the wall cavity and stud cavity insulation shall not exceed 750°F (417°C) above their temperature as measured immediately after the start of the test by thermocouples nos. 18, 19, 66, and 67, as applicable, as shown in Figure 6.1(a) and in Figure 6.1(b), Detail D.

(4) For test specimens constructed of noncombustible or limited-combustible exterior wall panels and having a wall cavity with an air space as shown in Figure 6.1(a) and in Figure 6.1(b), Details G, H and I, the following conditions shall be met:

(a) Temperatures in the wall cavity air space shall not exceed 1000°F (538°C) as measured by thermocouples nos. 18 and 19.

(b) Temperatures in the wall cavity and stud cavity insulation shall not exceed 750°F (417°C) above their temperature as measured immediately after the start of the fire test by thermocouples nos. 66, 67, 79, and 80, as applicable.

10.2.4 Temperatures in Second-Story Test Room. Temperatures measured 1 in. (25 mm) from the interior surface of the test specimen within the second-story test room shall not exceed 500°F (278°C) above the ambient air temperature of the test facility at the start of the fire test as measured by thermocouples nos. 49 through 54 as shown in Figure 6.1(c).

10.2.5 Flames in Second-Story Test Room. Flames shall not occur in the second-story test room.

10.2.6 Flame Propagation to Adjacent Horizontal Spaces. Flames shall not occur beyond the intersection of the test specimen and the side walls of the test apparatus.

Chapter 11 Report

11.1* Fire Test Report. A fire test report shall be prepared to document the fire test and shall contain all of the following:

(1)* Description of the test specimen wall assembly, including the following:
  (a) Drawings showing the structural design in plan and elevation, principal cross-section and other sections as needed for clarity, and joint locations and details
  (b) Drawings and description of the construction used in the test around the window opening header, jambs, and sills, including the type and thickness of the closure material around the perimeter of the opening; the fastening detail, including the type, size, and spacing of fasteners around the perimeter of the window opening; and the type, thickness, and density of any insulation or blocking used internal to the window opening closure
  (c) Details of the attachment of the wall assembly to the test apparatus
(2) Location of thermocouples
(3) The date and results (temperature and heat flux) of the most recent calibration
(4) Ambient conditions at the start of the fire test
(5) Temperatures of all thermocouples during the fire test
(6) Burner gas flow data obtained during the fire test, including type of gas used and total gas flow of both burners for the duration of the fire test
(7) Comparison of burner gas flow data obtained during the fire test to the burner gas flow data obtained during the latest calibration test
(8) Position of the vertical centerline of the window burner with respect to the exterior face of the wall assembly for the fire test and the latest calibration test
(9) Visual observations made during the fire test
(10) Photographs of the following:
  (a) Wall assembly — prior to fire test, exterior face
  (b) Wall assembly — fire test in progress, exterior face
  (c) Wall assembly — post-fire test, exterior face
  (d) Wall assembly — post-fire test, interior face, both stories
  (e) Wall cavity insulation in wall assembly — post-fire test
(11) Damage sketch(es) of the wall assembly
(12) Extent of residual burning that continues during the 10-minute period immediately after the gas flow to the gas burners has been shut off
(13) Visual observations of smoke accumulation inside the second-story test room during the fire test
(14) Performance of the wall assembly with respect to each of the applicable conditions of acceptance *(see Chapter 10)*

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

Δ **A.1.1** In the late 1970s, the use of foam plastic insulation and other combustible materials in exterior, non-load-bearing walls on noncombustible construction (typically Types I, II, III, and IV) was proposed. At that time, questions were raised concerning the vertical and horizontal spread of fire over the combustible faces or through the combustible cores of these types of exterior walls. In order to address these concerns, a full-scale fire test program was sponsored by the Society of Plastics Industry (SPI). The testing was conducted in 1980 at Southwest Research Institute. This program consisted of a series of full-scale fire tests that utilized an outdoor 26 ft tall two-story building. The test wall systems were erected on two adjoining sides of the building and in one wall; a window opening was placed in the lower floor wall area. A 1285 lb wood crib was placed in the lower floor, and when ignited this fire source produced an NFPA 251 (withdrawn and replaced by ASTM E119, *Standard Methods of Tests of Fire Resistance of Building Construction and Materials*) time-temperature fire exposure on the interior of the wall system. At approximately 5 minutes into the test, flames exited the window opening and simultaneously exposed the exterior face of the wall assembly. Temperature measurements and visual observations were made during the 30-minute test and after the test to evaluate the extent of flame propagation. The test series showed that for the wall panel systems evaluated, the extent of flame propagation both vertically and horizontally was limited (Beitel and Evans).

When the ICC *Uniform Building Code (UBC)* was modified to recognize this application, the full-scale fire test was also codified and was published in the 1988 edition of the *UBC* as Test Standard 17-6. When the 1994 edition of the *UBC* was reorganized, the test became UBC Test Standard 26-4.

In the early 1990s, SPI sponsored a test program that developed a reduced-scale version of the UBC 26-4 test. This test used an indoor, intermediate-scale, multistory test apparatus, a single wall with a window opening, and two gas-fired burners to produce the same exposure conditions as the UBC 26-4 test. A combination of temperature measurements and visual observations were used to determine the extent of vertical and horizontal flame propagation over the face of the wall systems or through the combustible core material. After development of the test apparatus, a series of tests were conducted that showed correlation between the new intermediate-scale test and the full-scale UBC 26-4 test. Testing was done with wall systems that both passed and failed in the UBC 26-4 test, with similar results being attained in the intermediate-scale test method (Beitel and Griffith).

This test was recognized by the *UBC* as an alternative to the UBC 26-4 test and was published as UBC Test Standard 26-9 in the 1997 edition of the *UBC*.

In 1998, NFPA adopted NFPA 285, which used as its basis the UBC 26-9 test. The NFPA 285 test is technically the same as the UBC 26-9 test, with the only differences between the test methods being formatting and editorial issues. The *International Building Code* and *NFPA 5000* reference NFPA 285 for assessment of fire performance of exterior walls.

Δ **A.1.1.1** The fire test method described is intended to evaluate the inclusion of combustible components within wall assemblies/panels of buildings.

The test apparatus described in this standard is commonly referred to as the intermediate-scale multistory apparatus (ISMA).

A.1.1.2 This standard addresses fire exposures from interior fires, including those that reach flashover, break exterior windows, and expose the building facade. It can also be used to

evaluate the effects of fire involving the exterior wall assembly. It is not intended to address the effect of exterior radiation from nearby fires but is relevant to fires that start at the exterior wall assembly.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.3.3 Exterior Wallcovering. Examples include but are not limited to veneers, siding, exterior insulation, and finish systems.

Δ **A.4.4.3** Figure A.4.4.3(a) through Figure A.4.4.3(c) show additional diagrams of the test structure.

A.4.6.3.6 In relation to Figure 4.6.3.6, Figure A.4.6.3.6 illustrates a side view of burner placement. The window burner is similar to the burner described in Section 5.1 and Figure 1 of ASTM E108, *Standard Test Methods for Fire Tests of Roof Coverings*.

A.4.6.13 The calibration flow rates shown in Table 4.6.13 are designed to achieve the temperatures shown in Table 7.1.11.

Δ **A.5.6.2.1** Figure A.4.4.3(b) and Figure A.4.4.3(c) provide an illustration of the spandrel beam.

A.5.7.1.2 The construction of the wall assembly should be typical of actual product use.

• *N* **A.5.7.1.3** As in ASTM E119, *Standard Methods of Tests of Fire Resistance of Building Construction and Materials*, substituting wood studs for tested steel studs or substituting steel studs for tested wood studs should not be done due to the difference in performance of these two stud materials in full-scale fire tests.

N **A.5.7.2.2.3(4)** An example of an assembly without continuous vertical joints is running bond patterns.

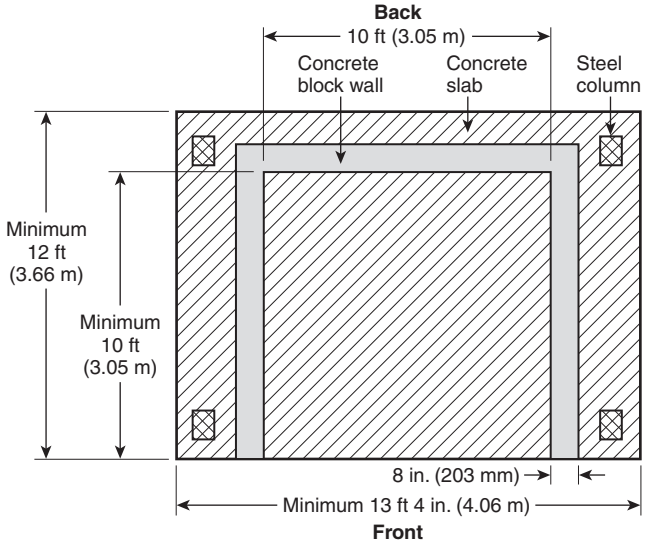


FIGURE A.4.4.3(a) Plan View of Test Apparatus — Both Stories (not to scale).

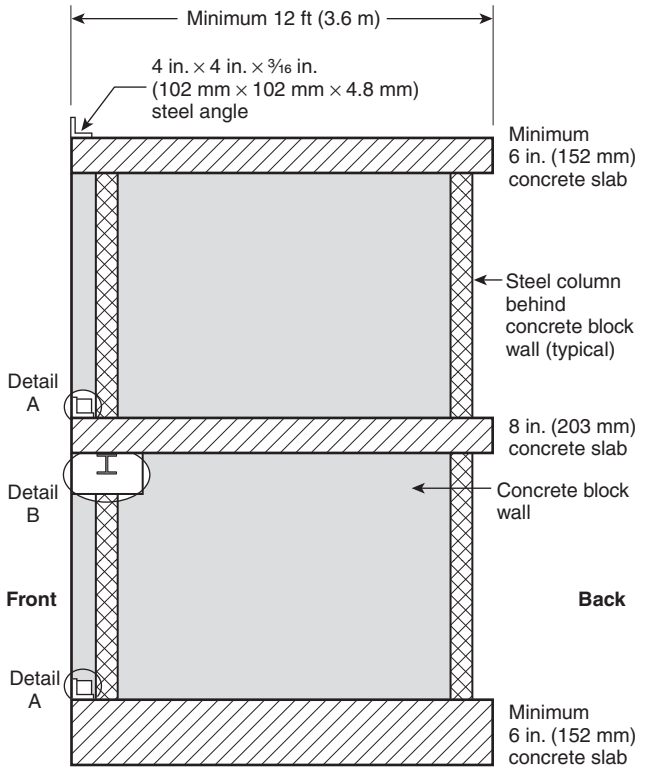


FIGURE A.4.4.3(b) Section View Through Test Apparatus (not to scale). For Details A and B, see Figure A.4.4.3(c).