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FIRE DOORS AND WINDOWS 1975

NATIONAL FIRE PROTECTION ASSOCIATION
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Standard for
Fire Doors and Windows

NFPA 80 — 1975

Origin and Development of NFPA 80

The Standard for the Protection of Openings in Walls and Partitions can be traced to the early days of the Association. Reports covering various phases of the problems of protectives for openings were submitted to the Association by several committees concerned and adopted in 1897, 1898, 1899, 1900, 1901, 1902 and 1908. In 1911 a standard on Door Openings was presented and adopted, and Rules for Fire Protection Coverings for Openings in Walls and Partitions on the Interior Buildings were adopted in 1912. In 1915 the existing rules were recodified and rearranged. A new name, the Committee on Protection of Openings in Walls and Partitions, was chosen in 1916. Revisions recommended by the Committee were adopted by the NFPA in 1916, 1917, 1918, 1926, 1927, 1928, 1931, 1937 and 1941.

In 1955 the name of the Committee was changed to the Committee on Fire Doors and Windows. In 1959 a complete revision of the 1941 edition was adopted including a change in name to correspond with the name of the committee. The 1959 edition was revised in 1961, 1962, 1965, 1966, 1967, 1968, and 1970. Complete revisions were also made in 1973 and 1974.

This 1975 edition of NFPA 80 was officially adopted at the 1975 NFPA Fall Meeting in Pittsburgh, PA on November 18, 1975. This edition represents a complete editorial revision. Substantive changes to the text are indicated by vertical lines in the margins.

Interpretation Procedure

Those desiring an interpretation shall supply the Chairman with five identical copies of a statement in which shall appear specific reference to a single problem, paragraph, or section. Such a statement shall be on the business stationery of the inquirer and shall be duly signed.

When applications involve actual field situations they shall so state and all parties involved shall be named.

The Interpretations Committee will reserve the prerogative to refuse consideration of any application that refers specifically to proprietary items of equipment or devices. Generally inquiries should be confined to interpretation of the literal text or the intent thereof.

Requests for interpretations should be addressed to the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

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Introduction

0-1 Each class of device (doors, shutters, windows, etc.) has certain advantages and limitations and the importance of each of these characteristics must be considered for the specific opening under consideration. A device cannot be expected to perform properly except for the condition for which it was designed. Prospective users should first ascertain from the authority having jurisdiction which type device or material, if any, will be accepted in the location proposed and should make contract subject to the approval of the authority having jurisdiction.

0-2 Fire door assemblies for the protection of openings depend on the use of labeled fire doors and frames, listed or labeled latching devices, listed swinging and sliding hardware and closing devices having the required fire protection ratings, which will close or be closed at the time of fire. The effectiveness of the entire assembly as a fire barrier may be destroyed if any component is omitted or one of substandard quality is used.

0-3 Where fire doors also serve as exit doors, the *Life Safety Code (NFPA 101, see Appendix D)* specifies that they must swing with the exit travel except for doors on individual small rooms which may swing in, and that on horizontal exits, where fire doors are required on both sides of the wall, one may be an automatic horizontally sliding door normally open and the other a self-closing door swinging with the exit travel, normally closed. This excludes the following types of doors from use on exits: rolling steel doors or shutters, vertical sliding doors, jackknife doors.

0-4 Labeled fire exit devices which meet the requirements for safety to life and for fire protection are available for use on labeled fire doors. Fire doors for use with this hardware bear the marking *"Fire Door to be Equipped with Fire Exit Hardware"* on the label.

0-5 Reference is directed to *Recommended Practice for Protection of Buildings from Exterior Fire Exposures (NFPA 80A-1970, see Appendix D)* for detailed guidance in determination of fire exposure severity and corresponding degree of protection of opening which may be warranted.

0-6 Exit doors should normally be closed. Fusible link or similar door closing arrangements are of limited value for exit purposes because quantities of smoke may pass through the door opening before there is sufficient heat to fuse the link.

0-7 Doors of small to moderate size are more suitable for exit purposes than very large doors, owing to the relative ease of operation of the smaller doors.

0-8 Horizontally sliding doors are open to the objection, for exit purposes, of difficulty in reopening once closed in case of fire.

0-9 Doors swinging in pairs can be arranged satisfactorily for exit purposes, but single doors are preferable. Two single doors installed in a frame with a mullion can be arranged to provide satisfactory exit facilities.

0-10 Structural requirements specified in this Standard generally refer to materials and assemblies which, through field experience, have been found acceptable for such application. Walls and lintels, providing they are of fire rated construction, should provide the support required for the type of door to be installed. Materials and structural designs other than those specifically covered herein may be employed if judged equivalent by the authority having jurisdiction.

0-11 Despite the provision of protection specified in this Standard, walls with openings have a lesser fire resistance than unpierced walls. Fire doors, shutters, and fire windows are designed to protect the opening under normal conditions of use, with a clear space on both sides of the opening. When the opening is not used and combustible material is piled against the door, window, or shutter, the designed protection cannot be expected. For this reason combustible material should be kept well away from openings. When a door or window opening is no longer to be used, the opening should be closed with construction equivalent to that of the wall.

0-12 Any assembly provided in accordance with the provisions of this Standard does not necessarily provide the same degree of protection against the spread of fire that is provided by the wall in which the assembly is installed assuming that the wall has fire resistance established in accordance with *Standard Methods of Fire Tests of Building Construction and Materials (NFPA 251-1972, see Appendix D).* Therefore the size and number of openings in any wall required to have fire resistance should be held to the minimum necessary to the normal or to emergency operation of the occupancy. The use of assemblies covered in this Standard only for decorative, aesthetic and similar purposes in fire-resistive walls is not recommended.

0-13 Fire doors, shutters, or fire windows are of value only if properly maintained so that they will close or be closed at the time of fire. Periodic inspection of doors, shutters, and fire windows, with immediate attention to any necessary repairs and correction of any defects that may interfere with operation, is a very important responsibility of the management of the property. *(See Chapter 14.)*

Standard for

Fire Doors and Windows

NFPA 80 — 1975

Chapter 1 General

1-1 Scope.

1-1.1 This Standard shall cover the use, installation, and maintenance of fire door assemblies, windows, glass blocks and shutters for the protection of openings in walls to restrict the spread of fire and smoke within buildings whether from interior fire or from external fire, including arrangements for automatic operation in case of fire. It is not intended to establish the degree of protection required or to constitute the approval of any product.

1-1.2 Incinerator doors, record room doors, and vault doors are *not* covered in this Standard. For their installation, see *Standard on Incinerators and Rubbish Handling (NFPA 82-1972, see Appendix D); Standard for the Protection of Records (NFPA 232-1970, see Appendix D);* and *Standard for Fur Storage, Fumigation and Cleaning (NFPA 81-1969, see Appendix D).*

1-1.3 For standards on the installation of hoistway doors for elevators and dumbwaiters, see Section 110 of *Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks (ANSI A17.1-1971, see Appendix D).*

1-2 New Developments.

1-2.1 This Standard shall not act as an obstruction to the development of new, modified or improved devices which meet the intent of these requirements. It shall be the responsibility of the manufacturer to furnish the necessary information to effect the updating of the requirements pertaining to such new and improved devices.[1]

[1] The development of fire doors and related devices is a continuous process, therefore this Standard cannot be up to date at all times. This Standard is intended to be current only to the date of publication.

1-2.2 For devices not described in this Standard, the authority having jurisdiction shall request from manufacturers descriptive information provided by a nationally recognized testing laboratory concerning acceptable methods for satisfactory field installation, based on fire tests and engineering studies for operation and maintenance considerations, where applicable.

1-3 General Limitations.[1]

1-3.1 Fire doors equipped with automatic louvers or special closures for conveying systems shall be used only for protecting openings in required enclosures, where the opening is not in an exit or otherwise located so that products of combustion flowing through the opening could jeopardize the use of exits prior to operation of the louver.

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[1] Openings are classified in accordance with the character and location of the wall in which they are situated. In each of the following classes, the minimum fire protection ratings are shown; however, doors, shutters, or windows having higher fire protection ratings are acceptable.

Fire protection ratings for products meeting this Standard shall be as determined and reported by a nationally recognized testing agency in accordance with *Standard Methods of Fire Tests of Door Assemblies (NFPA 252-1972, see Appendix D)* or *Standard for Fire Tests of Window Assemblies (NFPA 257-1970, see Appendix D)*.

Three-hour fire doors (A) are for use in openings in walls separating buildings or dividing a single building into fire areas.

One- and one-half hour fire doors (B) and (D) are for use in openings in two-hour enclosures of vertical communication through buildings (stairs, elevators, etc.) or in exterior walls which are subject to severe fire exposure from outside of the building. One and one-half hour fire doors (B) are also for use in two-hour fire rated partitions providing horizontal fire separation. One-hour fire doors (B) are for use in openings in one-hour enclosures of vertical communication through buildings (stairs, elevators, etc.).

Three-quarter-hour fire doors (C) and (E) are for use in openings in corridor and room partitions or in exterior walls which are subject to moderate fire exposure from outside of the building.

Three-quarter-hour fire windows are for use in openings in corridor or room partitions or in exterior walls.

One-half-hour (30-minute) and one-third-hour (20-minute) fire doors are for use where smoke control is a primary consideration and are for the protection of openings in partitions between a habitable room and a corridor when the wall is constructed to have a fire-resitance rating of not more than one hour or across corridors where a smoke partition is required.

Where fire doors are used in stairway enclosures, such doors should be constructed so that the maximum transmitted temperature end point should not exceed 450°F above ambient at the end of 30 minutes of the Standard Fire Exposure Test. These doors should be rated for use in 1- or 1½-hour (B) locations.

1-3.2 Sliding doors shall not be used on access openings to exit stairways, fire escapes or exit ramps, nor on exits to the exterior of the building.[1]

1-4 Definitions.

1-4.1 Access Door. An access door is a fire-protective door assembly of smaller size than conventional doors and used to provide access to utility shafts, chases, manways, plumbing, equipment, doors to service equipment for elevators and dumbwaiters, or as a scuttle hole to gain entry into an attic or space above a ceiling.

1-4.2 Approved. "Approved" shall be as defined on the inside front cover of this document, under Official NFPA Definitions.

1-4.3 Automatic-Closing Door. Automatic closing doors are those which are normally open, but will close at the time of fire.

1-4.4 Automatic Fire Detectors. Automatic fire detectors are either individual devices or prescribed combinations of devices designed to detect flame, heat, smoke, or combustion gases resulting from fire.

1-4.5 Coordinator. A coordinator is a device used on a pair of swinging doors that causes the inactive leaf to close before the active leaf closes.

1-4.6 Detectors. *See Automatic Fire Detectors. 1-4.4.*

1-4.7 Door, Access. *See Access Door, 1-4.1.*

1-4.8 Door, Automatic Closing. *See Automatic-Closing Door, 1-4.3.*

1-4.9 Door Closer. A door closer is a labeled device applied to the door or frame to cause a door to close by mechanical force. The closing speed may be regulated by this device.

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[1] For further details, including prohibition of locking of exit doors from the inside, see *Life Safety Code (NFPA 101-1973, see Appendix D).*

1-4.10 Door Holder/Release Device. A door holder/release device is a labeled, fail-safe device, controlled by a detection device, used on automatic closing doors to release the door at the time of fire causing it to close.

1-4.11 Door, Power-Operated. *See Power-Operated Fire Door, 1-4.23.*

1-4.12 Door, Self-Closing. *See Self-Closing Door, 1-4.25.*

1-4.13 Door, Service Counter. *See Service Counter Door, 1-4.26.*

1-4.14 Fire Door Hardware. Fire door hardware is applied to both swinging and sliding doors and consists of the items referred to in Tables 3-8A, 3-8B, 3-8C, and 4-5A. *(See also Figures 29, 31, 34, 37, and 41 through 45 in Appendix A.)*

1-4.15 Fire Exit Hardware. Fire exit hardware consists of exit devices which have been labeled both for fire and panic protection. *(Fire exit hardware is illustrated in Figures 24 and 25, Appendix A.)*

1-4.16 Fire Shutter. A fire shutter is a labeled door assembly that is used for the protection of a window opening in an exterior wall.

1-4.17 Frame, Window. A window frame is the stationary part of a sash, not including the ventilator.

1-4.18 Heat-Actuated Device. Heat actuated devices include fixed temperature releases, rate-of-temperature-rise releases, and door closers with hold-open arms embodying a fusible link.

1-4.19 Labeled. "Labeled" shall be as defined on the inside front cover of this document, under Official NFPA Definitions. *(Used interchangeably with "listed" in this standard.)*

1-4.20 Listed. "Listed" shall be as defined on the inside front cover of this document, under Official NFPA Definitions. *(Used interchangeably with "labeled" in this standard.)*

1-4.21 Mullion, Window. A mullion is the vertical or horizontal member in a window, between the sash.

1-4.22 Muntin, Window. A muntin is a tee-shaped bar in a frame or ventilator, dividing the glass.

1-4.23 Noncombustible. See NFPA 220-1975, Types of Building Construction.

1-4.24 Power-Operated Fire Door. A power-operated fire door is one which normally opens and closes by power.

1-4.25 Sash, Window. A sash is an integral arrangement of a steel frame, whose purpose is to hold glass in place in a window. If the glass is stationary, the sash includes the frame, vertical muntins, and horizontal muntins. If the sash is arranged to open, the sash includes the frame and ventilator and all parts attached, except mullions.

1-4.26 Self-Closing Door. A self-closing door is one which, when opened, will return to the closed position.

1-4.27 Service Counter Door. A service counter door is a labeled fire door assembly used for the protection of openings in walls where the primary purpose of the opening is for nonpedestrian use, such as counter service for food, pharmaceutical dispensary, package and baggage transfer, or observation ports.

1-4.28 Shutter, Fire. *See Fire Shutter, 1-4.16.*

1-4.29 Smoke Detector. A smoke detector is a device which senses visible or invisible particles of combustion.

1-4.30 Spring Hinge. A spring hinge is a hinge with a built-in spring which is used to close the door.

1-4.31 Ventilator, Window. A ventilator is that part of a sash that opens.

1-5. Listed and Labeled Products. *(See Definitions, 1-4.)*

1-5.1 Listed items shall be identified by a label, a listing, or a classification mark.[1]

1-5.2 The label, the listing, or the classification mark, shall be considered as evidence that samplings of such devices or materials have been evaluated by test and that these devices or materials are produced under an in-plant follow-up program.

1-5.3 Specification of items of a generic nature, such as hinges, that are not labeled shall comply with the specifications contained herein.

[1] Labels or classification marks may be metal, paper, stamped, or diecast.

1-6 Classifications and Types of Doors.

1-6.1 Only labeled or listed doors shall be used.[1]

1-6.2 The label on doors covers only the design and construction of the door.

Exception No. 1: On fire doors bearing the "Fire Door To Be Equipped with Fire Exit Hardware" label, the label shall cover the reinforcements or construction features necessary for the exit devices which shall bear the "Fire Exit Hardware" label.

Exception No. :2 On doors bearing the "Fire Door" label, the label shall include:

(a) On counterbalanced freight elevator doors — the guides, latching, and counterbalancing mechanisms.

(b) On rolling steel doors — wall guides, counterbalancing, and automatic mechanisms.

(c) On steel sectional (overhead) doors — hinged steel panels, wall guides, interlock at top edge, vertical and horizontal tracks, roller wheels, counterbalancing, automatic closing mechanisms, and governors.

(d) On elevator doors, see 7-3.

Exception No. 3: On doors bearing the "Frame and Fire Door" assembly label, the label also shall include:

(a) On access doors — the frame, hinging, and latching mechanism.

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[1] Doors are of several classifications, types, and methods of operation. Fire door assemblies consist of individually labeled components which are essential to satisfactory performance of the complete assembly. Some labels cover one or more components in addition to the door. *(For specific information, see 1-6.2)*

The fire protection ratings of 3, 1½, 1, ¾, ½, or ⅓ hours indicate the duration of the test exposure, and the letters A, B, C, D, or E appearing on the label following the hourly rating indicate the classification of the wall opening for which the door is designed. Labels provide evidence that the size of the door and the exposed glass area are acceptable under this Standard.

When the temperature rise is shown on the label, it indicates the temperature developed on the unexposed face of the door at the end of 30 minutes of exposure to the Standard Fire Test. Labels may indicate that maximum transmitted temperatures are 250°F, 450°F, or 650°F. If the temperature rise is not indicated, the rise for the door is in excess of 650°F. The temperature rise with glass vision panels of 100 sq. in. or less per door leaf is the same as for similar doors without glass lights. The temperature rise for all doors with glass lights exceeding 100 sq. in. or for doors provided with louvers is in excess of 650°F.

(b) On acoustical doors — the frame, sill, and latching mechanism.

(c) On chute doors — the frame, hinging, latching, and closing mechanism.

(d) On dumbwaiter doors, see 7-3.4.

(e) On service counter doors — frames, sills, wall guides, counterbalancing, and automatic closing mechanisms.

(f) On material conveying systems — the frame, sill guides, and automatic closing systems (refer to Appendix C for guidelines).

1-6.3 Authorities having jurisdiction shall be consulted as to the size of oversize doors which may be deemed acceptable in a given location.[1]

1-7 Glass.

1-7.1 Only labeled wired glass, not less than ¼-inch thick, labeled for fire protection rating and installed in approved steel frames, shall be used. The glass shall be well imbedded in putty, and all exposed joints between the metal and glass shall be struck and pointed.

1-7.2 No glass shall be used in doors for 3-hour (A) or 1½-hour (D) severe exterior locations.

1-7.3 Wired glass shall be permitted in each door of a pair of doors or in a single door for 1- or 1½-hour enclosures of vertical communications, (B) openings when the exposed glass area does not exceed 100 sq. in. per individual leaf.

1-7.4 Wired glass shall be permitted in ¾-hour doors in corridor or room partitions (C) openings or moderate exposure exterior (E) openings when the glass for individual exposed areas (per light) does not exceed 1,296 sq. in. with neither dimension exceeding 54 in.

1-7.5 Wired glass shall be permitted in ½-hour and ⅓-hour doors, when so tested.

[1] Testing laboratories may provide a label or certificate of inspection for doors larger than the maximum sizes indicated in Appendix B. Doors exceeding those size limitations have not been subjected to the Standard Fire Test. In certain cases the testing laboratory may be prepared to furnish a label or certificate of inspection for such oversize doors. They do not indicate that the doors are capable of furnishing standard fire protection, but only that they conform to the requirements of design, materials, and construction as established by the individual listings.

1-7.6 Devices used to view through fire doors rated at 1½ hours or less shall be labeled.

1-8 Types of Door Construction.

1-8.1 Composite Doors. Composite fire doors consist of wood, steel, or plastic sheets bonded to and supported by a solid core material.

1-8.2 Hollow-Metal Doors. Hollow-metal fire doors are of flush or panel design with not less than 20 gage steel faces. Flush door designs include steel stiffeners or honeycomb core material to support the faces. The voids between stiffeners may be filled with insulating material. Panel door designs are of stile and rail construction with insulated panels.

1-8.3 Metal-Clad (Kalamein) Doors. Metal-clad fire doors are swinging type only and are of flush or panel design consisting of metal covered wood cores or stiles and rails and insulated panels covered with steel of 24 gage or lighter.

1-8.4 Sheet-Metal Doors. Sheet-metal fire doors are formed of 22 gage or lighter steel and are of corrugated, flush sheet, or panel design.

1-8.5 Rolling Steel Doors. Rolling steel fire doors consist of steel or stainless steel interlocking slats to form a curtain of not less than 22 gage attached to an overhead barrel mounted on brackets for attachment to walls. The complete assembly includes the operating counter-balance enclosed in the barrel, automatic closing mechanism, the door guides, metal hood enclosure, and flame baffle.

1-8.6 Tinclad Doors. Tinclad fire doors are of two- or three-ply wooden core construction, covered with 30 gage galvanized steel or terne plate (maximum size 14 in. by 20 in.) or 24 gage galvanized steel sheets not more than 48 in. wide. Face sheets shall be vented.

1-8.7 Curtain Type Doors. Curtain type doors consist of interlocking steel blades or a continuous formed spring steel curtain installed in a steel frame.

1-9. Classification of Hardware for Fire Doors.

1-9.1 Hardware required for the installation of all types of fire doors appears in this Standard as:

(a) Described in those sections covering installation.

(b) Listed in Tables 2-8A, 2-8B, 3-8A, 3-8B, 3-8C and 4-5A.

(See illustrations of typical applications in Appendix A).

1-9.2 Hardware for fire doors shall be referred to as "Builders Hardware" and "Fire Door Hardware". Within the category of "Builders Hardware" is "Fire Exit Hardware".

1-9.3 In this Standard, builders hardware is applied only to swinging doors and consists of the items referred to in Tables 2-8A and 2-8B *(see illustrations in Figures 20 through 28, Appendix A)*. These include hinges (full mortise, half mortise, half surface, full surface, olive knuckle, paumelle or spring); single, two, or three point locks and latches; top and bottom bolts (flush, surface, or concealed); and door closers. This type of hardware is not usually shipped from the factory with the fire doors.

Fire exit hardware consists of exit devices which have been labeled both for fire and panic protection. *(See fire exit hardware as illustrated in Figures 24 and 25, Appendix A.)*

1-9.4 Fire door hardware is applied to both swinging and sliding doors and consists of the items referred to in Tables 3-8A, 3-8B, 3-8C, 4-5A. *(See illustrations in Figures 29, 31, 34, 37, and 41-45, Appendix A.)* Fire door hardware that is applied to swinging doors consists of surface-mounted strap hinges, surface applied latches and closing devices. In this Standard all hardware for sliding doors is fire door hardware. This type of hardware is normally shipped from the factory with the fire doors.

1-10 Classification of Steel Door Frames.

1-10.1 Single Unit Type (Pressed Steel). These frames consist of head and jamb members with or without solid or glazed transom panels, glazed side lights, solid side panels, transom bars, and/or mullions. These frames may consist of one or more units which may be factory or field assembled. They may be designed for erection before or after walls are built.

1-10.2 Two Section Type. Frames of this type shall consist of a rough buck either pressed steel or steel channels designed to be erected before masonry walls are built or may be installed in finished masonry wall openings. Finish head and jamb members are secured to rough bucks.

1-10.3 Single Unit Type (Steel Channel). Frames of this type shall consist of head and jamb members of structural steel channels, either shop or field assembled, to be erected before masonry walls are built. The design and construction shall meet the requirements of 2-5.1.

Chapter 2

Use and Installation of Swinging Doors with Builders Hardware

2-1 Doors. Swinging composite, hollow metal, flush sheet metal, and metal-clad (Kalamein) doors shall be flush-mounted in steel frames with builders hardware.

2-2 Sills.

2-2.1 In buildings with noncombustible floors, special sill construction shall not be required, if the floor structure is extended through the door opening.

2-2.2 In buildings with combustible floors, special sill construction shall be required if the floor structure is extended through the door opening, as combustible floor construction shall not extend through the door opening.

2-2.3 Sills shall be constructed of noncombustible materials. For frames having a jamb depth of 4 inches or less, the sill width shall be equal to the jamb depth. When frames have a greater jamb depth, the sills shall have a minimum width of 4 inches and shall be installed so that the sill extends from the face of the frame on the door side into the frame. *(See Figure 2, Appendix A.)*

2-2.4 Flush concrete sills shall extend to the wall opening on both sides.

2-2.5 Raised noncombustible sills or thresholds shall be acceptable whenever combustible floor coverings are contemplated or are in use on one or both sides of the door openings. *(See Figure 2, Appendix A).*

2-2.6 Combustible floor covering shall not be permitted to extend through door openings.

2-3 Wall Openings. Wall openings shall be constructed to readily accept the fire door frame and shall be designed so that no structural load is carried by the fire door frame except when frames are of structural steel. Frames shall be securely anchored to the wall construction. *(See Figure 29, Appendix A.)*

2-4 Lintels. Separate reinforcing units shall be provided for pressed steel door frames when necessary to support overhead wall loads over door openings. Reinforcements of head members of pressed steel door frames shall not be permitted. *(See Figures 5-8, Appendix A.)*

2-5 Frames.

2-5.1 Only labeled steel door frames shall be used.

2-5.2 Methods of anchoring shall be as shown in the listing or as provided in *Safety Standard For Fire Door Frames, (UL 63 or ANSI A155.1-1970, See Appendix D.)*

2-5.3 Wood or plastic-faced composite doors shall be installed in pressed steel frames of the single unit type. Steel-faced composite, hollow metal, metal-clad (Kalamein), and flush sheet metal doors shall be installed in pressed steel or steel channel frames.

2-5.4 The clearance between the door and the frame and between meeting edges of doors swinging in pairs shall not exceed 1/8 inch. The clearance between the bottom of the door and a raised noncombustible sill shall not exceed 3/8 inch. Where there is no sill, the maximum clearance between the bottom of the door and the floor shall not exceed 3/4 inch.

2-6 Frames with Transoms, Side Lights, or Panels.

2-6.1 Side lights, side panels and/or transoms shall be nonoperable when installed in labeled frames.

2-6.2 The combined area of door or doors, transom lights or panels, and side lights or panels shall not exceed 120 sq. ft. and neither height nor width shall be greater than 12 ft.

2-6.3 Frames with transom (lights or panels) only shall not exceed 40 sq. ft. when a single door is used or 80 sq. ft. when doors in pairs are used.

2-6.4 Frames with solid transoms and/or panels shall be permitted in situations where 3-, 1½-, 1- or ¾-hour fire protection is required.

2-6.5 Frames with glazed transoms and/or side lights shall be permitted in situations where ¾-hour fire protection is required.

2-7 Astragals. Doors swinging in pairs requiring astragals shall have at least one astragal attached in place so as to project approximately ¾-inch. *(See Figures 21, 23 and 31, Appendix A.)*

Exception: The authority having jurisdiction may require the use of pairs of doors without astragals in exit locations.[1]

2-8 Builders Hardware *(see Figures 20-27, Appendix A).*

2-8.1 Hinges.

2-8.1.1 Hinges shall be as required in Table 2-8A.

2-8.1.2 Attaching Hinges to Doors. Mortise hinges shall be secured to reinforcements in the doors with steel machine screws and surface hinges shall be attached with steel through bolts.

Exception: Mortise hinges shall be secured to wood and plastic covered composite doors with No. 12 by 1¼ inch flat threaded-to-the-head, steel wood screws.

2-8.1.3 Attaching Hinges to Frame. Hinges shall be secured with steel machine screws to reinforcements of pressed steel frames or directly to steel channel frames.

2-8.2 Locks or Latches.

2-8.2.1 Only labeled locks and latches or labeled fire exit hardware (panic devices) meeting both life safety requirements and fire protection requirements shall be used.[2]

2-8.2.2 All single doors and active leaves of pairs of doors shall be provided with an active latch bolt (one that cannot be held in a retracted position), as specified in Table 2-8B.

Exception: Doors not used as a required means of egress shall be permitted to be provided with dead bolts in addition to the active latch bolts.

2-8.2.3 Where both leaves are required for exit purposes, they shall be provided with labeled fire exit hardware.

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[1]Some manufacturers provide doors swinging in pairs without astragals with fire protection ratings of up to 1½ hours, as indicated in the individual published listings.

[2]See Section 0-3, Introduction.

Table 2-8A

Builders Hardware

Mortise and Surface Hinges or Pivots for Swinging Doors Including Spring Hinges.

Doors up to 60 in. in height shall be provided with two hinges and an additional hinge for each additional 30 in. of height or fraction thereof.

Door Rating, Hr.	Maximum Door Size		Minimum Hinge Size		Type Hinge
	Width, Feet	Height, Feet	Height, In.	Thickness, In.	
For 1¾ Inch or Thicker Doors					
3, 1½, 1, ¾	4	10	4½	0.180	Steel, Mortise or Surface
3, 1½, 1, ¾	4	8	4½	0.134	Steel, Mortise or Surface
1½, ¾,	3′2″	8	6	0.225	Steel-Olive Knuckle or Paumelle
3, 1½, ¾,	4	10	4	0.225	Steel Pivots (Including Top, Bottom and Intermediate)
1½, 1, ¾	3	5	4	0.130	Steel, Mortise or Surface
1½, 1, ¾	2	3	3	0.092	Steel, Mortise or Surface
3, 1½, 1, ¾	3	7	4½	0.109	Steel, Mortise (spring closing)
For 1⅜ Inch Doors					
3, 1½, ¾	3	7	3½	0.123	Steel, Mortise or Surface
3, 1½, 1, ¾	2′8″	7	3½	0.109	Steel, Mortise (spring closing)

NOTE 1: All hinges or pivots, except spring hinges, shall be of the ball-bearing type. Hinges or pivots employing other antifriction bearing surfaces are permitted if they meet the test requirements of *Standard for Butts and Hinges (ANSI A156.1-1970, see Appendix D)*.

NOTE 2: 4½ in. high, 0.180 in. thick hinges should be used on doors which are unusually wide and heavy or which will receive high frequency use or unusual stresses.

Table 2-8B

Builders Hardware

Latching Devices for Swinging Doors

For alternate assemblies and exceptions, see Section 2-8

	Single Swing Doors			Doors in Pairs		
	Door Rating Hours	Maximum Opening Height	Min. Latch Throw	Maximum Opening Height	Active Leaf Minimum Latch Throw	Inactive Leaf
Composite Wood (flush)	1½	10′	½ in.	8′	¾ in.	Top & Bottom Bolts
	1	10′	½ in.	8′	¾ in.	Top & Bottom Bolts
	¾	10′	½ in.	8′	¾ in.	Top & Bottom Bolts
Composite Plastic (flush)	1½	8′	½ in.	—	—	—
	1	8′	½ in.	—	—	—
	¾	8′	½ in.	—	—	—
Composite Steel (flush)	3	8′	3 Pt. Surface	—	—	—
	3	8′	⅝ in.	7′ 6″	⅝ in.	Top & Bottom Bolts
	1½	8′	½ in.	7′ 6″	⅝ in.	Top & Bottom Bolts
	¾	8′	½ in.	7′ 6″	⅝ in.	Top & Bottom Bolts
Hollow Metal (flush)	3	10′	½ in.	8′	¾ in.	Top & Bottom Bolts
	1½	10′	½ in.	9′	¾ in.	Top & Bottom Bolts
	¾	10′	½ in.	9′	¾ in.	Top & Bottom Bolts
Hollow Metal (Panelled or flush)	3 or 1½ or ¾	10′	3 Pt. Concealed	10′	3 Pt. Concealed	2 Pt. Concealed
Metal Clad (Panelled or flush)	1½ or ¾	8′	½ in.	8′	¾ in.	Top & Bottom Bolts
Sheet Metal (Panelled or flush)	1½ or ¾	8′	½ in.	8′	¾ in.	Top & Bottom Bolts

Exception: Where acceptable to the authority having jurisdiction, the inactive leaf shall be permitted to be provided with labeled automatic top and bottom bolts that are self-unlatching when the active leaf is opened; and the active leaf shall be permitted to have either labeled fire exit hardware or any labeled latch which is able to be opened by one obvious operation from the egress side. When automatic bolts are used, the inactive leaf shall have no knob or other visible hardware.

2-8.2.4 Where the inactive leaf of pairs of doors is not required for exit purposes, it shall be provided with labeled self-latching top and bottom bolts or labeled two-point latches.

Exception: Manually-operated, labeled top and bottom flush or surface bolts on the inactive leaf of a pair of doors shall be permitted to be used when acceptable to the authority having jurisdiction, provided they do not pose a hazard to safety to life. This provision limits their use to rooms not normally occupied by humans (e.g. transformer vaults, storage rooms). The inactive leaf shall not require a closer.

2-8.2.5 The throw of single point latchbolts shall not be less than the minimum shown on the fire door label. If the minimum throw is not shown or the door does not bear a label, the minimum throw shall be as required in Table 2-8B.

2-8.2.6 Attaching Locks, Latches, Top and Bottom Bolts and Fire Exit Hardware. Locks, latches, surface mounted top and bottom bolts and fire exit hardware shall be secured to reinforcements in the doors with machine screws or be attached with through bolts. Flush mounted top and bottom bolts shall be secured to reinforcements in the doors with machine screws.

Exception: Locks and latches shall be attached to wood and plastic covered composite doors with not less than No. 8 flat, threaded to the head, wood screws or be attached with through bolts. Fire exit hardware and surface mounted top and bottom bolts shall be attached to wood and plastic covered composite doors with through bolts.

2-8.2.7 Attaching Strikes. Strike plates for single swing doors shall be secured to reinforcements in the frame with machine screws. Channel frames for single swing doors shall be provided with rectangular holes to receive the latch bolts. Strike plates for top bolts shall be secured to reinforcements in the frame with machine screws. Channel frames shall be provided with holes to receive top bolts. Strike plates for bottom bolts shall be secured to the sill or the threshold.

2-8.2.8 Strike plates for doors swinging in pairs shall be secured to reinforcements in the inactive leaf with machine screws.

Exception: Strike plates for wood and plastic covered composite doors swinging in pairs shall be attached to the inactive leaf with not less than No. 8 flat, threaded to the head, wood screws.

2-8.2.9 Open back strikes shall be permitted to be used in lieu of conventional strikes only where specifically provided for in the published listings. *(See 2-7 and Figure 28, Appendix A.)*

2-8.3 Kick and Mop (Protection) Plates. The top of the plate shall be a maximum of 12 inches above the bottom of the door. No other plates shall be installed.

Exception: Where otherwise tested and approved.[1]

2-8.4 Closing Devices.

2-8.4.1 When there is an astragal or projecting latch bolt that prevents the inactive door from closing and latching before the active door closes and latches, a coordinating device shall be used. A coordinating device shall not be required where each door closes and latches independently of the other.

2-8.4.2 A closing device shall be installed on every fire door.

2-8.4.3 Attachment. All components of closing devices used shall be securely attached to doors and frames by steel screws or through-bolts.

2-8.4.4 Adjustment. All closing mechanisms shall be adjusted to overcome the resistance of the latch mechanism so that positive latching is achieved on each door operation.

2-8.5 Door Holder/Release Devices. Holder/release devices shall be permitted in conjunction with doors illustrated in Figures 20 through 28 and as shown in Figure 51, Appendix A, when acceptable to the authority having jurisdiction.

2-8.6 Automatic Fire Detectors.

2-8.6.1 Detectors for the release of fire doors shall be permitted to be part of an overall system, such as a fire alarm, water flow alarm or carbon dioxide release system, which will release the door.

[1]Some manufacturers provide doors with protection plates of other sizes or materials, as indicated in their individual published listings.

2-8.6.2 Smoke detectors shall be located to effectively insure releasing of doors at the time of fire. When doors are to be closed by the release of other than fusible links, detectors shall be located as shown in Figure 51, Appendix A.

2-8.6.3 **Installation.** Detectors and their components shall be installed in accordance with the manufacturer's instructions.

2-8.7 **Operation of Doors.** All swinging doors shall be closed and latched at the time of fire. For the purposes of this section the operation of doors is divided into three categories.

2-8.7.1 **Self-closing doors.** The door shall swing easily and freely and shall be equipped with a closing device to cause the door to close and latch each time it is opened. The closing mechanism shall not have a hold-open feature.

2-8.7.2 **Automatic-closing doors.** A door may be made automatic closing by the installation of a closing device and a separate, labeled, fail-safe door-holder/release device or a hold-open mechanism which may be an integral part of the basic closing device, provided the hold-open mechanism is released by one or a combination of automatic fire detectors acceptable to the authority having jurisdiction.

2-8.7.3 **Power-operated fire doors.** They shall be equipped with a releasing device which will automatically disconnect the power operator at the time of fire, allowing a self-closing or automatic device to close the door irrespective of power failure or manual operation.

2-8.8 **Application of Door Holder/Release Devices.**

2-8.8.1 Door holder/release devices shall be installed in accordance with the manufacturer's instructions and only in conformance with the individual manufacturer's published listings.[1]

2-8.8.2 Location of smoke detectors used to control door holder/release devices shall be as shown in Figure 51 of Appendix A.

Exception: A detector shall not be required on the exterior (outside) wall.

[1]Labeled door holder/release devices for swinging doors should, whenever possible, be installed at the top of the door as close as possible to the lock edge and shall be located to avoid interference with any other hardware. If necessary, holder/release may be located at the bottom of the door as close as possible to the lock edge with the device installed on the wall or floor.

2-8.9 Application, Installation and Adjustment.

2-8.9.1 The installation of all components of a fire door assembly shall be in accordance with the specific listing of each component.

2-8.9.2 All components shall be installed in accordance with the manufacturer's installation instructions and shall be adjusted to function as described in the listing.

2-8.9.3 All components of a fire door assembly shall be firmly attached to walls, doors and frames in a manner acceptable to the authority having jurisdiction.

2-8.9.4 Mounting to masonry walls shall be by means of through-bolts except where steel shells are permitted elsewhere herein.

2-8.9.5 All mounting screws, bolts or shields shall be steel except where permitted elsewhere herein.

2-8.9.6 Attachment to doors with composite cores shall provide firm anchorage for anticipated use.

Chapter 3

Use and Installation of Swinging Doors with Fire Door Hardware

3-1 Mounting of Doors.

3-1.1 Swinging tinclad doors and flush or corrugated type sheet metal doors shall be provided with fire door hardware and shall be flush or lap mounted.

3-1.2 Flush mounted doors shall be hung in steel channel frames securely anchored to the wall construction.

3-1.3 Lap mounted doors shall be hung on the surface of the wall and shall lap the opening at least 4 in. at the top and on each side.

3-2 Vents.

3-2.1 Each tinclad door formed of 14 in. by 20 in. sheets shall be provided with 3-in. diameter vent holes located as shown in Figure 33, Appendix A.

3-2.2 The vent holes shall be cut through the sheets on the face of the door to be provided with the fire door hardware, care being taken so as not to interfere with the hardware or to injure the wood core when cutting the holes in the sheets. The metal covering around the opening shall be secured with small nails spaced about 1 in. apart and the exposed wood thoroughly painted.

3-3 Sills.

3-3.1 In buildings with noncombustible floors, special sill construction shall not be required, if the floor structure is extended through the door opening.

3-3.2 In buildings with combustible floors, special sill construction shall be required if the floor structure is extended through the door opening, as combustible floor construction shall not extend through the door opening.

3-3.3 Sills shall be constructed of noncombustible materials.

3-3.4 Sills shall extend at least the depth of the door frame for flush-mounted doors. For lap-mounted doors, sills shall extend beyond the opening by an amount equal to the projection of the installed door or doors. *(See Figures 1, 3, and 4, Appendix A, for recommended construction.)*

3-4 Walls.

3-4.1 Walls shall be plumb and true and present smooth surfaces. They shall be of brick, concrete, or concrete block construction. *(When concrete blocks are used, see Figures 16 and 17, Appendix A, for methods of reinforcement.)*

3-4.2 Mounting bolts shall pass through walls.

Exception: When doors are mounted on corner walls or on walls more than 18 inches thick, as shown in Figures 9 and 10, Appendix A.

3-5 Frames.

3-5.1 Frames shall not be required for lap-mounted doors.

3-5.2 Only labeled frames of the structural steel type shall be used for flush-mounted doors. The frames shall be erected before the wall is built.[1]

3-6 Clearances.

3-6.1 Flush-Mounted. Clearances for flush-mounted doors shall not exceed ¾ in. at the sill. Clearances at the meeting edges of doors in pairs shall not exceed ¼ in. for 3 ply tinclad doors or ⅛ in. for other doors.

3-6.2 Lap-Mounted. The clearance between the door and the wall when the door is in a closed position shall not exceed ⅜ in., and between the door and the sill shall not exceed ¾ in.

3-7 Coordinating Devices. When there is an astragal or projecting latchbolt that prevents the inactive door of a pair of doors from closing and latching before the active door closes and latches, a coordinating device shall be used. A coordinating device shall not be required where each door closes and latches independent of the other door.

3-8 Fire Door Hardware *(See Figures 29 and 31, Appendix A.)*

3-8.1 Only labeled fire door hardware shall be used. The design and construction of typical fire door hardware for swinging fire doors is illustrated in *Swinging Hardware for Standard Tin-Clad Fire Doors, ANSI A133.1-1973, (See Appendix D.)*

[1]Structural steel frames consist of head and jamb members, either shop or field assembled.

3-8.2 Fire door hardware includes hinge brackets, hinges, latches, latch keepers, and operating handle mechanism; for the inactive door of pairs of doors, top and bottom bolts and keepers.

3-8.3 Hinges and Latches, Number and Length. *(See Tables 3-8A, 3-8B and 3-8C.)*

3-8.4 Attaching Fire Door Hardware to Doors. Upper and lower hinges and latches shall be spaced not less than 8 in. nor more than 11 in. from the top and bottom of the door.

3-8.5 Attaching Fire Door Hardware to Frames for Flush-Mounted Doors. Hinges and latch keepers shall be bolted, riveted or welded to the frame.

3-8.6 Attachment of Wall Strips for Lap-Mounted Doors. Hinges and latch keepers shall be mounted on wall strips bolted through the wall. Not less than ¾ in. through bolts shall be used for attaching hinge wall strips and not less than ½ in. through bolts for latch keeper wall strips. *(See Figure 31, Appendix A.)*

3-9 Operation of Doors. The doors shall swing easily and freely on their hinges. The latches shall operate freely.

3-10 Closing Devices for Swinging Tinclad and Sheet Metal Fire Doors.

3-10.1 Swinging tinclad and sheet metal fire doors shall be equipped with self-closing or automatic-closing devices to insure that they will be closed and latched at the time of fire.[1] Other arrangements, acceptable to or required by the authority having jurisdiction, shall be permitted.

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[1] Self-closing devices for these doors consist of a system of weights suspended by ropes, wire cables or chains over pulleys arranged to return the door to the normally closed position each time it is used.

Automatic-closing devices consist of a system of weights suspended by ropes, wire cables or chains over pulleys and a hold-open device with a release mechanism which is activated by an automatic fire detector.

The weights, ropes, cables or chains, and hold-open device are arranged to keep the door in a normally open position. When fire occurs the detector causes the release to disconnect the hold-open device from the door which is then free to close. *(Typical arrangements are shown in Figures 30 and 32, Appendix A.)*

Table 3-8A

Fire Door Hardware

Table Giving Number of Hinges and Latches for Different Size Doors of Tinclad Construction.

Width of Door		0ft.-2ft.0in.	2ft.0in.-3ft.0in.	3ft.0in.-4ft.0in.	4ft.0in.-5ft.0in.	5ft.0in.-6ft.0in.
Height of Door	No. of Latches	No. of Hinges	No. of Hinges	No. of Hinges	No. of Hinges	No. of Hinges
0 ft. to 5 ft. 0 in.	2	2	2	2	2	2
5 ft. 0 in. to 6 ft. 6 in.	2	2	2	2	3	3
6 ft. 6 in. to 8 ft. 6 in.	3	2	2	3	3	4
8 ft. 6 in. to 10 ft. 6 in.	4	3	3	3	4	4
10 ft. 6 in. to 12 ft. 0 in.	5	4	4	4	4	4

Table 3-8B

Fire Door Hardware

Table Giving Length of Hinges and Latches For Different Widths of Doors of Tinclad Construction.

Width of Door	*Length of Hinges	No. of Holes in Hinge	Length of Latches
1 ft. 6 in. to 1 ft. 9 in. (incl.)	16 in.	2	Not less than 14¾ in.
1 ft. 9 in. to 2 ft. 0 in.	19 in.	2	" " " " "
2 ft. 0 in. to 2 ft. 4 in.	22 in.	3	" " " " "
2 ft. 4 in. to 2 ft. 8 in.	25 in.	3	" " " " "
2 ft. 8 in. to 3 ft. 0 in.	28 in.	3	" " " " "
3 ft. 0 in. to 3 ft. 4 in.	31 in.	3	" " " " "
3 ft. 4 in. to 3 ft. 8 in.	34 in.	4	" " " " "
3 ft. 8 in. to 4 ft. 0 in.	37 in.	4	" " " " "
4 ft. 0 in. to 4 ft. 4 in.	40 in.	4	" " " " "
4 ft. 4 in. to 4 ft. 8 in.	43 in.	4	" " " " "
4 ft. 8 in. to 5 ft. 0 in.	46 in.	5	" " " " "
5 ft. 0 in. to 5 ft. 4 in.	49 in.	5	" " " " "
5 ft. 4 in. to 5 ft. 8 in.	52 in.	5	" " " " "
5 ft. 8 in. to 6 ft. 0 in.	55 in.	5	" " " " "

*The intermediate hinge straps (when three or more are used) may be not more than eight inches shorter than is indicated.

Table 3-8C

Fire Door Hardware

Table Giving Numbers of Latches and Hinges For Sheet Metal Doors.

Height of Door	No. of Latches	No. of Hinges
0 ft. to 5 ft. 3 in.	2	2
5 ft. 4 in. to 8 ft. 3 in.	3	3
8 ft. 4 in. to 10 ft. 3 in.	4	4
10 ft. 4 in. to 12 ft. 4 in.	5	4

NOTE: For heights in fractional inches, use next higher full inch.

3-11 Automatic Fire Detectors.

3-11.1 Detectors or fusible links shall be installed on both sides of the wall, interconnected so that the operation of any single detector or fusible link will cause the door to close and latch. *(See Figures 30 and 32, Appendix A.)*

Exception: A detector or fusible link shall not be required on the exterior (outside) wall.

3-11.1.1 When fusible links are used, one fusible link shall be located near the top of the opening and additional links shall be located at or near the ceiling on each side of the wall.

3-11.1.2 When smoke detectors are used, they shall be located as shown in Figure 51 of Appendix A.

3-11.2 Detectors for the release of fire doors may be part of an overall system, such as a fire alarm, water flow alarm or carbon dioxide release system, which will release the door.

3-11.3 Installation. Detectors and their components shall be installed in accordance with the manufacturer's instructions.

Chapter 4

Use and Installation of Horizontally Sliding Doors

4-1 **Doors.** Sliding tinclad, composite, hollow metal and sheet metal (flush and corrugated) doors shall be wall mounted (hung on the surface of the wall).

4-1.1 Doors shall lap openings at least 4 in, at the sides and top. Where doors provide protection of openings located in walls above floor level and no projecting sill is provided, the doors shall lap the bottom of the opening at least 4 in.

4-1.2 **Astragals.** Center-parting doors shall have an astragal securely attached in place so as to project approximately ¾ in. *(See Figure 37, Appendix A.)*

4-1.3 **Vents.**

4-1.3.1 Each tinclad door formed of 14 in. by 20 in. sheets shall be provided with 3 in. diameter vent holes located as shown on Figure 40. Appendix A. Each section of spliced single doors and each leaf of center-parting doors shall be vented as provided for two-hanger doors in Figure 40, Appendix A.

4-1.3.2 The vent holes shall be cut through the sheets on the face of the door opposite the rear binder pockets, care being taken so as not to injure the wood core when cutting the holes in the sheets. The metal covering around the opening shall be secured with small nails spaced about 1 in. apart and the exposed wood thoroughly painted.

4-1.4 **Clearances.** The clearance between the wall and the door when in the closed position shall not be more than ¾ in. The clearance between any door and the sill shall not be more than ⅜ in.

4-1.5 **Sectional Door Units.**

4-1.5.1 **Tinclad or Sheet Metal.** These units shall not be furnished in more than two sections. Channels or reinforcing angles shall be installed horizontally across each section and shall be through-bolted. One section shall have two cover plates through-bolted to that section, forming a channel. The other section shall be field installed by inserting into the channel formed by the cover plates and shall be through-bolted.

4-1.5.2 **Hollow Metal or Composite.** These units shall be furnished in not more than five panels, constructed for either field or factory assembly. For center-parting doors, not more than four panels shall comprise a single leaf.

4-2 Sills.

4-2.1 In buildings with noncombustible floors, special sill construction shall not be required if the floor structure is extended through the door opening.

4-2.2 In buildings with combustible floors, special sill construction shall be required if the floor structure is extended through the door opening, as combustible floor construction shall not extend through the door opening.

4-2.3 Sills shall be constructed of noncombustible material and extend 6 in. past the edge of the opening on each side and at least 4 in. out from the face of the wall. *(Figures 1, 3, and 4, Appendix A, show constructions that are acceptable.)*

4-3 Walls.

4-3.1 Walls shall be plumb and true and present smooth surfaces. They shall be of brick, concrete, or concrete block construction. *(When concrete blocks are used, see Figures 18 and 19, Appendix A, for methods of reinforcement.)*

4-3.2 Mounting bolts shall pass through walls.

Exception: When doors are mounted on corner walls or on walls more than 18 inches thick, as shown in Figures 9 and 10, Appendix A.

4-4 Lintels. Lintels shall be brick, concrete or masonry arches, steel or reinforced concrete. If of steel or reinforced concrete, they shall be constructed as shown in Figures 5, 6, 7 or 8, Appendix A, or as acceptable to the authority having jurisdiction.

4-5 Fire Door Hardware *(See Figures 31, 37, and 41 through 44, Appendix A.)*

4-5.1 Only labeled fire door hardware shall be used. The design and construction of typical fire door hardware for sliding fire doors is illustrated in *Sliding Hardware for Horizontally Mounted Tinclad Fire Doors (ANSI A143.1-1973, see Appendix D.)*

4-5.2 Fire door hardware shall include tracks, hangers, track brackets, bumpers, binders, pull handles, stay rolls and center latch assembly for center-parting doors.

4-5.3 Track.

4-5.3.1 Mounting Flat Track, Single Door. For tinclad and sheet-metal fire doors the length of track shall be equal to twice the width of the wall opening plus 21 in.[1] Wall bolts shall be so spaced that one bolt will be located directly opposite each hanger when the door is closed to permit attachment of front and back bumpers. Wall bolts securing the track in position shall be installed through the wall with track bracket at each bolt.[2]

The space "A" in Table 4-5A, giving spacings for wall bolts, shall always be on the side of the door opening to which the door closes. This will be the lower end of the track when the track is inclined. The track shall have an incline of ¾ in. to 1 ft. if door is intended to close by gravity.

4-5.3.2 Mounting Track, Hollow Metal Doors. For hollow-metal doors wall bolts shall be located 2 in. from each end of track, opposite hangers when the door is in a closed position and additional bolts on centers not to exceed 24 in. Wall bolts shall be installed through the wall except as provided in 4-3.2

4-5.3.3 Mounting Flat Track, Center Parting Doors. The mounting is similar to the requirements of 4-5.3.1. For tinclad and sheet-metal doors the track for each door shall be 10 in. shorter. In Table 4-5A giving the length of track, 10 in. shall be subtracted from the total length, the first bolt hole shall be omitted, and 10 in. is to be subtracted from each other bolt-hole dimension.

4-5.3.4 Mounting Round Track. When round track is used, the number of brackets provided shall be such that one bracket is located directly under each hanger when the door is closed; one at each end, and at points between end brackets not exceeding 24 in. apart. Wall bolts securing brackets in position shall be installed through the wall, except as provided in 4-3.2.

4-5.3.5 Mounting Box Type Track. When box type track is used the number of track brackets provided shall be such that a bracket is located directly over each hanger when the door is closed, on each end, and such intermediate brackets so that bracket centers shall not exceed 39½ in. Bolts securing brackets in position shall be installed through the wall except as provided in 4-3.2.

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[1] This length of track is given in terms of the wall opening, 12 in. being allowed for the lap and width of the door, 8 in. for attaching front and back bumpers and 1 in. for clearance when the door is wide open.

[2] Refer to Table 4-5A for bolt spacing (except as provided in 4-3.2). Figures in heavy type in the table indicate spacings for bolts opposite door hangers and number of hangers required.

4-5.4 **Hangers.** Not less than two hangers shall be provided for each door. Tinclad, sheet-metal and composite doors for openings in excess of 6 ft. shall have an additional hanger. *(See Table 4-5A).* Two hangers shall be provided on each section of vertically spliced sheet-metal or tinclad doors. *(See 4-1.5.)*

Table 4-5A

Table Giving Dimensions for Punching Flat Track for Tinclad and Sheet Metal Fire Doors.

Size of Opening	Length of Track	Space A 1st Bolt In.	Space B 2nd Bolt In.	Space C 3rd Bolt In.	Space D 4th Bolt In.	Space E 5th Bolt In.	Space F 6th Bolt In.	Space G 7th Bolt In.	Space H 8th Bolt In.	Space I 9th Bolt In.	Space J 10th Bolt In.	Space K 11th Bolt In.
3′0″	7′9″	1¾	**12¼**	**24**	26½	26¾						
3′3″	8′3″	1¾	**12¼**	**27**	28	28¼						
3′6″	8′9″	1¾	**13¼**	**28**	30	30¼						
3′9″	9′3″	1¾	**13¼**	**31**	31½	31¾						
4′0″	9′9″	1¾	**14¼**	**32**	33½	33¾						
4′3″	10′3″	1¾	**14¼**	**35**	35	35¼						
4′6″	10′9″	1¾	**15¼**	**36**	37	37¼						
4′9″	11′3″	1¾	**15¼**	19½	**19½**	38½	38¾					
5′0″	11′9″	1¾	**16¼**	20	**20**	40½	40¾					
5′3″	12′3″	1¾	**16¼**	21½	**21½**	28	28	28¼				
5′6″	12′9″	1¾	**17¼**	22	**22**	30	29	29¼				
5′9″	13′3″	1¾	**17¼**	23½	**23½**	31	30	30¼				
6′0″	13′9″	1¾	**18¼**	24	**24**	32	32	31¼				
6′3″	14′3″	1¾	**12¼**	31½	**31½**	31	31	30¼				
6′6″	14′9″	1¾	**12¼**	**33**	**33**	32	32	31¼				
6′9″	15′3″	1¾	**13¼**	33½	**33½**	33	33	33¼				
7′0″	15′9″	1¾	**13¾**	35	**35**	34	34	34¼				
7′3″	16′3″	1¾	**14¼**	35½	**35½**	36	35	35¼				
7′6″	16′9″	1¾	**14¼**	37	**37**	37	36	36¼				
7′9″	17′3″	1¾	**14¼**	19¼	**19¼**	19¼	**19¼**	38	37	37¼		
8′0″	17′9″	1¾	**14¼**	20	**20**	20	**20**	39	38	38¼		
8′3″	18′3″	1¾	**14¼**	20¾	**20¾**	20¾	**20¾**	40	39	39¼		
8′6″	18′9″	1¾	**14¼**	21½	**21½**	21½	**21½**	41	40	40¼		
8′9″	19′3″	1¾	**14¼**	22¼	**22¼**	22¼	**22¼**	31	31	31	31¼	
9′0″	19′9″	1¾	**14¼**	23	**23**	23	**23**	31¾	31¾	31¾	32	
9′3″	20′3″	1¾	**15¼**	23¼	**23¼**	23¼	**23¼**	32¾	32¾	32¾	33	
9′9″	20′9″	1¾	**15¼**	24	**24**	24	**24**	34	34	33	33¼	
9′9″	21′3″	1¾	**16¼**	24¼	**24¼**	24¼	**24¼**	35	35	34	34½	
10′0″	21′9″	1¾	**16¼**	25	**25**	25	**25**	35¼	35¼	35¼	35½	
10′3″	22′3″	1¾	**17¼**	25¼	**25¼**	25¼	**25¼**	36¼	36¼	36¼	**36½**	
10′6″	22′9″	1¾	**17¼**	26	**26**	26	**26**	37	37	37	37¼	
10′9″	23′3″	1¾	**18¼**	26¼	**26¼**	26¼	**26¼**	38	38	38	38¼	
11′0″	23′9″	1¾	**18¼**	27	**27**	27	**27**	38¾	38¾	38¾	39	
11′3″	24′3″	1¾	**19¼**	27¼	**27¼**	27¼	**27¼**	39¾	39¾	39¾	40	
11′6″	24′9″	1¾	**19¼**	28½	**28½**	28½	**28½**	40	40	40	40¼	
11′9″	25′3″	1¾	**20¼**	29¼	**29¼**	29¼	**29¼**	40½	40½	40½	40¾	
12′	25′9″	1¾	**20¼**	30	**30**	30	**30**	33	33	33	33	33¼

NOTE: Figures in heavy type indicate bolts opposite door hangers

4-5.5 Binders.

4-5.5.1 Binders for tinclad and sheet-metal doors shall meet the following requirements:

(a) At least two front binders are required for tinclad and sheet-metal doors. The upper binder shall be placed approximately 24 in. from the top of the door and the lower binder approximately 24 in. above the sill.

(b) In addition to the above front binders, doors for openings exceeding 8 ft. in height shall be provided with an additional front binder spaced midway between the upper and lower binders.

(c) Sheet-metal doors for openings not exceeding 10 ft. in height and tinclad doors 7 ft. but not more than 10 ft. in height shall be provided with one rear binder located midway between the top and bottom of the door. Both sheet metal and tinclad doors for openings exceeding 10 ft. in height shall be provided with two rear binders located at the quarter points for sheet metal and third points for tinclad doors.

(d) The space between the top of the door and the track for sheet-metal doors shall be at least ¾ in. to permit upward expansion on exposure to fire. Track binders or other approved means shall be provided to prevent door leaving track during exposure to fire. The track binder shall lap the track about ½ in. and be located two inches to one side of the center line of the wall bolts. *(See Figures 34 and 37, Appendix A.)*

(e) Front and rear binders for tinclad and sheet metal doors shall be fastened to the wall with bolts having a diameter of not less than ¾ inch and which extend through the wall.[1]

(f) For center parting doors, the head binder shall be bolted to the track and the sill binder securely fastened to the masonry of the sill.

4-5.5.2 Binders for Composite Doors. Composite fire doors shall have one front binder near the sill, one or more intermediate front binders, and one or more intermediate rear binders.

4-5.5.3 Binders for Hollow-Metal Doors. Hollow-metal doors shall have front binders as specified for tinclad doors. In addition to front binders, hollow-metal doors shall be provided

[1] The bolt holes should not be made larger than necessary.

with continuous interlocking binders at rear and head. The interlocking rear and head binders shall be either secured directly to the masonry wall by steel bolts and steel expansion shields or to the opening framing by means of steel machine bolts. *(See Figures 43 and 44, Appendix A.)*

4-5.5.4 Binders for Center Parting Doors. All center parting sliding doors shall be provided with sill binders or center guides to maintain the doors in proper alignment when they are closed. *(See Figures 37, 42 and 44, Appendix A.)*

The sill binder or center guides shall be securely attached to concrete sills with machine screws and steel shields or to metal thresholds drilled and tapped to receive machine screws.

4-5.6 Stay Rolls.

4-5.6.1 Stay rolls shall be installed in an approved manner. *(See Figures 11 through 15, Appendix A.)*

4-5.6.2 Wedge. On tinclad and sheet-metal doors, a wedge shall be attached at the end of the roller stays, so the door will be close to, but not tight against the wall when in closed position. *(See Figures 34 and 37, Appendix A.)*

4-5.7 Latches, Center-Parting Doors. All center-parting doors shall be provided with a latch. *(See Figures 37 and 44, Appendix A.)* All tinclad and sheet-metal doors shall be provided with a center pin located midway between the latch and the top of the door. *(See Figure 37, Appendix A.)*

4-5.8 Chafing Strips. Tinclad doors shall be provided with chafing strip assemblies consisting of half-oval strips on the back or wall side of the door bolted through the door to washer strips on the front of the door. The length of the chafing strip assemblies shall be 8 in. less than the door width. Two chafing strip assemblies shall be required for doors 8 ft. 4 in. in height or less. Three chafing strip assemblies shall be required for doors exceeding 8 ft. 4 in. in height. The chafing strip assemblies shall be parallel to the track and the top strip assembly shall be located one-third the distance from the top of the door and the bottom strip assembly 24 in. from the bottom edge of the door. When three chafing strip assemblies are required, the middle strip shall be located midway between the other two. For doors equipped with two rear binders a flat strip shall be used in place of the top half-oval strip when three chafing strip assemblies are used.

4-5.9 Bumper Shoes. Bumper shoes shall be required on tinclad doors, one opposite each bumper and one opposite each binder, fastened to the faces and edges of the door by wood screws. *(See Figures 34 and 37, Appendix A.)*

4-5.10 Handles. Means shall be provided for opening the doors from either side. If flush pulls are used they shall not be back to back. Handles shall be securely attached.

4-6 Closing Devices for Horizontally Sliding Composite, Hollow Metal, Tinclad and Sheet Metal Fire Doors.

4-6.1 Horizontally sliding fire doors shall be equipped with self-closing or automatic-closing devices to insure that they will close or be closed at the time of fire.[1]

4-6.2 Power-operated fire doors shall be equipped with a releasing device which will automatically disconnect the power operator at the time of fire, allowing a self-closing or automatic device to close the door irrespective of power failure or manual operation.

4-6.3 Automatic Fire Detectors.

4-6.3.1 Detectors or fusible links shall be installed on both sides of the wall and interconnected so that the operation of any single detector or fusible link will cause the door to close and latch.

Exception: A detector or fusible link is not required on the exterior (outside) wall.

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[1]Self-closing devices for these doors consist of a system of weights suspended by ropes, wire cables, or chains over pulleys arranged to return the door to the normally closed position each time it is used.

Automatic-closing devices for tinclad and sheet-metal fire doors consist of a system of weights suspended by ropes, wire cables or chains over pulleys, and a hold-open device with a release mechanism which is activated by a device for the detection of fire.

Automatic-closing devices for composite and hollow metal fire doors may be of the type described above or may consist of a labeled tension spring device with hold-open and detector-controlled release. *(See Figures 42 and 43, Appendix A.)*

The weights, ropes, cables or chains and hold-open device are arranged to keep the door in a normally open position. When fire occurs the detector causes the release to disconnect the hold-open device from the door, which is then free to close. *(Typical arrangements are shown in Figures 35, 36, 38 and 39, Appendix A.)* Other arrangements of weights, ropes, cables or chains, hold-open devices and detectors, acceptable to or required by the authorities having jurisdiction, may be used.

(a) For tinclad and sheet metal doors, one fusible link shall be mounted on an arm projecting from the leading edge of the door or doors near the top of the opening, and a second fusible link shall be at or near the ceiling on each side of the wall. *(See Figures 35 and 38, Appendix A.)*

(b) For composite and hollow metal doors, one fusible link shall be centered just above the opening and another at or near the ceiling. *(See Figures 41 through 44, Appendix A.)*

(c) When smoke detectors are used, they shall be located as shown in Figure 51, Appendix A.

4-6.3.2 Detectors and their components shall be installed in accordance with the manufacturer's instructions.

Chapter 5

Use and Installation of Vertically Sliding Fire Doors

5-1 Doors. Vertically sliding doors of the tinclad, sheet metal (flush and corruguated), and steel sectional (overhead) types shall be wall mounted.

5-1.1 The tinclad and sheet metal doors shall lap the opening at least 4 in. at the sides and top. The steel sectional doors shall lap the opening at least 2 in. at the sides and top. The sides of the sectional door shall be mounted within wall guides and the top edge shall engage in an interlock along the lintel.

5-2 Vents. Each tinclad door shall be provided with 3 in. diameter vent holes located as shown in Figure 40, Appendix A. Doors up to 6 ft. wide shall be provided with three vents and doors over 6 ft. wide shall be provided with four vents, as shown for two-hanger doors.

5-2.1 The vent holes shall be cut through the sheets on the face of the door to be provided with the guide shoes, care being taken not to interfere with the hardware or injure the wood core when cutting the holes in the sheet. The metal covering around the opening shall be secured with small nails spaced about 1 in. apart and the exposed wood shall be thoroughly painted.

5-3 Clearances. The clearances between the door and the wall, when the door is in the closed position, and between the door and sill shall not exceed 3/8 in.

5-4 Sills.

5-4.1 In buildings with noncombustible floors, special sill construction shall not be required if the floor structure is extended through the door opening.

5-4.2 In buildings with combustible floors, special sill construction shall be required if the floor structure is extended through the door opening, as combustible floor construction shall not extend through the door opening.

5-4.3 Sills shall be constructed of noncombustible material and shall extend 6 in. past the edge of the opening on each side and 4 in. out from the face of the wall. *(See Figures 1, 3, and 4, Appendix A.)*

5-5 Walls.

5-5.1 Walls shall be plumb and true and present smooth surfaces. They shall be of brick, concrete or concrete block construction. When concrete blocks are used, reinforcements similar to that shown in Figure 16, Appendix A, shall be provided.

5-5.2 Mounting bolts shall pass through walls.

Exception: When doors are mounted on corner walls, or on walls more than 18 inches thick, as shown in Figures 9 and 10, Appendix A.

5-6 Lintels. Lintels shall be brick, concrete, or masonry arches, steel, or reinforced concrete. If of steel or reinforced concrete, they shall be constructed as shown in Figures 5, 6, 7, or 8, Appendix A, or as acceptable to the authority having jurisdiction.

5-7 Fire Door Hardware for Tinclad and Sheet Metal Doors. *(See Figure 45, Appendix A.)*

5-7.1 Only labeled fire door hardware shall be used.

5-7.2 Fire door hardware shall consist of tracks, brackets, guides, bumpers and counter-balancing mechanisms.

5-7.3 **Track.** Two tracks, each with a length equal to twice the height plus 9 in., shall be provided. The track shall be attached with track brackets at each bolt.[1]

5-7.4 **Guides.** Two track guides shall be provided for each track for openings 5 ft. or less in height. An additional guide for each track shall be provided for each 2½ ft. or fraction thereof in excess of 5 ft. in height. Each of the track guides shall be bolted through the door.

5-7.5 **Cables.** Cables shall be of sufficient strength to support the load. Cable brackets are required and shall be bolted through the door. Cable fasteners and thimbles are required. Cable pulleys with frames and sheaves shall be bolted through the wall with ¾ in. bolts.

[1] The length of the track is given in terms of height of the opening, 4 in. being allowed for the lap of the door, 4 in. for attaching the bumper and 1 in. clearance when the door is wide open.

5-7.6 Chafing Strips

5-7.6.1 Tinclad and flush type sheet metal doors shall be provided with two half oval chafing strips for the back of doors not exceeding 8 ft. in width. The length shall be 2 in. less than the height of the door. The strips shall be held by ¼ in. through bolts with countersunk heads and with nuts bearing against washers. When doors exceed the above dimension, three strips shall be required.

5-7.6.2 Chafing strips shall not be required for corrugated doors.

5-7.7 Bumpers and Bumper Shoes.

5-7.7.1 One bumper shall be bolted to the top of each track with wall bolts.

5-7.7.2 Four bumper shoes shall be located at the top and bottom corners of the door. Each bumper shall be fastened to the faces and edges of the door by wood screws.

5-7.8 Rear Binders. Doors shall be provided with one rear binder located at the center of the lintel and attached with ¾ in. through bolts. *(See Figure 45, Appendix A.)*

5-7.9 Handles. Flush pull handles on the wall side of the door shall be countersunk flush with the surface of the door. Bow-shaped handles shall be bolted to the flush pull by through bolts or otherwise securely attached.

5-8 Fire Door Hardware for Steel Sectional Doors.

5-8.1 The *"Fire Door"* label on a sectional door shall include the hinged steel panels, wall guides, interlock at the top edge, vertical and horizontal tracks, roller wheels, counterbalance, automatic closing mechanism and governors.

5-8.2 The horizontal track section shall extend from the wall a distance of the wall opening height plus 3 ft. and shall be connected by a fusible track link to the vertical track section such that it can break away from the vertical track section if subjected to damage from falling materials at the time of fire.

5-8.3 The wall guides shall be plumb, bolted through the wall and threaded into nuts on the opposite side. The guides shall extend above the wall opening a distance of 2½ in.

5-8.4 An angle type interlock shall be bolted to the lintel and shall engage a matching pocket on the top edge of the door when in the closed position.

5-8.5 Counterbalancing Mechanism. The sectional door shall be counterbalanced by an overhead horizontal helical spring on a shaft. The shaft shall be attached to a reel with a steel cable, which is attached to both sides of the door near the bottom edge.

5-9 Closing Devices for Vertically Sliding Tinclad, Sheet Metal, and Steel Sectional Fire Doors.

5-9.1 Vertically sliding tinclad, sheet metal, and sectional steel doors shall be equipped to close automatically so they will close or be closed at the time of fire.

5-9.2 Automatic Closers.

5-9.2.1 Automatic-closing vertically sliding doors shall be suspended by a system of weights and ropes, wire cables, or chains over pulleys.

5-9.2.2 The automatic mechanism for vertically sliding tinclad and sheet metal doors shall employ a system of weights suspended by wire cables over pulleys. One of these weights shall be so arranged that the operation of a fusible link or detector will release this weight and permit the door to close by gravity. The total weight of the remaining weights shall be sufficient to prevent the door from dropping suddenly, but not enough to prevent it from closing in a positive manner.

5-9.2.3 Vertically sliding sectional doors shall close automatically upon operation of a fusible link or detector which releases the overhead sectional door, and the governor shall control the rate of descent.

5-9.3 Automatic Fire Detectors.

5-9.3.1 Detectors or fusible links shall be installed on both sides of the wall and shall be interconnected so that the operation of any single detector or fusible link will cause the door to close and latch.

Exception: A detector or fusible link is not required on the exterior (outside) wall.

(a) For tinclad and sheet metal doors, one fusible link shall be located at the center near the bottom of the door, and additional links shall be located at or near the ceiling on each side of the wall. *(See Figures 45 and 46, Appendix A.)*

(b) For steel sectional doors, one fusible link shall be located near the top of the opening near the automatic release mechanism on the door in an area where there is no obstruction to the circulation of air, and additional links shall be located at or near the ceiling on each side of the wall. *(See Figure 47, Appendix A.)*

(c) When smoke detectors, are used they shall be located as shown in Figure 51, Appendix A.

5-9.3.2 Installation. Detectors and their components shall be installed in accordance with the manufacturer's instructions.

Chapter 6

Use and Installation of Rolling Steel Doors

6-1 Doors.

6-1.1 The mounting for rolling steel doors shall be either face-of-wall mounted *(see Figure 48, Appendix A)* or between-the-jamb mounted. *(See Figures 49 and 50, Appendix A.)*

6-1.2 The opening shall be protected by either a single or double door installation, as determined by the authority having jurisdiction.

6-1.3 Doors, mounted on the face of the wall and subject to damage from falling debris, shall be protected by the building structure.

6-2 Sills.

6-2.1 In buildings with noncombustible floors, special sill construction shall not be required, if the floor structure is extended through the door opening.

6-2.2 In buildings with combustible floors, special sill construction shall be required if the floor structure is extended through the door opening, as combustible floor construction shall not extend through the door opening.

6-2.3 Sills shall be constructed of noncombustible material. They shall extend 6 in. past the edge of the opening on each side and at least 4 in. out from the face of the wall. *(Figures 1, 3, and 4, Appendix A, show acceptable constructions.)*

6-3 Walls

6-3.1 Walls shall be plumb and true and present smooth surfaces. They shall be brick, concrete, or concrete block construction. *(When concrete blocks are used, see Figures 18 and 19, Appendix A for methods of reinforcement.)*

6-3.2 Lintels. Heads of door frames shall be reinforced or suitable lintels shall be provided, depending on the type of wall construction and loads to be supported.

6-3.3 Frames. Frames are not required for rolling steel door installations. When frames or jambs only are provided, only structural steel or formed steel plate shall be used. Pressed steel frames are not permitted.

6-4 Assembly of Rolling Doors.

6-4.1 Guides.

6-4.1.1 The guides shall be mounted plumb and with sufficient clearances allowed for vertical expansion when exposed to fire.

6-4.1.2 The guides for between-jamb mounted doors shall be either exposed or concealed in a pocket or wall reveal.

6-4.1.3 On brick and concrete walls, the guide mounting bolts shall pass through the wall and thread into nuts on the opposite side. Nuts shall be provided with suitable washers. Through bolts, not less than 3/8 in. diameter, shall be used.

Exception: When guides are mounted on corner walls or on walls more than 18 inches thick, as shown in Figures 9 and 10, Appendix A.[1]

6-4.1.4 When structural steel frames are used at jambs, guides shall be secured to the frame with machine bolts of not less than 3/8 in. diameter.

6-4.2 Brackets.

6-4.2.1 Brackets mounted on the face of the wall shall be bolted either to the wall or to an extension of the guide wall angle with not less than two 1/2 in. diameter through bolts or machine bolts to each bracket.

6-4.2.2 Brackets mounted between the jambs shall be secured to the lintel or to the side of the jambs by not less than two machine bolts of 1/2 in. diameter.

6-4.3 Hoods and Housings. When the door is mounted on the face of the wall or between jambs, the metal hood and housing shall be tightly secured to the brackets and/or wall.[2]

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[1] Because anchor bolts must be set at the time the wall is being constructed their use is not recommended. A structural steel frame provided at the jamb for mounting the guides is acceptable.

[2] A flame baffle may be an integral part of the hood or curtain and utilized where required to protect the opening.

6-5 Closing Devices.

6-5.1 An automatic-closing device shall be installed on every rolling steel door.

6-5.2 Rolling steel doors shall be made automatic closing by the incorporation of an integral escapement system consisting of either a spring releasing device or an auxiliary push-down spring which, when activated by release of a fusible link or detector, will cause the door to close.

6-5.3 The automatic-closing mechanism shall be enclosed in a metal housing to protect the mechanism from debris and insure proper operation in the event of fire.

6-5.4 A governor, when employed on a door, shall be an integral mechanism working in coordination with the closing device and shall control the closing speed of the door.

6-6 Automatic Fire Detectors.[1]

6-6.1 When smoke detectors are used they shall be located as shown in Figure 51, Appendix A.

6-6.2 Installation. Detectors and their components shall be installed in accordance with the manufacturer's instructions.

6-7 Power-Operated Fire Doors. Power-operated fire doors are those which normally are opened and closed by power. They shall be equipped with a releasing device which will automatically disconnect the power operator at the time of fire, allowing a self-closing or automatic-closing device to close the door irrespective of power failure or manual operation.

[1] The arrangements shown in Figures 48, 49, and 50, Appendix A, are recommended to give the performance intended. Other arrangements acceptable to the authority having jurisdiction may be used.

Chapter 7

Use and Installation of Hoistway Doors for Elevators and Dumbwaiters

7-1 Scope. This section covers only fire door assemblies in hoistway entrances directly connected with elevator or dumbwaiter operation and used in the vertical hoistway enclosure for the purpose of preventing the passage of fire through such entrances. Fire door assemblies not connected with access to cars shall be installed as provided in other sections of this standard.

7-2 General Requirements.

7-2.1 Doors shall be 1 hour(B) or 1½ hour(B) and shall be hollow metal or steel-covered composite types as defined in Section 1-8.

7-2.2 Hoistway Door Vision Panels.

7-2.2.1 Manually operated or self-closing hoistway doors of the vertically or horizontally sliding type, for elevators with automatic or continuous-pressure operation, shall be provided with a vision panel.[1]

Exception: Where a corridor position indicator is provided at the landing of automatic-operation elevators.

7-2.2.2 In multiple-section doors, the vision panel shall be required in one section, but shall be permitted in all sections. All swinging elevator doors shall be provided with vision panels.

7-2.2.3 Where required or used, vision panels shall conform to the following requirements:

(a) The area of any single vision panel shall be not less than twenty-five (25) square inches, and the total area of all vision panels in any hoistway door shall be not more than eighty (80) square inches.

(b) The clear opening of each vision panel shall not permit passage of a ball six (6) inches in diameter.

(c) Muntins used between panel sections shall be of noncombustible material and of substantial construction.

[1] Vision panels may be provided for any type of hoistway door, irrespective of the type of operation of the elevator.

(d) Vision panel openings shall be glazed with labeled clear wired glass not less than one-quarter (¼) inch thick.

(e) The center of the panel shall be located not less than fifty-four (54) inches nor more than sixty-six (66) inches above the landing.

Exception: For vertically sliding bi-parting counterbalanced doors, it shall be located to conform with the dimensions indicated insofar as the door design will permit.

(f) The vision panels in swinging doors shall be located for convenient vision when opening the door from the car side.

7-2.3 Elevator doors shall be closed when not in use and shall remain closed in a fire emergency.

Exception: When under the control of the fire department.

7-3 Types of Doors.

7-3.1 Labeled Swinging Hoistway Doors for Elevators — Fire Rated Entrance Assembly. *(See Figure 52, Appendix A.)* The major components of a typical assembly (single-swinging or double-swinging) shall include sill and attachments, frame with attachments, door panel (panels) and hinges, closing devices, and latching device.

7-3.2 Labeled Horizontally Sliding Hoistway Doors for Elevators — Fire Rated Entrance Assembly. *(See Figures 53 and 54, Appendix A.)* The major components of a typical assembly (single- or multi-section, side- or center-opening) shall include landing sill with attachments, header with vertical struts or other supports, frame with attachments, hanger track assembly, hangers, door panel (panels), and door closing devices where required.

7-3.3 Labeled Vertically Sliding Hoistway Doors for Elevators — Fire Rated Entrance Assembly. *(See Figure 55, Appendix A.)* The major components of a typical assembly (vertically sliding bi-parting counterbalanced or vertically sliding counterweighted, single- or multi-section) shall include frame and attachments, landing sills, guide rails, door panel with guides, counterbalancing mechanism or counterweight and door locking device for elevator operation.

7-3.4 Labeled Hoistway Doors for Dumbwaiters — Fire Rated Entrance Assembly. The major components of a typical assembly are pre-assembled and shall conform to paragraph 7-3.1 for swinging doors; paragraph 7-3.2 for horizontally sliding doors; and paragraph 7-3.3 for vertically sliding doors. *(See Figure 56, Appendix A, for vertically bi-parting doors.)*

Chapter 8 Use and Installation of Chute Doors

8-1 General.

8-1.1 Chute doors shall be of the swinging type, hinged on side or bottom for intake and on side or top for discharge.

8-1.2 Chute doors shall have a fire protection rating of 1 hour (B) or 1½ hour (B).[1]

8-2 Sills. Chute door assemblies shall be installed on masonry sills and shall be securely fastened to the sill or the chute.

8-3 Walls. These assemblies shall be installed in masonry walls in a similar manner to that of pressed steel frames of the single type. No part of the assembly shall project into the chute.

8-4 Lintels. The lintel shall be constructed of noncombustible materials and adequate for the service.

8-5 Closing Device. Doors shall be arranged for automatic-closing operation as described in 3-10.1 for swinging doors.

[1] Some chute doors, depending on location, may be required to have a temperature rise of not more than 250°F at the end of 30 minutes exposure to the standard fire test as described in *Standard Methods of Fire Tests of Door Assemblies, NFPA 252-1972.*

Chapter 9 Use and Installation of Fire Shutters

9-1 General.

9-1.1 Fire doors without glass lights shall be used as fire shutters.

9-1.2 Shutters shall be of three general types:

(a) Swinging door

(b) Horizontally or vertically sliding door

(c) Rolling steel door

9-2 Installation.

9-2.1 The installation of shutters shall be in accordance with the requirements for installation of swinging, sliding, and rolling steel doors.

9-2.2 When shutters are installed on the outside of an opening, they shall be protected against the weather to insure proper operation.[1]

9-3 Operation of Shutters.

9-3.1 All shutters shall be equipped to close automatically in the event of fire.

9-3.2 The operation of shutters shall be in accordance with the requirements for operation of swinging, sliding, and rolling steel doors.

9-4 Location of Detection Device.

9-4.1 Fusible links shall be located in the proximity of the shutter near the top of the opening and in an area where there is no obstruction to the circulation of air.

[1] Shutters may be installed on the inside or outside of an opening or between jambs, but preferably on the inside or between jambs for ease of maintenance and protection from adverse weather conditions.

Chapter 10 Use and Installation of Access Doors

10-1 General.

10-1.1 Each access door shall either be an integral unit including door, frame, hinges, and latch bearing the "*Frame and Fire Door Assembly*" label, or consist of a labeled door, frame, and latch with hinges that conform to Table 2-8A.

10-1.2 Doors shall be self-latching. Doors shall be openable from the inside without the use of a key or tool.

10-1.3 Access doors shall be kept in the closed and latched position when not in use.

10-2 Installation.

10-2.1 Access doors shall have a fire protection rating of 1 hour (B) or 1½ hour (B).[1]

10-2.2 When installed in a vertical surface, access doors shall be self-closing. This shall be accomplished by use of a closer or by top hinging to provide gravity closing.

10-2.3 A horizontally mounted access door shall be self-closing and shall be used only if it has been tested as a component of a fire-rated floor, floor-ceiling, or roof-ceiling assembly.

[1] Some access doors, depending on location and the proximity of combustibles, may be required to have a temperature rise of not more than 250°F at the end of 30 minutes exposure to the standard fire test as described in *Standard Methods of Fire Tests of Door Assemblies, NFPA 252-1972.*

Chapter 11

Use and Installation of Service Counter Doors

11-1 Door Construction. Door construction shall be as follows:

(a) Door panels of a single or multiple section vertical type, integrally mounted in a four-sided frame to form a labeled door and frame assembly; *or*

(b) Door curtains of the interlocking slat type integrally mounted in a four-sided frame to form a labeled door and frame assembly; *or*

(c) Door curtains of the interlocking slat type including guides, brackets and hoods for mounting directly to masonry walls or noncombustible opening framing.

11-2 Installation.

11-2.1 Service counter doors shall be either factory or field assembled and shall be installed during construction of the wall or in a prepared wall opening.

11-2.2 When service counter doors are mounted in walls other than solid masonry, the frame or guides shall be anchored to steel struts running from the floor to a supporting member above.

11-2.3 Heads of integral door frame assemblies shall not support a wall above. Separate lintels shall be provided of a size based on the type of wall construction and loads to be supported.

11-3 Automatic Closers.

11-3.1 All service counter doors shall be equipped to close automatically in the event of fire.

11-3.2 A service counter door of the rolling type shall be made automatic-closing by incorporation of an escapement system consisting of a spring-release device or an auxiliary push-down spring.

11-3.3 A service counter door of the swinging or sliding type shall be made automatic-closing by a system of weights suspended by ropes, cables, or chains over pulleys which, when activated by release of an automatic fire detector, will cause the door to close.

11-3.4 A governor, when employed on a service counter door, shall work in coordination with the closing device and shall control the closing speed of the door.

11-4 Automatic Fire Detectors.

11-4.1 Detectors or fusible links shall be installed on both sides of the wall and interconnected so that the operation of any single detector or fusible link will cause the door to close.

11-4.1.1 When fusible links are used, one fusible link shall be located near the top of the opening and additional links shall be located at or near the ceiling on each side of the wall.

11-4.1.2 When smoke detectors are used, they shall be located as shown in Figure 51 of Appendix A.

11-4.2 Detectors and their components shall be installed in accordance with the manufacturer's instructions.

Chapter 12 Use and Installation of Fire Windows

12-1 Classification.

12-1.1 Only labeled window sash shall be used in window openings, as classified in Footnote 1 of 1-3.

12-1.2 Labels.

12-1.2.1 The label on ¾-hour window sash for wall openings shall read *"Fire Window Frame"*.

12-1.2.2 The label on window sash shall cover the design and construction of the frame, ventilator, glass retaining members, and hardware. *(See Appendix E for types of window sash.)*

12-1.2.3 The label on hot-rolled or extruded steel section window sash shall include the hot-rolled or extruded steel mullions.

12-1.2.4 The label on hollow metal and hollow metal plate steel combination section window sash shall include hollow metal mullions.

12-1.3 Bearing mullions shall be fire protected with materials acceptable to the authority having jurisdiction.

12-2 Wired Glass.

12-2.1 Only labeled wired glass not less than ¼ in. thick shall be used.

12-2.2 The individual glass exposed area shall not exceed 1,296 sq. in. with no dimension exceeding 54 in.

12-3 Types of Window Sash.

12-3.1 Hollow Metal Window Sash (Frames).

12-3.1.1 Hollow metal window sash (frames) consist of formed steel sheet, reinforced as required, and are of the double hung, counterbalanced, casement, pivoted, stationary, tilting, hinged, and projected types.

12-3.1.2 Maximum Size Openings.

(a) Single sash, other than casement. 5 ft. 0 in. x 5 ft. 0 in.

(b) Multiple sash, other than casement: 7 ft. 0 in. x 10 ft. 0 in.

(c) Single casement sash: 3 ft. 6 in. x 10 ft. 0 in.

(d) Multiple casement sash: 7 ft. 0 in. x 10 ft. 0 in.

12-3.2 Hot-Rolled or Extruded Steel Section Window Sash.

12-3.2.1 Maximum Size Openings.

(a) The heavy intermediate sash types shall be used for openings not exceeding 84 sq. ft. in area with neither dimension exceeding 12 ft. When multiple units are installed, the distance between unprotected vertical steel mullions shall not exceed 7 ft.

(b) The standard intermediate types shall be used for openings not exceeding 60 sq. ft. in area with neither dimension exceeding 10 ft. When multiple units are installed, the distance between unprotected vertical steel mullions shall not exceed 6½ ft.

(c) Residential type windows shall be used for openings not exceeding 6½ ft. in either dimension. When multiple units are installed, the distance between unprotected vertical steel mullions shall not exceed 3½ ft.

12-3.3 Hollow Metal Plate Steel (Combination) Window Sash.

12-3.3.1 These consist of formed sheet steel frame sections at the head, jambs and sill, and plate-steel window sash. They are of the double-hung, counterbalanced, or stationary types.

12-3.3.2 Maximum Size Openings.

(a) Single sash: 5 ft. 0 in. x 5 ft. 0 in.

(b) Multiple sash: 7 ft. 0 in. x 10 ft. 0 in.

12-4 Installation.

12-4.1 Frames shall be securely fastened to the wall and be capable of resisting all wind stresses and any other stresses for which the window was designed.

12-4.2 Fire Lock Angles.

12-4.2.1 Fire lock angles shall be designed to hold the ventilator in the frame as the assembly expands under exposure to fire.

12-4.2.2 When sash is provided with fire lock angles, the fire lock angles shall be so adjusted that they pass one another with a minimum of clearance.

12-4.3 Installation of the Glass.

12-4.3.1 The clearance between the edges of the glass and the metal framing shall not exceed $\frac{1}{8}$ in.

12-4.3.2 Wire clips shall be used only for glazing windows specifically designed for their use.

12-4.3.3 The glass shall be well imbedded in putty and all exposed joints between the metal and the glass shall be struck and pointed.

12-5 Closing Devices. All fire windows shall be of a fixed type or shall be automatic closing. The automatic-closing device may be an integral part of the assembly or a separate system, such as weights suspended by ropes, wire cables, or chains over pulleys, so arranged that operation of the automatic fire detector will permit the ventilator to close.

Chapter 13 Use and Installation of Glass Blocks

13-1 Classification.

13-1.1 Only labeled glass blocks shall be used.

13-1.2 Glass blocks shall be permitted for the protection of exterior openings not exceeding 120 sq. ft. in area with neither the width nor height exceeding 12 ft.

13-1.3 Glass blocks shall be of two sizes 5¾ in. square or 7¾ in. square by 3⅞ in. thick.

13-2 Installation.

13-2.1 The mortar for installing glass blocks shall consist of one part portland cement, one part hydrated lime and four parts No. 1 screened torpedo sand by volume.

13-2.2 Steel lintels shall be made of 3 in. by 3 in. steel angles, cut to provide 1¼ in. clearance at each jamb secured to the structural steel of the building with ⅜ in. bolts, provided with heavy galvanized washers in 2 in. slotted holes spaced 12 in. on center. The blocks shall extend 1⅝ in. into the groove, with glass or mineral wool for expansion in the remaining spaces formed by the angles, and each horizontal row of blocks reinforced with Nos. 9 and 14 Awg galvanized wire mesh for the full length.

13-2.3 Concrete masonry lintels for 7¾ in. by 7¾ in. blocks shall be provided with 2½ in. deep grooves. The blocks shall extend 1½ in. into the groove, with glass or mineral wool in the remaining space, and with each horizontal row of blocks reinforced for the full length with Nos. 9 and 14 Awg galvanized wire mesh, except between the top two rows.

13-2.4 Concrete masonry lintels for the 5¾ in. by 5¾ in. blocks shall be provided with 2⅜ in. deep grooves. The blocks shall extend 1¼ in. into the groove, with glass or mineral wool in the remaining space, and with the first and each fourth horizontal row reinforced for the full length with Nos. 9 and 14 Awg galvanized wire mesh, except between the top two rows.

13-2.5 The jambs of brick or concrete for the 7¾ in. by 7¾ in. blocks shall be provided with 2½ in. deep grooves. The blocks shall extend 1½ in. into the groove, with glass or mineral wool in the remaining spaces in the grooves to provide for expansion of the glass panel.

13-2.6 The jambs of brick or concrete for the 5¾ in. by 5¾ in. blocks shall be provided with 2 in. deep grooves. The blocks shall extend 1¼ in. into the grooves, with glass or mineral wool in the remaining spaces in the grooves to provide for expansion of the glass panel.

13-2.7 Sills shall be made of concrete and coated with an asphalt emulsion to provide for expansion and movement of the panel.

13-2.8 Exterior jamb and lintel edges shall be caulked with waterproofing mastic.

Chapter 14 Care and Maintenance

14-1 General.[1]

14-1.1 When a door or window opening is no longer to be used, the opening shall be filled with construction equivalent to that of the wall.

14-1.2 Doors, shutters, and windows shall be operable at all times. They shall be kept closed and latched or arranged for automatic closing.

14-1.3 When it is necessary to replace fire doors, shutters, or windows or their frames, hardware and closing mechanisms, replacements shall meet the requirements for fire protection and be installed as required for new installations elsewhere in this Standard.

14-1.4 Repairs shall be made and defects that may interfere with operation shall be corrected immediately.

14-2 Specific Requirements.

14-2.1 Inspections.[2]

14-2.1.1 Hardware shall be examined frequently and any parts found to be inoperative shall be replaced immediately.[3]

14-2.1.2 Tinclad and Kalamein doors shall be inspected regularly for dry rot.

14-2.1.3 Chains or cables employed on suspended doors shall be inspected frequently for excessive wear and stretching.

14-2.2 Lubrication and Adjustments.

14-2.2.1 Guides and bearings shall be kept well lubricated to facilitate operation.

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[1] Walls with openings have less fire resistance than unpierced walls. Fire doors, shutters, and fire windows are designed to protect the opening under normal conditions of use, with clear spaces on both sides of the opening. When the opening is not used and combustible material may be piled against or near the door, window, or shutter, the designed protection cannot be expected.

[2] Fire doors, shutters, and windows are valueless unless properly maintained and closed or able to close at the time of fire. A periodic inspection and maintenance program should be implemented and should be the responsibility of the property management.

[3] Hinges, catches, closers, latches, and stay rolls are especially subject to wear.

14-2.2.2 Chains or cables on bi-parting counterbalanced doors shall be checked frequently and adjustments made to insure proper latching and to keep the doors in proper relation to the opening.

14-2.3 Prevention of Door Blockage.

14-2.3.1 Door openings and the surrounding areas shall be kept clear of everything that would be likely to obstruct or interfere with the free operation of the door.

14-2.3.2 When necessary, a barrier shall be built to prevent the piling of material against sliding doors.

14-2.3.3 Blocking or wedging of doors in the open position shall be prohibited.

14-2.4 Maintenance of Closing Mechanisms.

14-2.4.1 Self-closing devices shall be kept in proper working condition at all times.

14-2.4.2 Doors normally held in the open position and equipped with automatic-closing devices shall be operated at frequent intervals to insure proper operation.

14-2.4.3 Fusible links or other heat-actuated devices shall not be painted.

14-2.4.4 Care shall be taken to prevent paint accumulation on stay rolls.

14-2.5 Repair of Fire Doors and Windows.

14-2.5.1 Broken or damaged lights of glass shall be replaced with labeled wired glass, at least ¼ in. thick, well imbedded in putty and all exposed joints between the metal and the glass shall be struck and pointed.

14-2.5.2 Any breaks in face covering of doors shall be repaired immediately.

14-2.6 Fire Prevention. Combustible material shall be kept well away from openings.

Appendix A

Drawings of Fire Door Assemblies and Components

The figures included in this section illustrate typical good practice. Other methods acceptable to the authority having jurisdiction may be used.

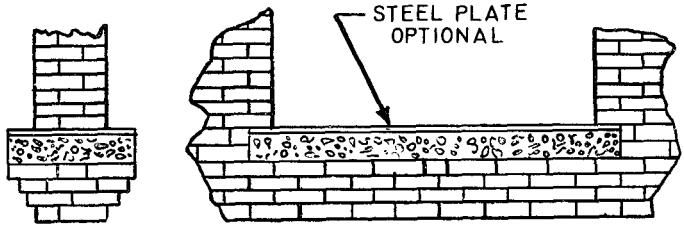


Figure. A-1. Concrete sill supported by a corbel of brick used with combustible floors.

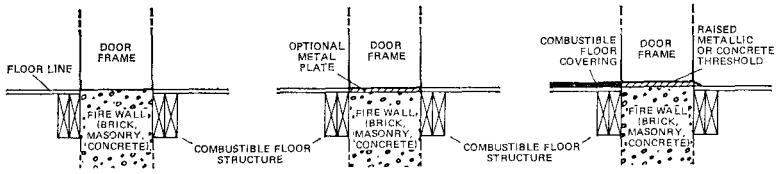


Figure A-2. Noncombustible sill used with combustible floors for doors swinging into steel frame.

Combustible floor covering shall not be permitted to extend through the door openings.

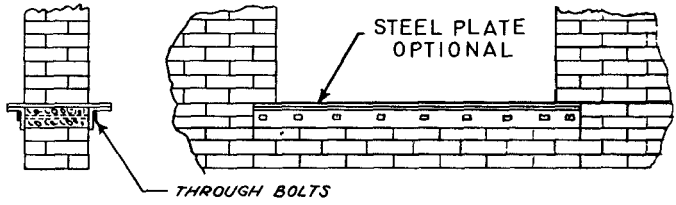


Figure A-3. Angle iron and concrete sill used with combustible floors.

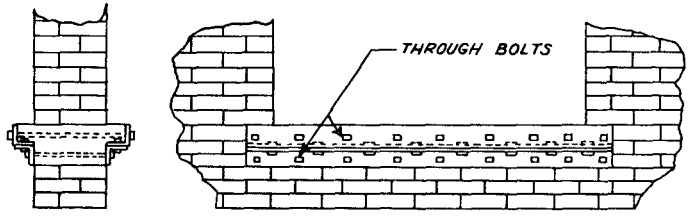


Figure A-4. Z-bar and concrete sill used with combustible floors.

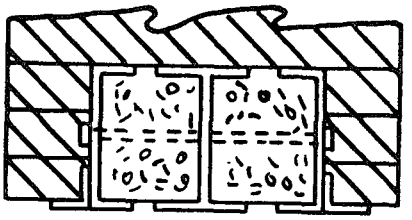


Figure A-5. Steel lintel.

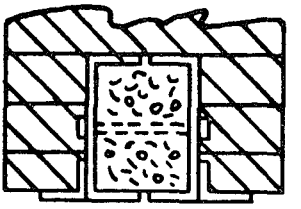


Figure A-6. Steel lintel.

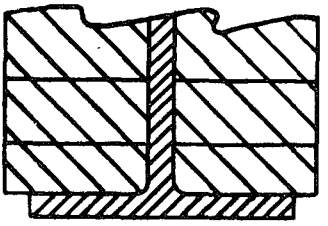


Figure A-7. Steel lintel.

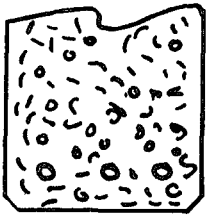


Figure A-8. Reinforced concrete lintel.

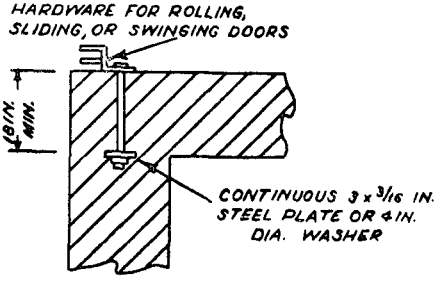


Figure A-9. Corner walls.

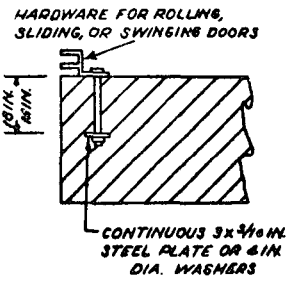


Figure A-10. Unusually thick walls.

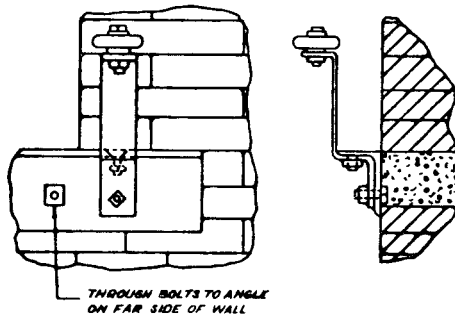


Figure A-11. Stay roll.

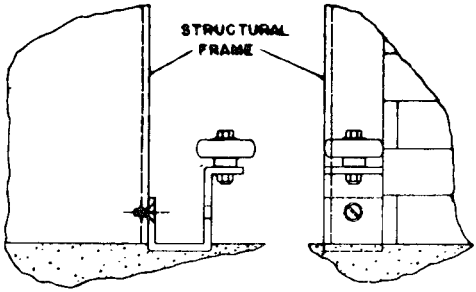


Figure A-12. Stay roll.

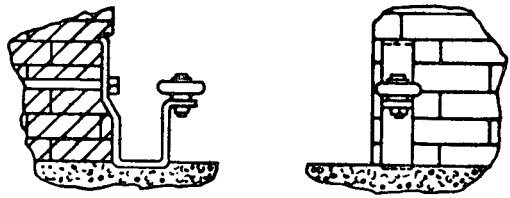


Figure A-13. Stay roll.

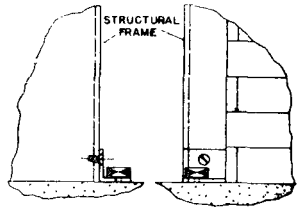


Figure A-14. Concealed type stay roll.

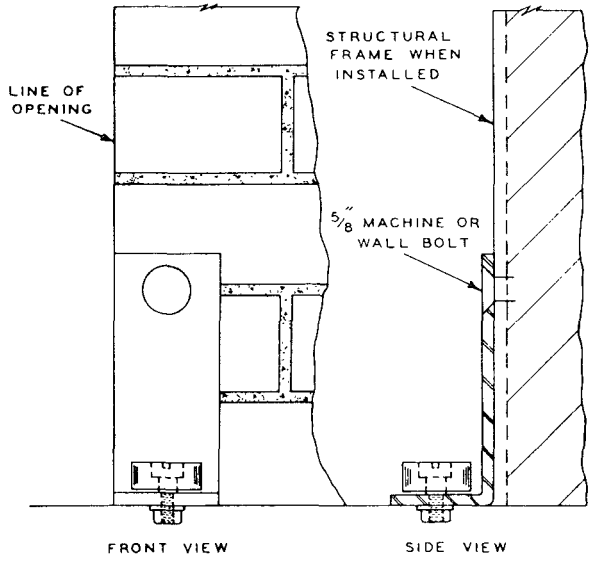


Figure A-15. Concealed type stay roll.

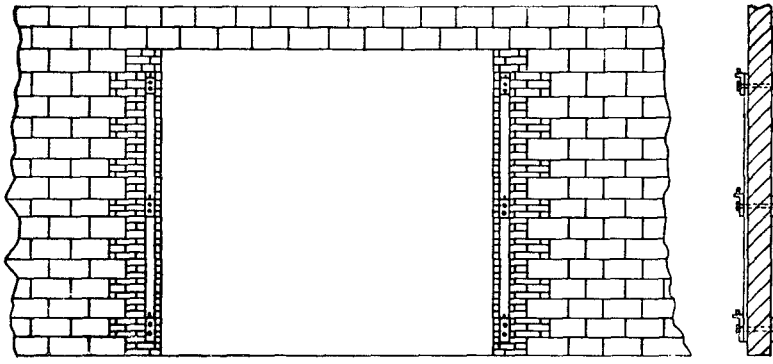


Figure A-16. Concrete block wall prepared for doors swinging in pairs — lap mounted, standard method.

Concrete block may be used in lieu of brick, provided all hollow cells within 16 inches of the opening are filled with concrete. It is recommended when openings are subjected to heavy traffic that jambs be protected with steel frames extending full thickness of the wall.

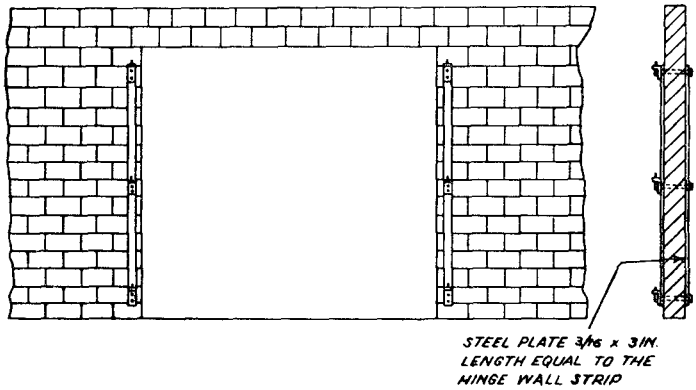


Figure A-17. Concrete block wall prepared for doors swinging in pairs — lap mounted.

It is recommended when openings are subjected to heavy traffic that jambs be protected with steel frames extending full thickness of the wall.

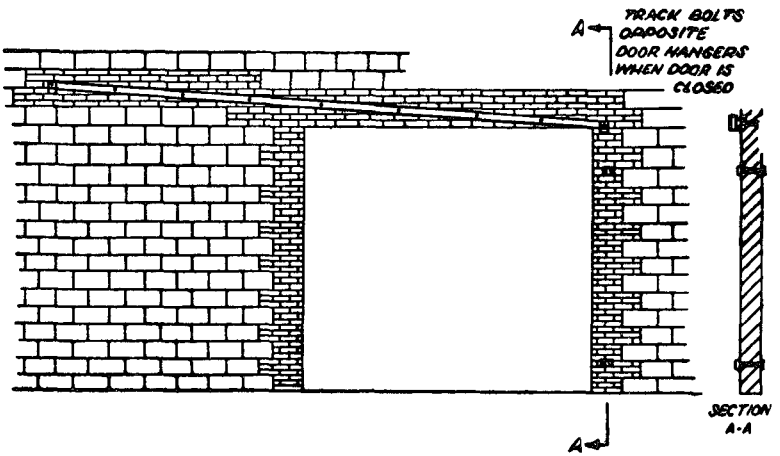


Figure A-18. Concrete block wall prepared for a single tinclad or sheet metal sliding door, standard method.

Concrete block may be used in lieu of brick, provided all hollow cells within 16 inches of opening on each side and all cells where track is mounted are filled with concrete. It is recommended when openings are subjected to heavy traffic that jambs be protected with steel frames extending full thickness of the wall.

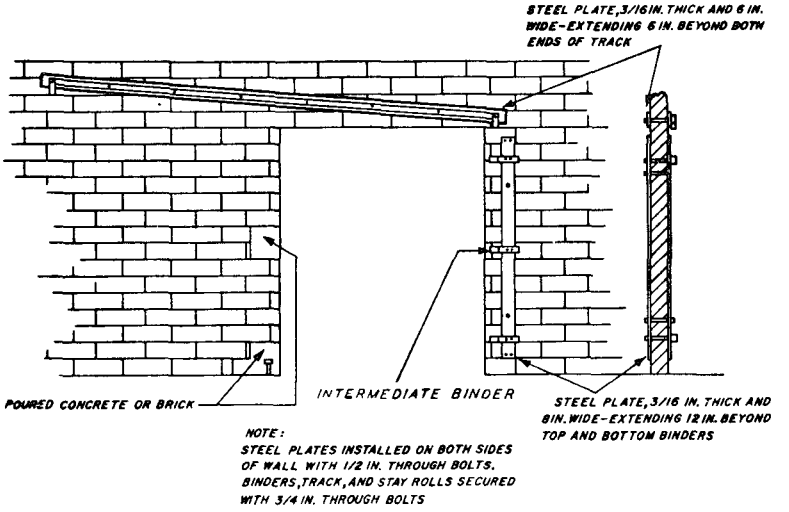


Figure A-19. Concrete block wall prepared for a single sliding door.

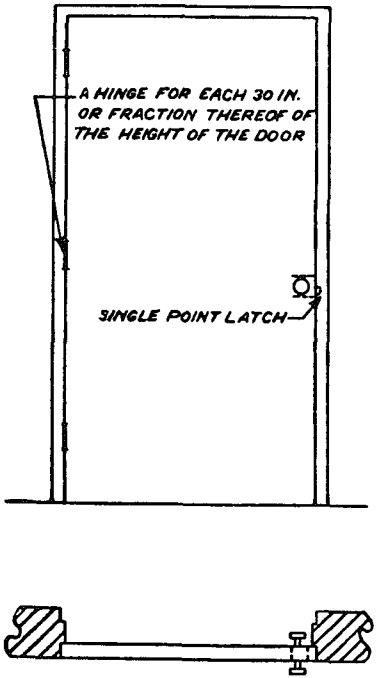


Figure A-20. Builders hardware (single swinging door with single point latch — flush mounted.)

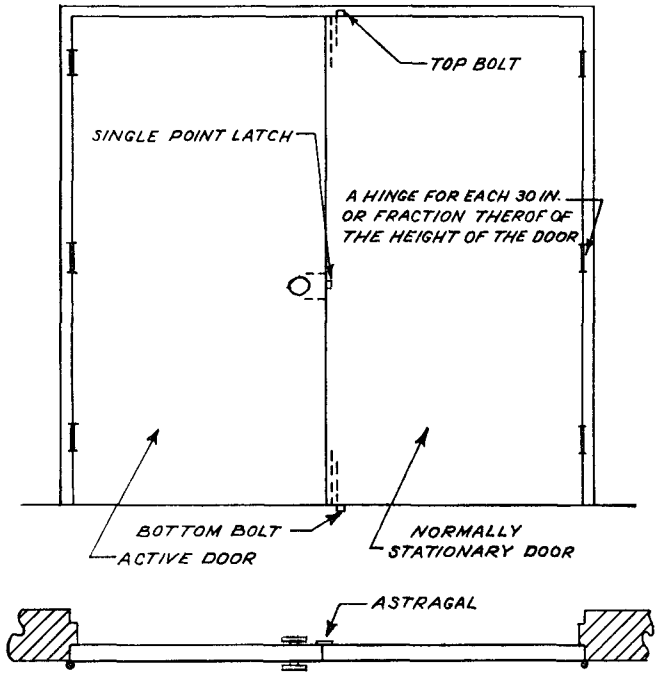


Figure A-21. Builders hardware (doors swinging in pairs with single point latch — flush mounted.)

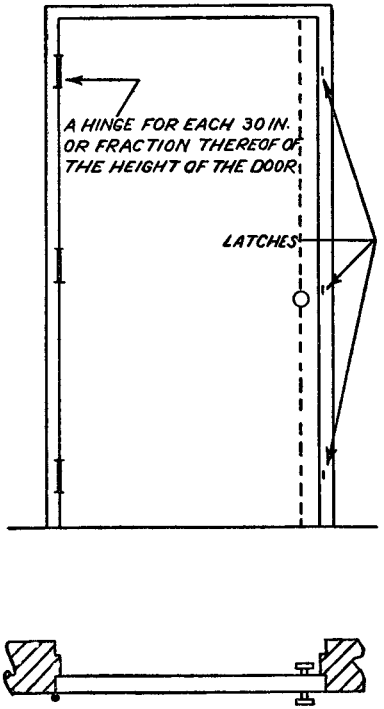


Figure A-22. Builders hardware (single swinging door with concealed three point latch — flush mounted.)

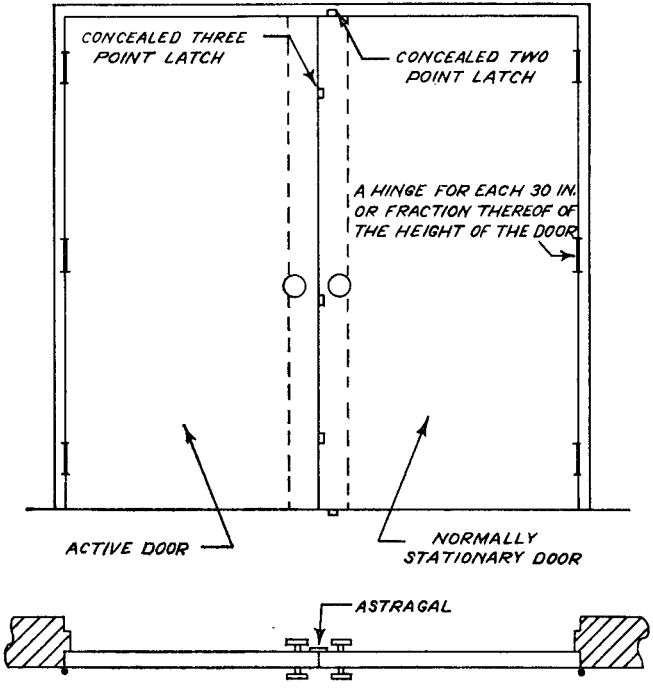


Figure A-23. Builders hardware (doors swinging in pairs with concealed two and three point latches — flush mounted.)

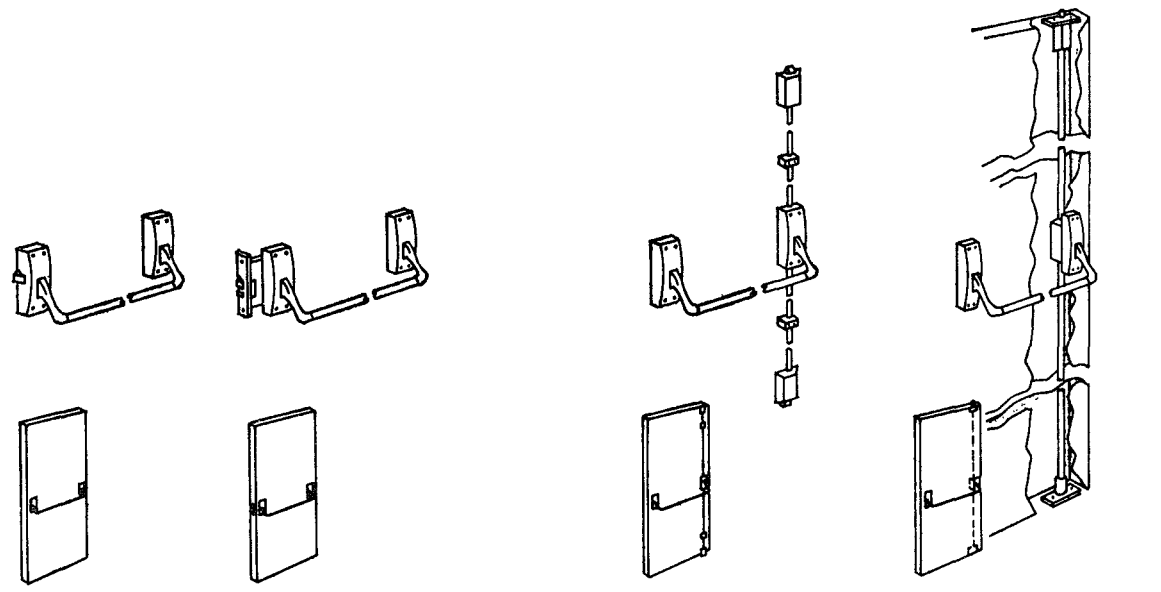


Figure A-24. Types of fire exit hardware.

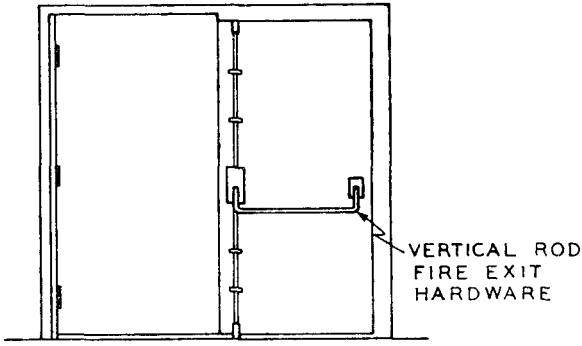
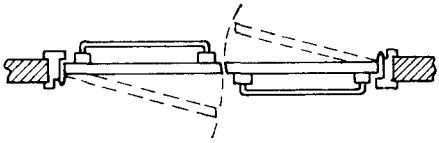


Figure A-25. Double egress door and frame.



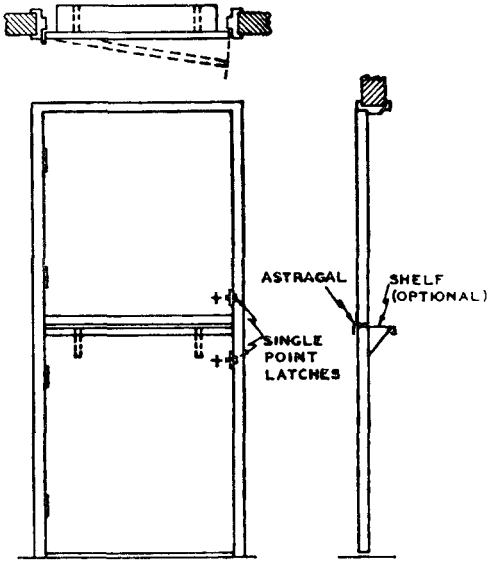
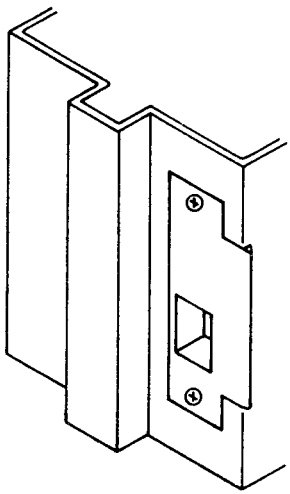
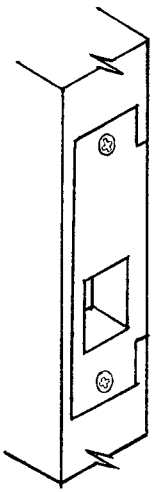


Figure A-26. Dutch door and frame.



Single door installed in jamb.



Pairs of doors installed in edge of inactive leaf.

Figure A-27. Typical latch strike for single or pairs of doors.

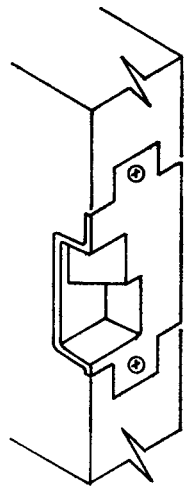


Figure A-28. Typical "open-back" latch strike for pairs of doors, installed in edge of inactive leaf, when permitted by individual published listings.

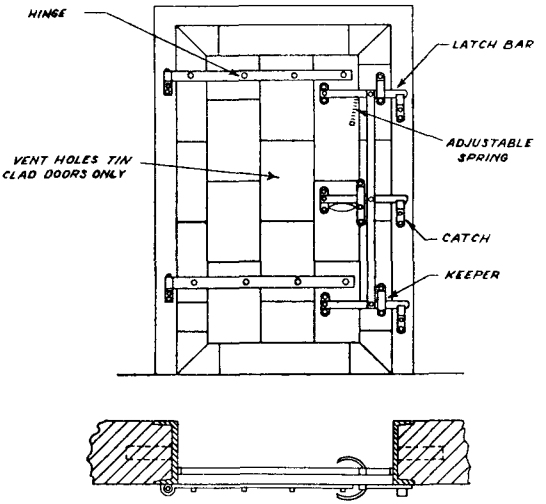


Figure A-29. Fire door hardware (single swinging door — flush mounted.)

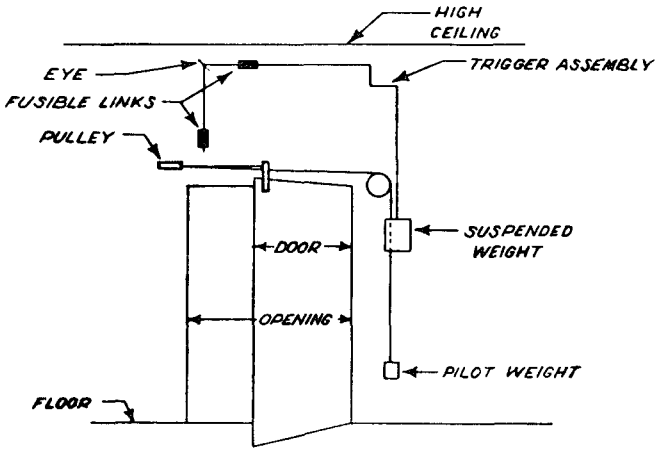


Figure A-30. Closing devices for single swinging door.

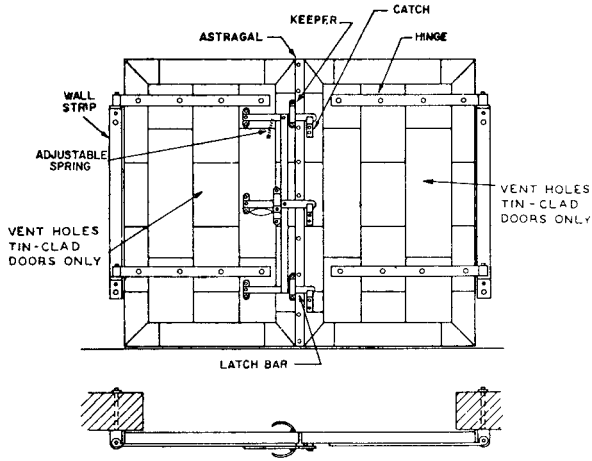


Figure A-31. Fire door hardware (doors swinging in pairs — lap mounted.)

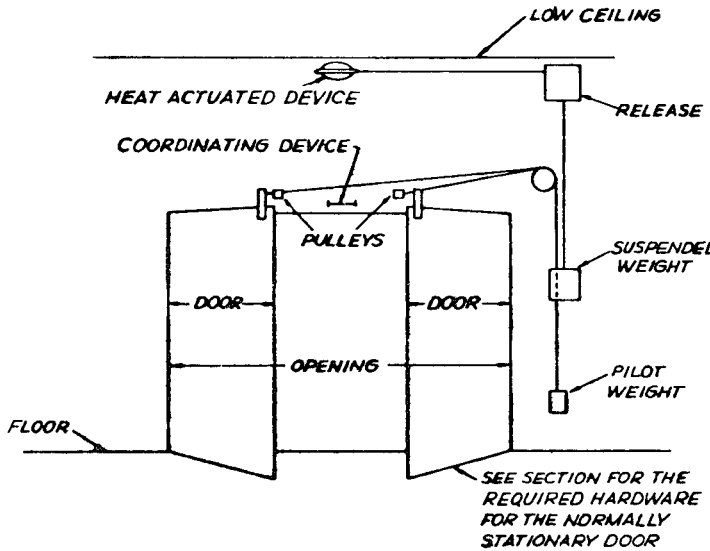
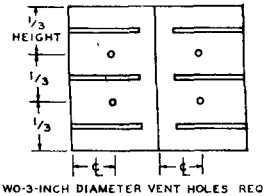
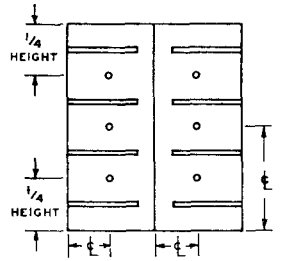


Figure A-32. Closing devices for doors swinging in pairs.



TWO-3-INCH DIAMETER VENT HOLES REQUIRED FOR EACH DOOR LEAF UP TO AND INCLUDING 8 FEET 6 INCHES IN HEIGHT.



THREE-3-INCH DIAMETER VENT HOLES REQUIRED FOR EACH DOOR LEAF 8 FEET 6 INCHES AND UP TO AND INCLUDING 12 FEET IN HEIGHT.

Figure A-33. Location of vent holes for swinging doors.

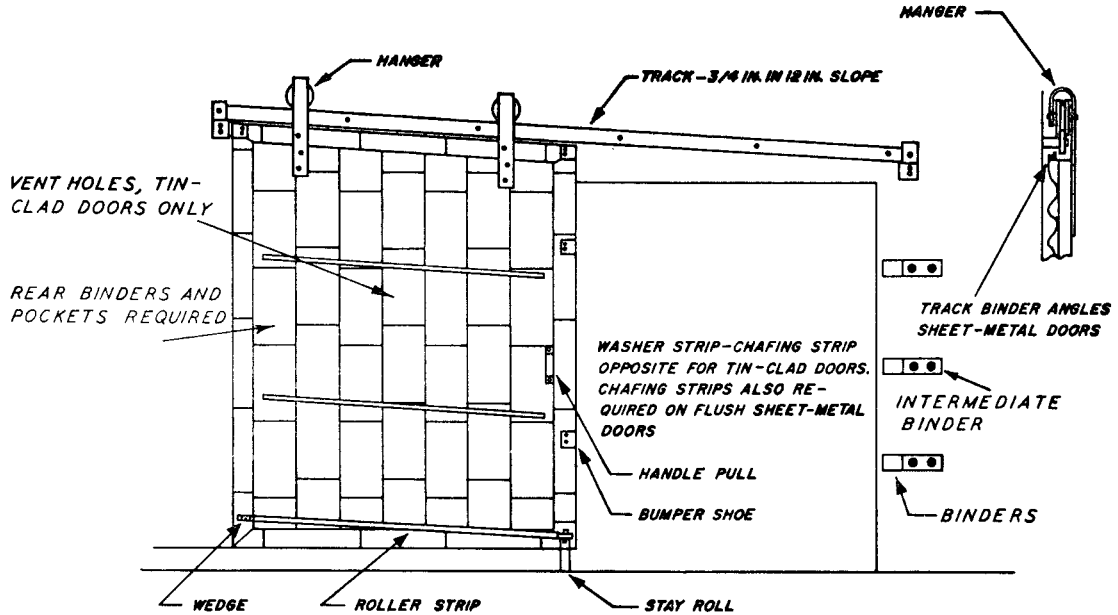


Figure A-34. Single sliding door (inclined track.)

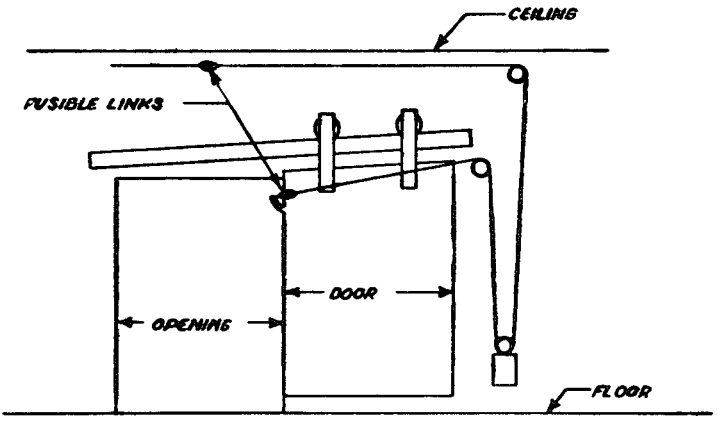


Figure A-35. Closing devices for single sliding door (inclined track.)

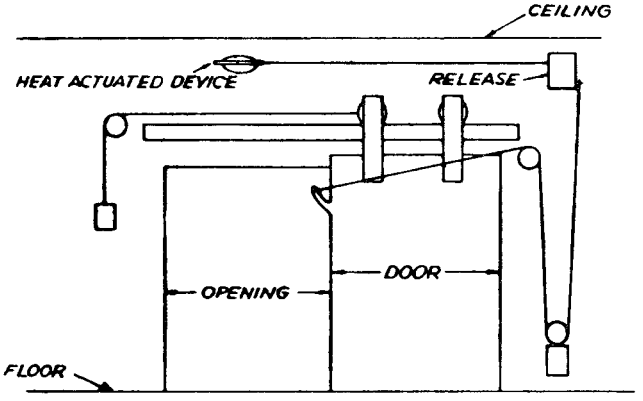


Figure A-36. Closing devices for single sliding door (level track.)

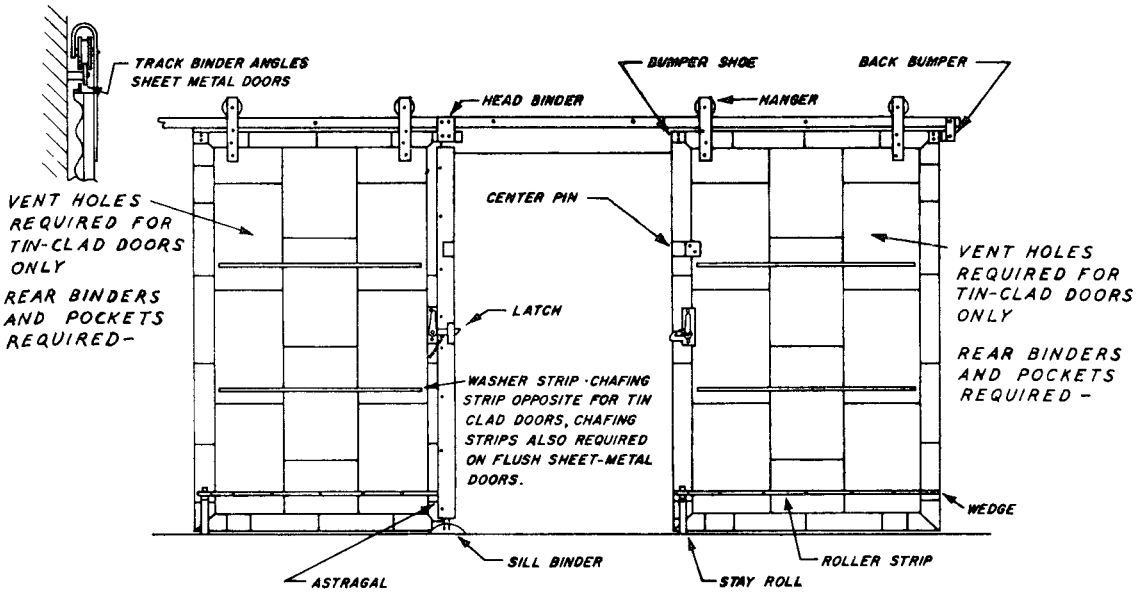


Figure A-37. Center parting horizontally sliding doors (level track.)

NOTE: Binder and pocket required. Vent holes required for tinclad only.

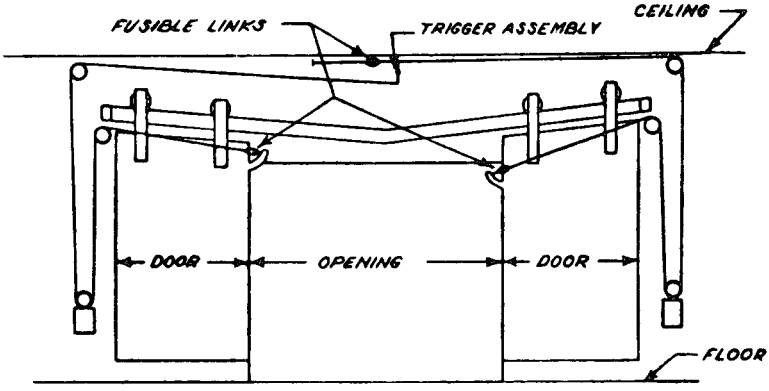


Figure A-38. Closing devices for center parting horizontally sliding doors (inclined track.)

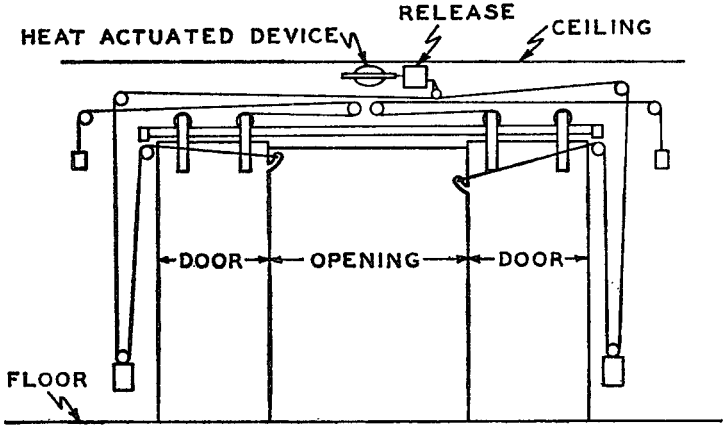


Figure A-39. Closing devices for center parting horizontally sliding doors (level track.)

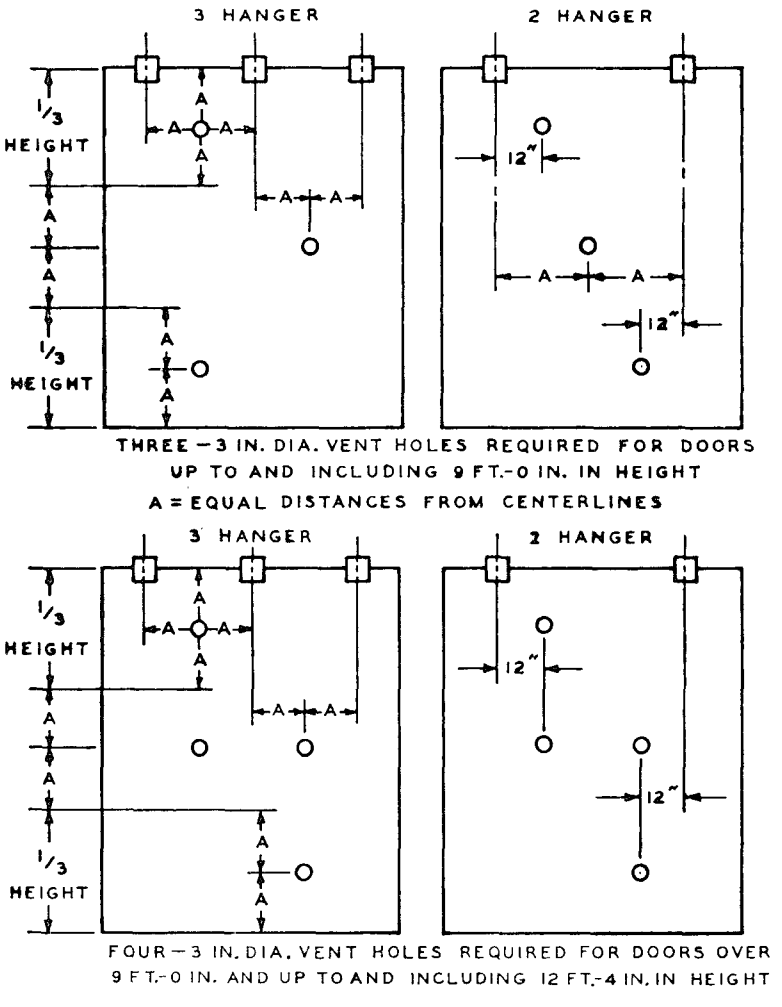


Figure A-40. Location of vent holes for horizontally sliding door.

NOTE: For vertically sliding doors the vent holes are to be positioned similarly, but so as not to interfere with the attached hardware.

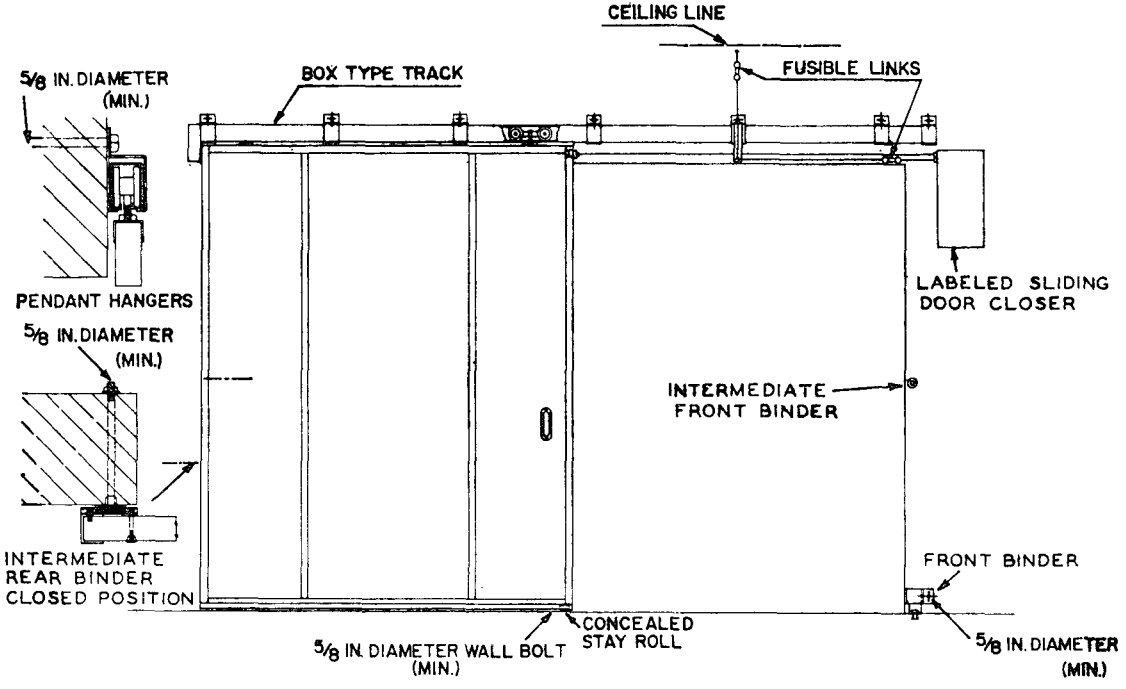


Figure A-41. Horizontally sliding composite door.

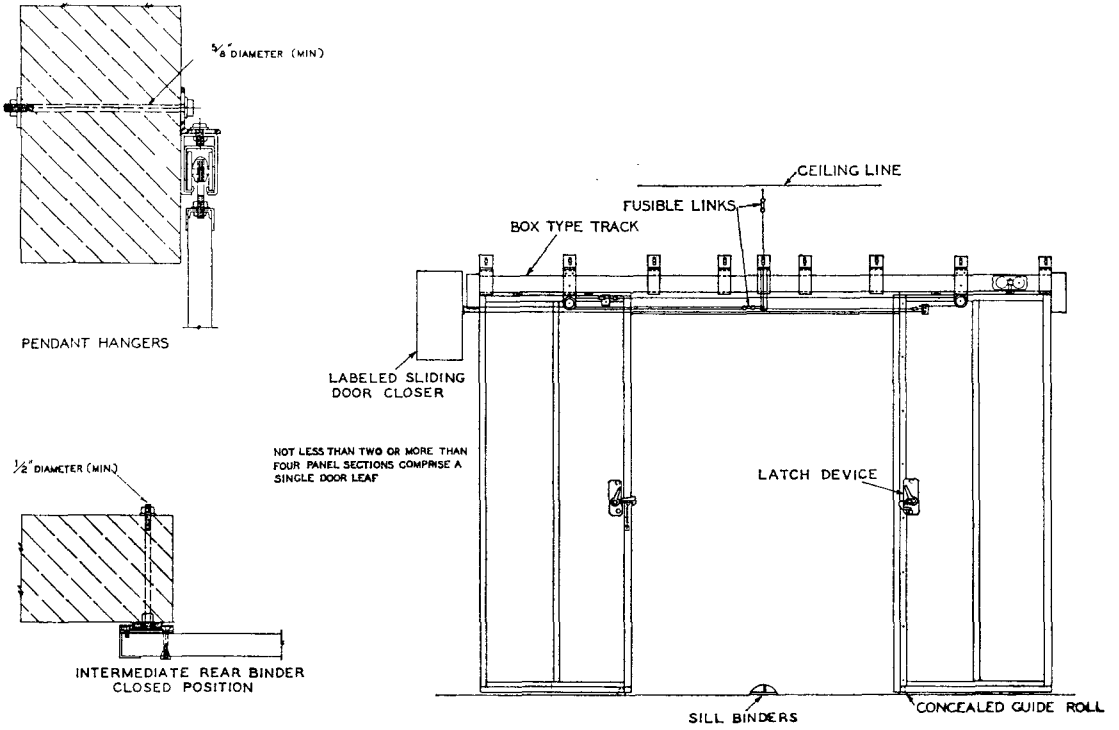


Figure A-42. Center parting horizontally sliding composite doors.

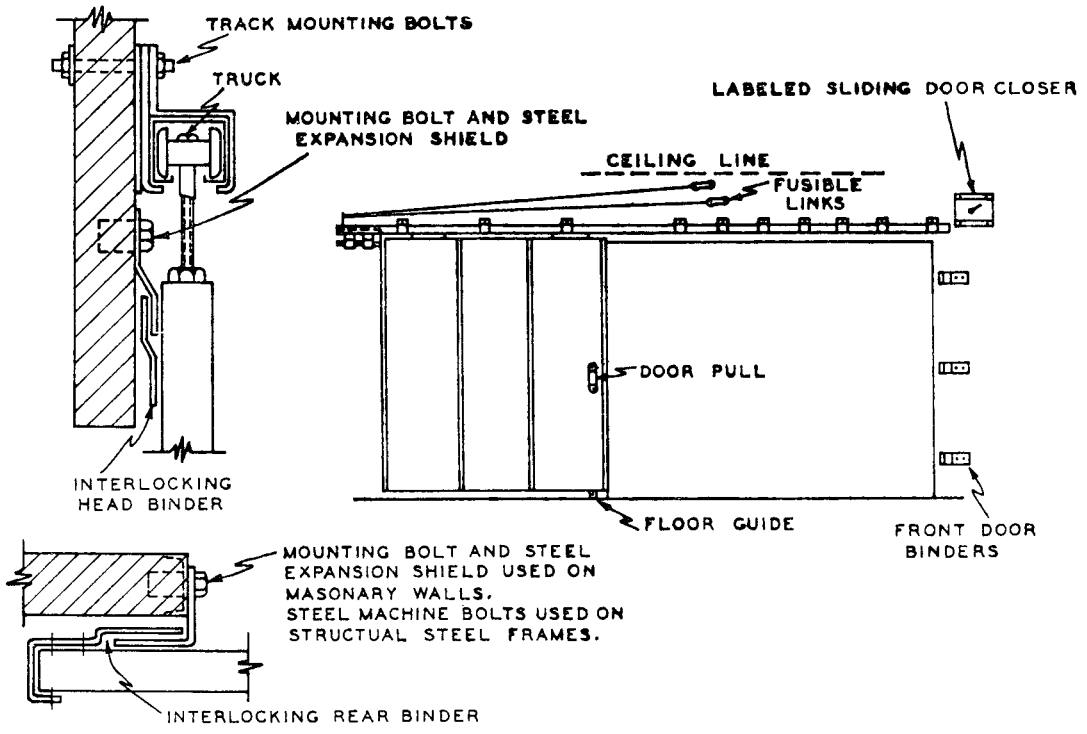


Figure A-43. Horizontally sliding hollow metal door.

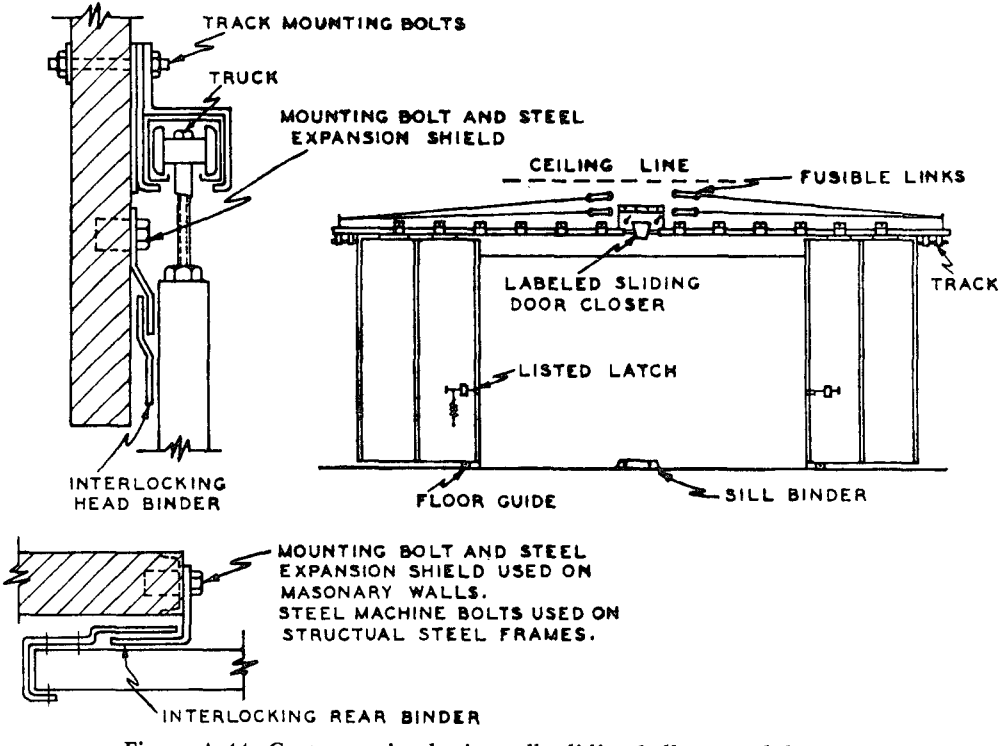


Figure A-44. Center parting horizontally sliding hollow metal doors.