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Standard for the

PROTECTION OF OPENINGS

in

WALLS AND PARTITIONS

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NATIONAL FIRE PROTECTION ASSOCIATION

INTERNATIONAL

Executive Office: 60 Batterymarch St., Boston 10, Mass.

The National Fire Protection Association was organized in 1896 to promote the science and improve the methods of fire protection and prevention, to obtain and circulate information on these subjects and to secure the cooperation of its members in establishing proper safeguards against loss of life and property by fire. Its membership includes over a hundred and eighty national and regional societies and associations (list on outside back cover) and more than fifteen thousand individuals, corporations, and organizations. Anyone interested may become a member; membership information is available on request.

This pamphlet is one of a large number of publications on fire-safety issued by the Association; a complete list is available without charge on request. The standards, prepared by the technical committees of the National Fire Protection Association and adopted in the annual meetings of the Association, are intended to prescribe reasonable measures for minimizing losses of life and property by fire. All interests concerned have opportunity through the National Fire Protection Association to participate in the development of the standards and to secure impartial consideration of matters affecting them.

NFPA standards are purely advisory as far as the Association is concerned, but are widely used by law enforcing authorities in addition to their general use as guides to fire-safety.

Definitions

The official NFPA definitions of "shall", "should" and "approved" are:

SHALL is intended to indicate requirements.

SHOULD is intended to indicate recommendations, or that which is advised but not required.

APPROVED refers to approval by the authority having jurisdiction.

Units of measurements used here are U. S. standard. 1 U. S. gallon= 0.83 Imperial gallons=3.785 liters.

Approved Equipment

The National Fire Protection Association does not "approve" individual items of fire protection equipment, materials or services. The standards are prepared, as far as practicable, in terms of required performance, avoiding specifications of materials, devices or methods so phrased as to preclude obtaining the desired results by other means. The suitability of devices and materials for installation under these standards is indicated by the listings of nationally recognized testing laboratories, whose findings are customarily used as a guide to approval by agencies applying these standards. Underwriters' Laboratories, Inc., Underwriters' Laboratories of Canada and the Factory Mutual Laboratories test devices and materials for use in accordance with the appropriate standards, and publish lists which are available on request.

Protection of Openings in Walls and Partitions.

NFPA No. 80 — 1941

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 of 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 in 1916, 1917 and 1918. In 1926 and 1927 further amendments to the 1918 edition were adopted by the NFPA and published by the National Board of Fire Underwriters. Further amendments were adopted in 1928, which were also adopted by the NBFU and printed in 1930. Further revisions were adopted in 1931 and published in 1935 as NBFU Pamphlet No. 80. Amendments were adopted in 1937 and the NBFU edition of 1939 was published. In 1941 the Association adopted further amendments to the 1939 edition. The current printing of the 1939 NBFU edition, Pamphlet No. 80 includes the 1941 amendments and is identical with the present text.

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STANDARDS FOR THE PROTECTION OF OPENINGS IN WALLS AND PARTITIONS AGAINST FIRE.

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PROTECTION OF OPENINGS.

GENERAL.

100. Fundamental Principles.

101. There are several classes of devices (doors, shutters, windows, etc.) primarily designed to resist the passage of fire of the various intensities that may be expected at the openings in walls or partitions in which they are installed.

102. Devices naturally cannot be expected to resist greater exposure than that for which they are designed. Hence, the type of exposure should be carefully determined before the door is selected and the inspection department having jurisdiction should be consulted before ordering.

103. Each class of device used for closing wall openings (when considered from a fire resistance viewpoint) has desirable and undesirable characteristics and the importance of each of these characteristics must be considered in its relation to the specific opening under consideration. In the following standards attention has been called to these limitations as well as the good qualities of each type of device used to protect wall openings against fire with the view of aiding in the selection of the type most likely to meet the requirements of any specific situation.

104. It is not intended that these standards should act as an obstruction to the development of new or improved devices; therefore, devices of a design and construction not specifically mentioned may be recognized when bearing evidence of acceptance as standard by an organization which is properly equipped for experimental testing and inspection of devices at the factory.

105. The attempt has been made to confine structural requirements specified in these standards to devices concerning which test data are not available or to devices that are usually assembled at the place of installation from parts or materials not primarily constructed for the purpose. Structural requirements are not specified in the case of standard devices which may be obtained bearing inspection manifests.

106. It must be recognized that wall openings, despite the provision of standard protection specified in these standards, have a considerably lesser fire resistance than the unpierced wall. 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 and combustible material is to be piled against it, the opening should be bricked up or otherwise filled with construction equivalent to that of the wall.

107. Fire doors, shutters or fire windows are valueless unless properly maintained so that they will 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.

108. In the short descriptive section covering each device, mention is made of the following characteristics:

(a) NUMBER OF UNITS. Whether or not the device is considered as being mounted on one or both sides of wall.

(b) STABILITY. The ability of the device to remain in position closing the opening and forming a barrier to the spread of fire.

(c) INSULATION. The transmission of heat to be anticipated.

NOTE.—Heat may be transmitted by radiation, by flame passage through or around the device or by the burning of combustible material used in construction.

(d) COMBUSTIBILITY. Devices made wholly or in part of combustible material frequently possess heat insulating properties of a high order but when heated may produce considerable quantities of smoke which is forced from the device into the protected areas. Such smoke is liable to hamper the efforts of the firemen, endanger life and (as smoke is a combustible substance) may possibly ignite, causing a smoke explosion.

(e) SAFETY. Characteristics of the device when considered with relation to the possibility or probability of the opening being used as an exit in time of fire.

(f) INSTALLATION AND MAINTENANCE. The installation is very important as under fire conditions the device must be held securely in place despite impact from falling bodies, settlement of the wall and the expansion or warping of the device itself. If under these conditions the device distorts sufficiently to allow the passage of flame, the protection afforded is materially reduced. It is urged that the installation of fire protection devices be entrusted only to those experienced in such work.

109. Vault Doors and Record Room Doors are not covered in these standards. For their installation see Underwriters' Laboratories' List of Inspected Fire Protection Appliances and also N.F.P.A. publication, Protection of Records.*

200. Classification of Openings.

201. Openings are classified as A, B, C, D, E, and F, in accordance with the character and location of the wall in which they are situated.

202. Class A openings are in division walls separating buildings or a single building into fire sections and devices protecting such openings are generally required on both sides of the wall.

203. Class B openings are in enclosures to vertical communications through buildings (stairs, elevators, hatchways, etc.) and devices protecting such openings are required on one side of the wall only.

204. Class C openings are in corridor and room partitions, and devices protecting such openings are required on one side of the wall only and may contain wired glass panels of limited area.

205. Classes D, E, and F openings are those in exterior walls which have severe, moderate or light fire exposure, respectively, from outside the building.

300. Method of Operation.

310. Horizontally Sliding Fire Doors.

311. Doors of this type are generally preferable and should be used unless features relating to exit facilities, service requirements, location or installation make other types advisable.

312. Sliding fire doors can be mounted close to the wall, require only a small amount of floor space, and are less likely than many other types to be rendered inoperative by obstruction.

They can be counterbalanced so as to operate without great difficulty and can be made to close automatically without the use of complicated apparatus.

They are particularly suitable for large openings; the method of operation is not obvious and they are more subject to injury from falling materials at the time of fire than doors that close flush with the face of the wall.

They can be used only where there is sufficient wall space beside and above the openings.

320. Swinging Fire Doors.

321. Doors of this type may be employed where the character and size of the opening make their use advisable. Where egress is in one direction only and the device is mounted singly, the doors should open in the direction of the travel.

322. Swinging doors are easier to operate than those of other types, especially under emergency conditions. They require considerable clear floor space, are more liable to be rendered inoperative by obstruction than doors of certain other types and are difficult to make automatic without the use of complicated apparatus.

323. Swinging doors in pairs do not furnish as satisfactory protection against fire as single doors.

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*Specifications for Vaults and Vault Doors, Record Rooms and Record Room Doors appear in Protection of Records (NFPA No. 232).

330. Vertically Sliding Doors.

331. Doors of this type may be employed where horizontally sliding or swinging doors cannot be used.

332. Vertical doors require considerable room above the opening and must be counterweighted to render them operative. They can be made automatic without the use of complicated apparatus but are difficult to operate, especially after they have closed automatically and their use in any given location should be considered in its relation to life hazards. Serious injury may be anticipated should the door operate while perons are passing under.

NOTE.—Jack-knife doors are not considered suitable for protection of openings in fire walls or vertical shafts.

335. Counterbalanced Doors.

336. Doors of this type are generally used for the protection of openings to freight elevators unless features relating to exit facilities, service requirements, location or installation make the other types of doors advisable. Counterbalanced doors are mounted on the inside face of the vertical shaft and are less likely than other types of doors to be rendered inoperative by obstructions. They can be counterbalanced so as to operate without great difficulty.

340. Rolling Fire Doors.

341. Doors of this type may be employed where the transmission of heat through the door is not liable to result in the spread of fire and when the doors do not serve as exit doors.

342. Rolling doors are capable of being installed in locations where space limitations prevent the installation of doors of other types. They can be mounted flush with the face of the wall so that no floor space is required and are less likely than many other types to be rendered inoperative by obstructions.

They can be counterbalanced so as to operate without great difficulty but the method of operating them is not obvious, and some types of rolling doors are difficult to open after they have closed automatically.

343. The type and use of these doors in any given case should be considered in its effect to life hazard.

350. Swinging Fire Shutters.

351. Shutters of this type may be employed where the character and size of the openings make their use advisable. This is the type of protection ordinarily employed, but shutters mounted in this manner cannot be made to close automatically by ordinary means.

352. Swinging shutters in pairs do not furnish as satisfactory protection against fire as single shutters.

360. Sliding Fire Shutters.

361. Although horizontally sliding fire shutters are sometimes used, this method of operation is not recommended. If used, the top of hanger and track should be covered with a metal hood to prevent the device being rendered inoperative on account of rain wetting the track and then freezing.

370. Rolling Fire Shutters.

371. Rolling shutters can be mounted either on the surface or flush with the face of the wall and may be arranged to close automatically.

Their use should be restricted to situations where the transmission of considerable heat through the shutter is not liable to result in the spread of fire and where the openings do not serve as emergency exits.

380. Operation of Windows.

381. Fire windows may be divided into five general types in accordance with their method of operation, namely sliding, pivoted, casement, top hinged and tilting.

(a) Sliding windows are windows having two sashes ordinarily designed to slide up and down. The motion of these sashes may be independent of each other and controlled by weights in which case the window is called a double hung window, or one sash may counterbalance the other, in which case the window is called a counterbalanced window.

(b) The pivoted window is a window having one or more of the sashes mounted on pivots allowing each movable sash to be turned.

(c) A casement window is a window having the sashes attached to the frame by hinges at a vertical edge and operating in the same manner as a door.

(d) The top hinged window is a window having a sash attached to the frame by hinges at the upper horizontal edge.

(e) A tilting window (projecting type window) is a window in which the sashes are attached to the frame in such a manner as to secure a sliding and tilting movement.

382. The fire protection afforded by windows of these various types mentioned is practically the same, but the pivoted type appears to be the only type which is ordinarily equipped with a reliable-acting automatic closing mechanism.

400. Self-Closing Doors.

401. From a fire protection viewpoint, doors that are normally in the closed position are preferable and doors should not be considered as normally closed unless equipped with an approved door check or other approved device which will insure closing.

410. Automatic Doors.

411. Doors which are liable to be retained in the open position should be equipped with a heat actuated mechanism which will insure their closing in time of fire.

412. The fire doors at all openings in major fire walls or where the conditions are such that the spread of fire through the wall opening is likely to be very rapid or where the spread of fire through the wall openings is likely seriously to endanger life, should be operated by an approved automatic quick-operating door closing device or system.

413. Where the conditions are such that the possibility of the very rapid spread of fire through the wall openings is small, and where the spread of fire through such openings is not likely seriously to endanger life, the fire doors may be operated by a less sensitive approved automatic door closing system or device such as the fusible link type.

NOTE.—It should be noted that the question is not so much that of rise of temperature as of rapidity of spread, and that in all situations where a very rapidly spreading fire appears likely, the sensitive device should be used. Such situations include those where there is a liability of a train of flammable material leading through the opening, or where

highly flammable material is present on each side of the opening in such close proximity to it that fire could pass through the opening before generating sufficient heat to operate the less sensitive door closing device.

Where quick operating door closing device or systems are used on doors furnishing the sole exit from hazardous areas, consideration should be given to the possibility that doors may close before occupants have time to escape from the fire area and that occupants may be trapped. The slower operating fusible link closing devices do not ordinarily involve this danger.

There are numerous methods of arranging fire doors to close automatically. The inspection bureau having jurisdiction should be consulted.

420. Doors Oversize for Standard Fire Protection.

421. Fire doors bearing the inspection manifest for openings oversize for standard fire protection in Classes A, B, D and E locations have not been subjected to standard fire tests in openings exceeding in size those specified in the tables in paragraph 1104 and have been inspected only for materials, design and construction.

CLASS A—PROTECTION OF OPENINGS IN DIVISION WALLS BETWEEN SEPARATE BUILDINGS OR SECTIONS OF BUILDINGS.

1001. The great importance of fire walls in preventing the spread of fire and the fact that they are liable to be severely exposed to fire for considerable periods makes it essential that all openings in such walls be protected by the most efficient methods, due consideration being given to their possible use as exit doors and, therefore, consideration being given to safety to life features.

1100. General Standards—Class A.

1101. Number of Wall Openings.

Shall be as few as the nature of the business will permit, giving due consideration to the possible necessity of their use as exit in time of fire.

NOTE.—The number of openings in division walls may be dictated by the number of occupants who have to use the openings as a means of exit at the time of fire. From the fire protection viewpoint, the number of openings should be as few as possible as there is always the chance that fire doors will be open at the time of fire, either through neglect to close them, failure of the automatic closing devices or inability to close doors that have been opened to afford better opportunity for fighting fire or for exit travel.

Considering the openings as safety exits the requirements are directly opposite. The openings should be sufficient in number to permit the occupants of the affected section to escape quickly. Doors protecting the openings should be open if possible, should preferably be on one side of the wall only and should be equipped with an easily operated latching mechanism.

The reconciling of these conflicting requirements calls for a careful consideration of many details which vary with each specific situation and necessitate consultation with inspection departments having jurisdiction in each case. (See NFPA Building Exits Code, NFPA No. 101.)

1102. Size of Wall Openings.

Openings used as exits shall be at least six feet, six inches in height and wide enough to provide means of rapid egress, otherwise to be as small as the nature of the business will permit.

NOTE.—The fire retardant value of fire doors is necessarily somewhat less than that of the wall itself, and, on account of structural weakness may decrease rapidly as the area of the door increases. It is important, therefore, that openings in division walls be as small as the circumstances will permit. Inspection departments having jurisdiction should be consulted regarding size before openings are made.

1103. Number of Doors.

Each side of the wall at every opening in a division wall separating buildings or dividing a single building into fire sections shall be provided with an approved self-closing or automatic fire door.

NOTE.—Self-closing doors are normally closed doors which, when released from the open position, will close and latch. Automatic doors (normally open) are doors arranged to close when released by the action of heat.

Inspection departments having jurisdiction should be consulted regarding the type of doors to be used, particularly at exits and regarding exceptions to the above general requirements.

1104. Types of Doors.

The following types of doors when of standard construction are considered suitable for openings in fire walls (Class A situations).

Size limitations at present in force are given in the following table. These size limitations are subject to change as applying to the product of any manufacturer who has satisfactorily demonstrated by tests that his particular construction will give the required fire protection when made in large sizes.

Type of Door	Maximum Size of Opening Not to Exceed Area Sq. Ft.	Height Ft.	Width Ft.
*Hollow Metal, Swinging, in pairs	—	10	8
*Hollow Metal, Swinging, single	—	10	4
Sheet Metal, Sliding, single	120	12	12
Sheet Metal, Sliding, in pairs	120	12	12
Sheet Metal, Swinging, in pairs	—	12	10
Sheet Metal, Swinging, single	—	12	6
Steel, Rolling and Lift-Up Type	120	12	12
Tin-Clad, 3-Ply, Sliding	120	12	12
Tin-Clad, 3-Ply, Swinging, in pairs	—	12	10
Tin-Clad, 3-Ply, Swinging, single	—	12	6

NOTE.—(1) Horizontal and vertical sliding doors and such swinging doors as are mounted on the face of the wall, shall overlap sides and top of opening at least four inches.

(2) Fire doors containing wood, cork or flammable materials may emit considerable smoke when heated, this should be considered in selecting doors for hospitals, stair towers, etc.

*When specially designed and labeled for use in Class A openings.

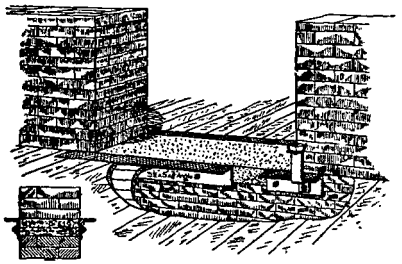

Fig. 1. Angle Iron and Concrete Sill.

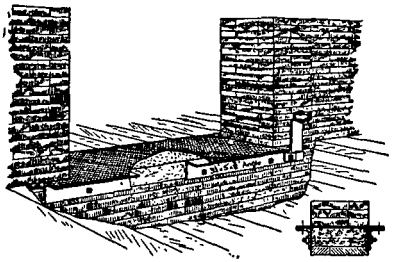

Fig. 2. Angle Iron and Concrete Sill, with Plate on Top.

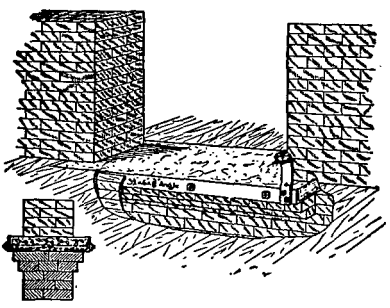

Fig. 3. Angle Iron and Concrete Sill. Supported by a Corbel of Two Courses of Brick.

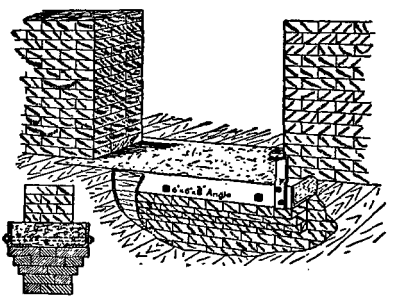

Fig. 4. Angle Iron and Concrete Sill. Supported by a Corbel of Three Courses of Brick.

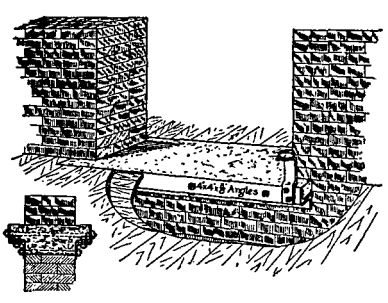

Fig. 5. Z-Bar and Concrete Sill.

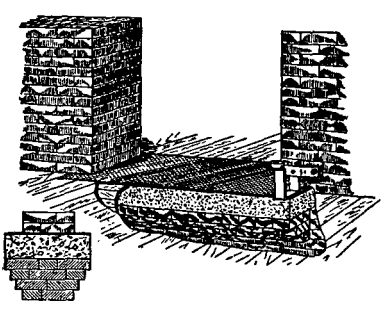

Fig. 6. Steel Plate Sill.

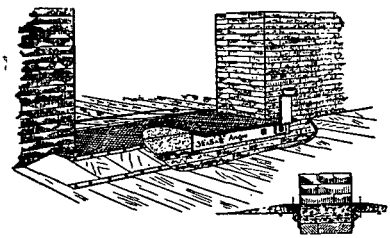

Fig. 7. Raised Angle Iron and Concrete Sill with Inclines.

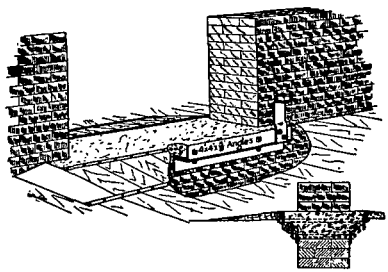

Fig. 8. Z-Bar and Concrete Sill with Inclines.

1105. Masonry at Wall Openings.

(a) Wall shall be plumb and true and present smooth masonry surfaces without combustible trim at openings.

(b) Where swinging tin-clad or sheet metal fire doors shut into a brick or concrete rabbet in wall, rabbet shall be at least three by four inches, and have true sides and angles so that door will close snugly.

1106. Sills.

(a) In buildings with non-combustible floors no special sill construction is necessary if the floor structure is extended through the opening.

(b) Sills shall be made of non-combustible material extending six inches past the edge of the opening on each side and at least four inches out from the face of the wall. Figs. 1 to 8 show constructions that are acceptable and are given as a guide in cases where openings are made in old walls or the construction is not under the supervision of a competent architect, or engineer.

(c) Concrete for sills shown by the illustrations shall be of a good grade and shall be at least four inches in thickness where used in construction not provided with a steel tread; where a steel tread is used concrete to be not less than 3½ inches in thickness. Steel treads if used shall be adequately secured. Z-bars or angles to extend 6 inches past the opening on each side and to be securely fastened together through the wall.

1107. Lintels.

Brick or concrete arches are preferable, but lintels made of steel, cast iron or reinforced concrete may be used. Stone or tin-clad wooden lintels are not approved.

The constructions specified below are acceptable and are given as a guide when preparing openings in old walls and when the construction is not under the supervision of a competent architect, or engineer.

(a) Standard steel sections securely riveted or bolted together, protected by at least four inches of solid concrete or brick flush with the face of the wall on each side and provided with a full header course of brick or concrete just above the steel work. Spaces between sections shall be filled solid with brickwork, concrete or grout. (See Figs. 9 and 10.)

NOTE.—The fire doors on each side of the wall afford sufficient protection to the lower exposed portions of heavy steel sections imbedded in masonry.

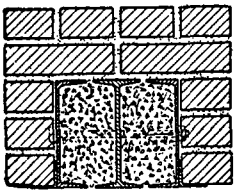

Fig. 9. Steel Lintel.

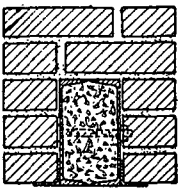

Fig. 10. Steel Lintel.

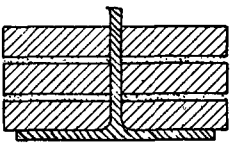

Fig. 11. Cast Iron Lintel.

(b) Cast iron tee sections not less than one inch in the thickness, protected by not less than four inches of solid brickwork flush with the face of the wall on each side (See Fig. 11).

(c) Solid reinforced concrete the full thickness of the wall. Reinforcing members to be protected by at least 1½ inches of concrete on exposed faces.

1108(A). Wall Frames—Angle Type.

Steel wall frames are of particular value where swinging tin-clad doors are mounted flush with the face of the wall, and for mounting steel fire doors. They provide for a tight-fitting door, serve to protect the brickwork from injury, furnish a secure fastening for the hardware, and are neat in appearance.

Proper installation of frames of any type demands a thorough incorporation with the masonry of the wall. Voids between the sill and masonry detract from the efficiency of the devices as a fire stop and permit distortion of the frame structure from the weight of the door.

Frames should be carefully plumbed, leveled and braced against distortion before masonry backing is applied.

Where used they should be either standard listed frames bearing inspection manifest or else constructed and installed in accordance with the following rules:

(a) Frames for tin-clad or sheet metal doors shall be made of 3 by 3-inch x ¼ steel angles set into rabbets in the masonry at sides and top on each side of the wall. Angles shall be securely fastened together at upper corners, shall extend into the sill at least three inches and be fastened in position by 1¼ by ¼-inch bars spaced not exceeding 24 inches apart and provided with ¾-inch by ¾-inch stops attached by ⅜-inch rivets, spaced not exceeding 12 inches apart. Bars shall be fastened to angles by two ⅜-inch countersunk rivets or bolts at each end. Catches for the latches and hinge pins or pin blocks shall be of malleable iron or heavy steel properly secured to the frame by at least ⅜-inch rivets. (See Figure 13.) Catches shall have 1½-inch face width.

NOTE:—Where the frames are mounted during the construction of the wall the connecting bars should be attached to the legs of the angles to which the catches and pin blocks are attached.

(b) Wall frame used to protect the masonry from injury shall be made of 3½ by 3½ by ¼ or 3½ by 3½ by ½-inch steel angles at sides and top of the opening on each side of the wall.

Frames shall be held in position as described in Rule (a) or provided with plate fillers on the face of the jambs securely riveted to the angles on each side of the wall.

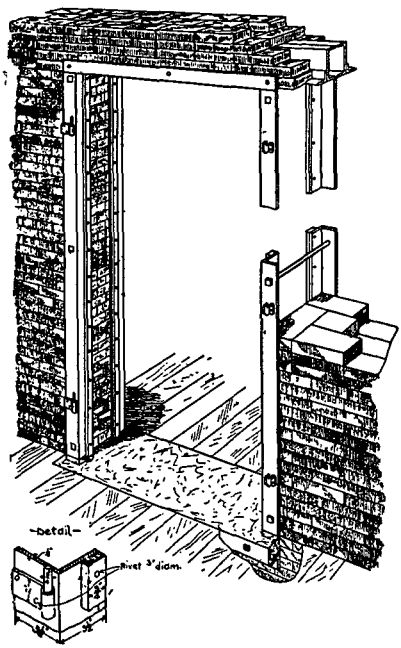

Fig. 12. Iron Door Frame for Tin-clad Fire Doors. Useful when door openings are made after wall has been erected.

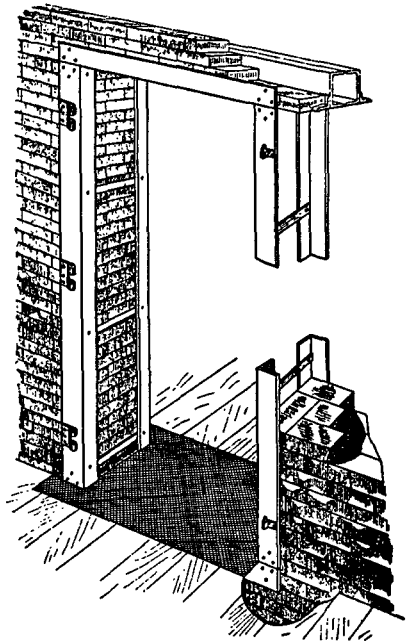

Fig. 13. Rabbeted Angle Iron Door Frame, for Tin-clad Fire Doors.

NOTE:—Angles extending only part way up on the sides of the wall opening prevent the fire doors from forming a tight closure at the upper portion of the wall opening and are not approved.

Standard frames are designed to extend three inches into the floor structure if jambs are tied together at bottom by metal tie strips. They are designed to extend three inches into floor structure or are provided with angle for fastening to floor structure when angles are not fastened together at the bottom.

1108(B). Wall Frames—Channel Type.

Structural steel channel frames may be used for mounting swinging fire doors. Frames may be shipped assembled or knocked down when attachments for securing frames in position are provided.

Standard structural steel channel frames are designed for mounting swinging fire doors not exceeding 10 feet in width and 12 feet in height.

NOTE:—The inspection manifest on standard steel channel frames certifies to the construction of the frame and covers, jambs, heads, anchors for holding the frames in walls and door stops, but does not cover the other hardware which may be attached, or provision made for its attachment, before shipment.

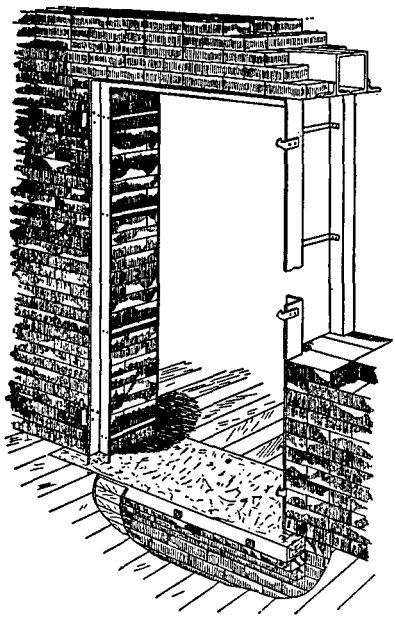

Fig. 14. Angle Iron Wall Frame for Plate Steel Doors.

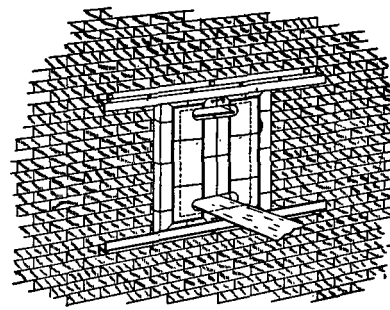

Fig. 15. Door to cover Belt Hole Opening. Dotted lines show opening through wall.

1109. Measurements for Size of Fire Doors.

Openings in walls shall be carefully measured before the doors are ordered. Where wall frames are not used, the measurements shall be from the edges of the masonry irrespective of any steel work in the opening. Where wall frames are employed, the size of the door is determined by the size of the opening in the frame.

NOTE:—Openings in walls frequently vary from the sizes given on plans. It is important, therefore, that the openings be measured before the doors are ordered.

1110. Openings for Shafting.

Where a shaft passes through a fire wall, the hanger shall be placed on one side of the wall and the opening around the shaft closed with masonry as completely as possible without touching the shaft. The remaining space around the shaft shall be finished with cement mortar, leaving a hole ⅛-inch larger in diameter than the shaft and concentric with the shaft.

NOTE:—In some cases it may be necessary to place a hanger on each side of the wall.

1111. Openings for Belts.

Inspection department having jurisdiction shall be consulted regarding method of protecting belt openings. Figure 15 gives a suggestion regarding the closing of an opening with a tin-clad fire shutter.

1112. Care and Maintenance.

(a) Doors should be ready for instant use at all times. Therefore, it is necessary to keep surroundings clear of everything that would be likely to obstruct or interfere with their free operation. They should be kept closed and latched as much of the time as possible.

(b) Where subject to deterioration from corrosion, doors should be painted at frequent intervals.

(c) Hardware should be examined at frequent intervals and any parts rendered inoperative should be promptly replaced.

(d) Hinges, catches and latches are especially subject to wear, and for this reason should be inspected frequently and kept in repair.

(e) Guides and bearings, except for rolling steel shutters, should be kept well greased to facilitate operation.

(f) Doors of the sliding pattern should be stenciled on the room side with the words, "To Open," and an arrow indicating the direction.

Swinging doors should be stenciled, indicating method of operation.

1200. Tin-clad Fire Doors.

1201. Standard tin-clad fire doors are substantial in construction, practical under most conditions and easy to install. Mounted on both sides of the wall they furnish a high degree of resistance to fire and to the transmission of heat for long periods of exposure. They resist fire streams well. Being constructed largely of combustible material they generate considerable smoke. As they are normally mounted on both sides of the wall and are equipped with heavy hardware, they are somewhat difficult to operate and, therefore, objectionable as closures for emergency exits.

Under adverse conditions of service, they are liable to deteriorate rapidly and are difficult to maintain. Sliding doors in pairs are not considered the equivalent of single sliding doors. Sliding tin-clad doors provided with wicket doors are not approved.

Inspection manifest on doors of this type applies to doors only, not including hardware or frame, which are covered by separate manifests.

1211. Vent Holes.

Cut a hole three or four inches in diameter through the middle metal plate on the exposed side of the door, but not through the wood core. Secure the tin around this opening with small nails, and thoroughly paint the wood thus exposed. (See Fig. 16.)

NOTE.—The hole will prevent excessive bulging of the tin covering and rupture of the joints between the plates by permitting the escape of gases generated from the wood core when the door is exposed to fire. Care should be taken to ascertain which is the exposed side of the door before the hole is made. Usually the hole should be made after the door is mounted. Three-inch holes should be made for doors under fifty square feet in area, and four-inch holes for doors in excess of fifty square feet.

1212. Mounting Tin-clad Doors.

The doors should be completely tinned before the hardware is attached and only such hardware as has been found satisfactory after examination and test should be used. Inspection manifest applies to door only. Hardware is covered by separate manifest.

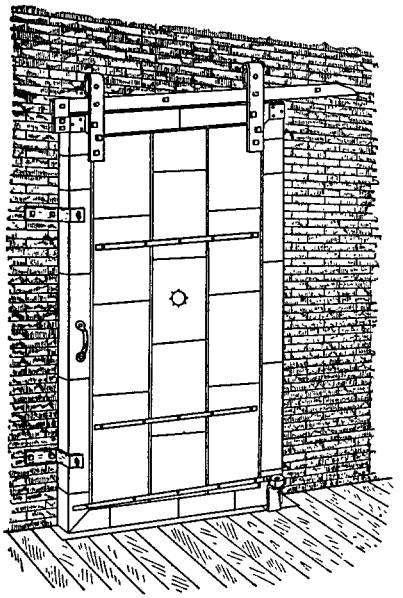

Fig. 16. Door Closed Properly Hung. One track bolt under each hanger.

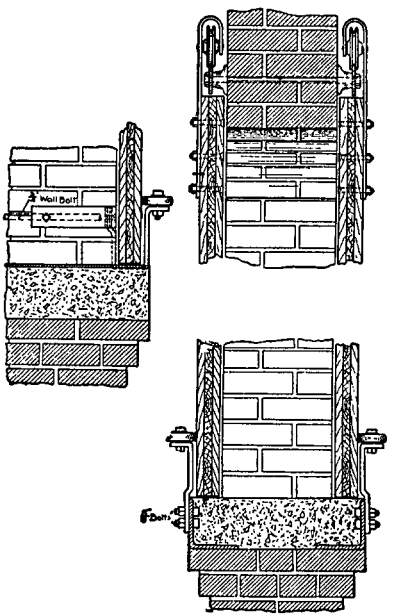

Fig. 17. (Left) U-Shaped Stay Roll. Used with Old and Concrete and Steel Plate Sills.

Fig. 18. (Right) Opening Protected by Standard Double Sliding Doors Mounted with Standard Hardware.

1220. Sliding Tin-clad Doors.

1221. Size and Shape of Doors.

Doors shall be designed for openings not exceeding 120 square feet. Doors shall overlap sides and top of wall opening four inches. Where steel lintels are used, doors shall overlap the masonry four inches above upper edge of steel unless such lintels are fireproofed in a manner satisfactory to the inspection department having jurisdiction. Top of door shall conform to incline of track, ¾-inch to one foot, when intended to close by gravity. The top of the door shall be horizontal when pulled to the closed position by weights.

NOTE.—Where the binders are set back on account of possible injury to those passing through the door, the lap on that side of the door should be correspondingly increased. (See Rule 1222(c).)

1222. Mounting Sliding Doors.

(a) MOUNTING TRACK.

(1) MOUNTING FLAT TRACK. Length of track shall be equal to twice the width of the wall opening, plus 21 inches.

NOTE.—The length of the track is given in terms of the wall opening, 12 inches being allowed for the lap and width of the door, eight inches for attaching front and back bumpers, and one inch for clearance when the door is wide open.

Wall bolts shall be so spaced that one bolt will be located directly opposite each hanger when the door is closed, and so that front and back bumpers can be attached. Wall bolts securing the track in position should be not less than ¾-inch in diameter and should be installed through the wall. (See table giving bolt spacings.)

NOTE.—(1) Figures in heavy type in the table indicate spacings for bolts opposite door hangers and number of hangers required.

(2) The space "A" in the table giving spacings for wall bolts should always be on the side of the door opening toward which the door closes. This will be at the lower end of the track.

Track shall have an incline of ¾-inch to one foot when mounted, if door is intended to roll by gravity to the closed position.

NOTE.—Never attach track to wood frame even if frame is tin-clad, and never use wood or lead plugs in the wall to support wall bolts. (See i.)

(2) MOUNTING ROUND TRACK. When round track is used, the number of brackets provided should 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 inches apart. Bolts securing brackets in position should not be less than ¾-inch in diameter and should be installed through the wall.

(b) HANGERS. Doors for openings six feet and less in width shall be provided with two hangers. Doors for openings in excess of six feet shall have additional hangers. (See table on next page.)

(c) BINDERS. At least two binders are required, the upper binder to be placed about 24 inches from the top of the door, and the lower binder about 18 inches above the sill. Bolts for fastening the binders to extend through the wall and should be not less than ¾-in diameter. (See Fig. 16.)

NOTE.—Where there is danger of injury to those passing through the door opening, the binders should be set about two inches further back from the edge of the door opening and the door made correspondingly wider. (See Rule 1221.)

Care should be taken not to make the bolt holes unnecessarily large. In some cases it may be necessary to set the binders in cement when they are bolted to the wall.

(d) ATTACHING STAY ROLL. Stay roll should be set in flush with the surface of wall and sill. Set the parts with cement, if necessary, and bolt firmly to wall. When the door is closed adjust the roller against the wedge at the end of the chafing strip so that the door will be held close to, but not tightly, against the wall. (See Fig. 16.)

NOTE.—The masonry should be chipped out, and the stay roll fitted to the wall before the door is in position. It can then be more easily installed after the door is hung. The stay rolls shown in Figure 18 are bolted to the steel work of the sill, and are recommended for new work.

TABLE GIVING DIMENSIONS FOR PUNCHING FLAT TRACK

Figures in heavy type indicate bolts opposite door hangers

Size of Opening	Length of Track	Space A 1st Bolt	Space B 2nd Bolt	Space C 3rd Bolt	Space D 4th Bolt	Space E 5th Bolt	Space F 6th Bolt	Space G 7th Bolt	Space H 8th Bolt	Space I 9th Bolt	Space J 10th Bolt	Space K 11th Bolt
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"	23¼"	31 "	30 "	30¼"				
6' 0"	13' 9"	1¾"	18¼"	24 "	24 "	32 "	32 "	31¼"				
6' 3"	14' 3"	1¾"	12¼"	31½"	31¼"	31 "	31 "	30¼"				
6' 6"	14' 9"	1¾"	12¼"	33 "	33 "	32 "	32 "	31¼"				
6' 9"	15' 3"	1¾"	18¼"	33½"	33½"	33 "	33 "	33¼"				
7' 0"	15' 9"	1¾"	18¼"	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"	31¼"	31¼"	32 "	
9' 3"	20' 3"	1¾"	15¼"	23¼"	23¼"	23¼"	23¼"	32¾"	32¾"	32¾"	33 "	
9' 6"	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 "	34¼"	
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"	28¼"	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"

(e) ATTACHING CHAFING STRIPS. Half oval chafing strips are required on the back of door, with flat companion strips on the front of the door. Also a flat strip on the front of the door near the bottom.

Two half-oval chafing strips are required on doors not exceeding eight feet in height. In doors exceeding that dimension three are required. The half-oval strips shall be placed one-third the distance from the top of the door and about twenty-four inches from the bottom. When three strips are used the middle strip shall be placed midway between the other two. The length of strips shall be four inches less than the door opening. Strips shall be parallel with the door track and bolted through the door to flat strips on the front of the door. (See Fig. 19.)

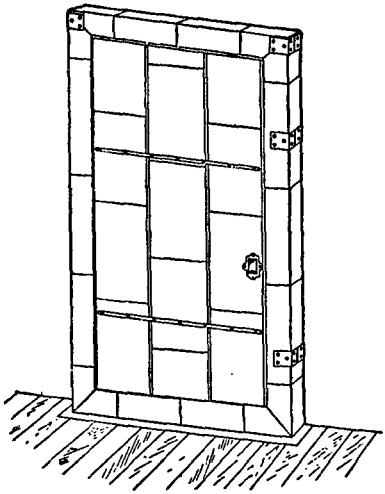

Fig. 19. Rear View of Door with Trimmings.

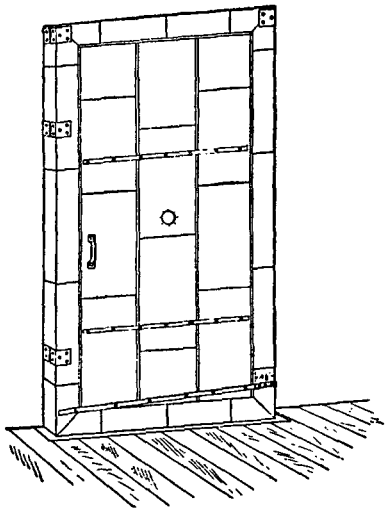

Fig. 20. Front View of Door with Trimmings.

Strip on the front of the door shall be parallel with the door track and so placed as to take the wear of the stay roll. Strip shall be five inches less than the width of the door and fastened to the door by wood screws. (See Fig. 20.)

(f) ATTACHING WEDGE. Shall be placed back of the stay roll when the door is closed and be fastened to the door by wood screws. (See Fig. 20.)

(g) ATTACHING BUMPER SHOES. Four are necessary, one opposite each bumper and one opposite each binder; fastened to the faces and edges of the door by wood screws. (See Fig. 20.)

NOTE.—The front and back bumpers are mounted with the track. (See Rule (a).)

(h) ATTACHING HANDLES. Flush pull on the back of the door shall be countersunk flush with the surface of the door. Heavy bowshaped handles shall be bolted together through the door or otherwise securely attached. (See Figs. 19 and 20.)

(i) BOLTS AND WASHERS. Bolts for track, binders and stay roll shall extend through the wall, and be provided with standard washers on opposite side of wall. (See Fig. 16.)

NOTE.—Where the above members are bolted together through the wall, washers are unnecessary.

Stay roll shall be securely fastened to steel work of sill as shown in Figure 16.

(j) ASSEMBLING OF SECTIONAL DOOR UNITS. It may be sometimes necessary to ship large tin-clad doors in sections. Sectional doors are provided with cover plates for the joint between the sections and reinforcing

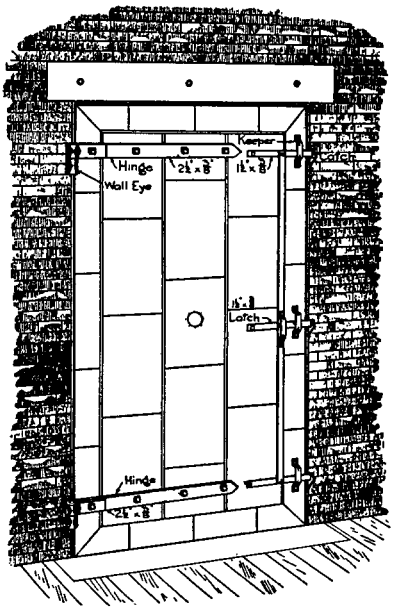

Fig. 21. Swinging Door in Rabbeted Frame.

angles or channels running horizontally across the door. When shipped both cover plates are attached to one section of the door, being bolted together through the door. The edge of the adjacent section should be inserted in the groove formed by these cover plates and secured in a like manner by through bolts. Reinforcing angles or channels to be secured by through bolts or lag screws.

(k) Operation of Door. The door should hang and operate freely. If the wall is unusually rough and uneven it may be necessary to dress it off, so as to remove all obstructions and prevent the destruction of the tin covering by chafing. The introduction of thin plates (1/16 to ⅛-inch) between the wall and brackets on the portion of the track at the side of the opening will sometimes remedy the defects due to slight unevenness in the wall.

The holes for the track bolts should be drilled with sufficient accuracy so that the door will not sag and chafe on the sill. If the door does sag, substantial metal strips should be installed under the track bolts so as to raise the door sufficiently to prevent chafing. Short length of ¾-inch gas pipe around the track bolts will often remedy this defect.

(l) Slatted Framework. When necessary a framework of pipe or slats with not more than two inches between should be built outside of sliding doors to prevent piling of stock, etc., against the doors, and the possibility of the doors being held by panicky crowds in cases of emergency.

(m) Protection of Covering. When the front edge of door is liable to injury from trucks, etc., a continuous U-shaped strip made of not less than No. 14 U. S. gage steel, and extending high enough to prevent injury should

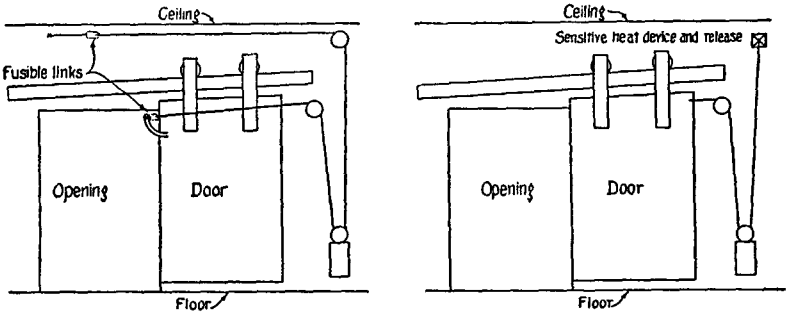

Fig. 22. Sliding Door with Inclined Track.

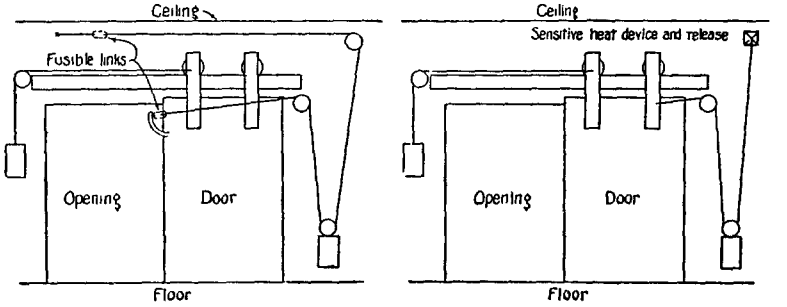

Fig. 23. Sliding Door with Level Track.

be installed. Strips should lap the sides of the door four inches and should be securely fastened. The above strip will render the lower bumper shoe unnecessary.

(n) AUTOMATIC DOOR. (See Figures 22 and 23.)

1. INCLINED TRACK. The automatic closing mechanism for sliding doors mounted on an inclined track generally consists of the attachment of a counterbalance weight suspended over a pulley so that the door will remain stationary in any position of its travel. At time of fire the action of a heat actuated device or the melting of a fusible link disengages the counterbalance and the door rolls shut of its own weight. The heat actuated devices or fusible links should be located at the top of opening and at the ceiling, preferably on both sides of the wall, so interconnected that the operation of the device on either side of the wall will operate the door. The actuating device of the quick closing mechanism may be located on one side only and near the ceiling. When doors are installed on both sides of the opening they should preferably be so interconnected that the operation of the device on either side will close both doors.

2. HORIZONTAL TRACK. When sliding doors are mounted on a horizontal track the arrangement is similar to the arrangement for the inclined track except that weights must be provided to pull the door shut after the heat actuated device has disengaged the counterbalance. The weight used

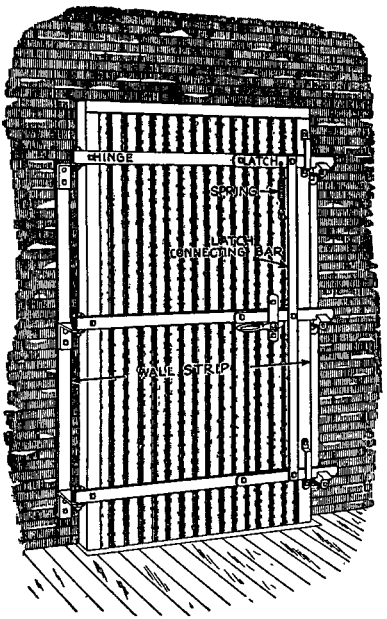

Fig. 24. Swinging Door without Rabbet in Wall.

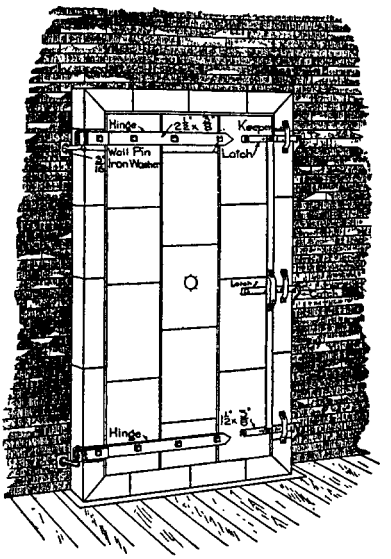

Fig. 25. Swinging Door without Rabbet in Wall.

to close the door shall be enclosed in a suitable boxing for the entire length of its travel.

NOTE.—For other suitable methods of automatic operation consult the inspection bureau having jurisdiction.

1230. Swinging Tin-clad Doors.

1231. Size and Shape of Doors.

Swinging doors mounted singly shall not exceed size suitable for wall openings six feet in width or twelve feet in height, shall shut into rabbets in wall, into approved wall frame, or, when acceptable to inspection departments having jurisdiction, doors may overlap top and sides of wall opening as required for sliding doors. (See Rules 1104, 1108, 1109).

Single swinging doors in pairs shall not exceed sizes suitable for wall openings ten feet in width and twelve feet in height, shall shut into rabbets in wall, into approved wall frame, or, when acceptable to inspection department having jurisdiction, doors may overlap top and sides of wall opening as required for sliding doors. (See Rules 1104, 1108, 1109.)

1232. Mounting Single Swinging Doors.

(a) ATTACHMENT OF HINGE WALL STRIPS AND CATCH WALL STRIPS. Shall be bolted together through the wall when each side of the wall is provided with a swinging tin-clad door, otherwise bolts pass through the wall and thread into nuts on the opposite side of the wall. Nuts shall be provided with standard washers. When opening is so provided, approved frame hinges

may be secured to the frames. Not less than ¾-inch through bolts shall be used for attaching hinge strips in position, and not less than ½-inch through bolts for catch wall strips. (See Figure 25.)

(b) NUMBER AND LENGTH OF HINGES AND LATCHES FOR TIN-CLAD DOORS. Number and length of hinges and latches shall comply with the following table:

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

Width of Door / Height of Door		No. of Latches	(incl.) 0 ft.- 2 ft. 0 in. No. of Hinges	(incl.) 2 ft. 0 in.- 3 ft. 0 in. No. of Hinges	(incl.) 3 ft. 0 in.- 4 ft. 0 in. No. of Hinges	(incl.) 4 ft. 0 in.- 5 ft. 0 in. No. of Hinges	(incl.) 5 ft. 0 in.- 6 ft. 0 in. 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 Giving Length of Hinges and Latches for Different Width of Doors.

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	"

(c) ATTACHMENT OF HINGES. Hinges are united to pintle which is riveted to wall straps; wall straps shall be secured to the wall by one bolt for each hinge pintle. Upper and lower hinges shall be spaced not less than eight inches nor more than fourteen inches from the top and bottom of the door.

(d) ATTACHMENT OF LATCHES. Upper and lower latches shall be spaced not less than eight inches nor more than fourteen inches from top and bottom of door. Latches shall be operated from either side of the door so as not to interfere with hinges. Latches shall be fastened by bolting through the door. (See Figures 21 and 25.)

NOTE.—The bar connecting the latches should be adjusted so that it will not lift the latches by expansion when heated.

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

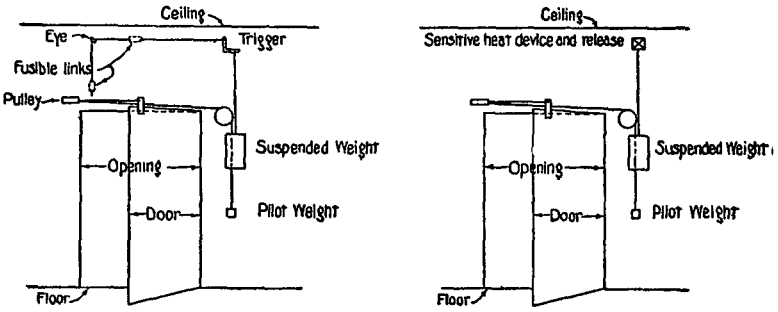

Fig. 26. Swinging Door.

(e) OPERATION OF DOOR. The door should swing easily and freely on its hinges. The latches should operate freely on their pivots and ride up the inclines on the catcher and snap into position when the door is slammed shut or closed with moderate force.

(f) AUTOMATIC DOOR. (See Figure 26.) Swinging doors are satisfactorily arranged to close automatically at time of fire by the attachment of a cable or chain so arranged over pulleys that the operation of a heat actuated device or the melting of a fusible link drops a weight which being connected to the door, pulls it shut. The weight used to close the doors shall be enclosed in a suitable boxing for the entire length of its travel.

The fusible links or heat actuated devices should preferably be located at the top of the opening and at the ceiling; preferably on both sides of the wall so inter-connected that the operation of the device on either side of the wall will operate the doors. The actuating device of the quick closing mechanism may be located on one side only and near the ceiling.

Automatic swinging doors in pairs shall be so arranged that the standing door must close and latch before the swinging door. This requires the use of an automatic stop or trigger which will hold the swinging door in the open position until standing door has closed.

NOTE.—For other suitable methods of automatic operation, consult the inspection bureau having jurisdiction.

1233. Mounting Swinging Doors in Pairs.

The rules for mounting single doors apply to doors in pairs with the following additions:

(a) DOOR BOLTS. The standing door of the pair shall be provided with a steel or malleable iron spring-operated bolt at the top and bottom. Both bolts shall enter substantial strike plates or catches securely fastened into lintel and sill.

NOTE.—The door bolts should be located far enough from the edge of the door to clear the astragal.

(b) Catches should be bolted to door using through bolts and plates on back of door.

(c) ASTRAGAL. An astragal shall be provided for one door of each pair of swinging doors mounted in pairs. The astragal shall be a steel strap not less than 3/16-inch thick and three inches wide and shall extend the full

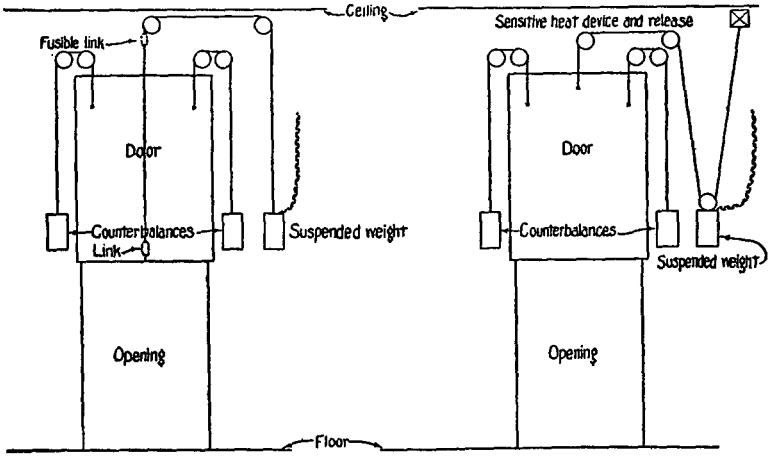

Fig. 27. Vertical Sliding Door.

height of the door. The astragal shall be fastened to the door by not less than ¼-inch machine, carriage or stove bolts, spaced at intervals not exceeding twelve inches.

Top bolts shall be not over five inches from the end of the astragal and bottom bolts not over three inches. Bolts shall pass through the astragal and be secured by nuts on the opposite side of the door.

When attached in place, the astragal shall extend at least one inch beyond the vertical edge of the door to which it is attached.

(d) Doors shall be provided with an approved interference device to prevent the wrong door from closing first. This device shall be securely bolted to the wall.

Note.—This is important for if device becomes loose it may prevent doors closing.

1240. Vertical Sliding Tin-clad Doors.

1241. Size and Shape of Doors.

Doors shall be designed for openings not exceeding 120 square feet in area or twelve feet in either dimension. Doors shall overlap sides and top of wall opening four inches. When steel lintels are used, doors shall overlap masonry four inches above upper edge of steel, unless such lintels are fireproofed in a manner satisfactory to the inspection department having jurisdiction.

1242. Mounting Vertical Doors.

(a) Guides shall be bolted through wall with washers on back of wall. Proper precaution shall be taken to care for expansion during fire conditions.

(b) PULLEYS AND COUNTERWEIGHTS. Doors of more than four feet in vertical dimensions and doors at openings through which persons will pass, shall be provided with two counterweights and a counterbalance. (See Figure 27 for arrangement.)

Doors less than four feet in vertical dimension and doors at openings through which there can be no passage of persons—such as ducts, conveyors etc.—may be provided with a single counterweight and a counterbalance instead of double counterweights and a counterbalance.

The total weight of the counterweights should be sufficient to prevent the door from dropping suddenly, but not sufficient to prevent it from closing in a positive manner when the auxiliary counterbalance used in connection with the automatic device is released. The two permanent counterweights shall be of equal weight so that there will be no tendency of the door to cock or bind in the guides.

1300. Plate Steel Fire Doors.

1301. Plate steel fire doors when made of not less than 12 gage plate and properly reinforced with angles are substantial in construction and practicable under some conditions. They are somewhat difficult to install. Doors on both sides of wall furnish a high degree of resistance to fire, a sufficiently high resistance to the transmission of heat for many situations and resist fire streams well. They are noncombustible, durable if protected against corrosion and easy to inspect and maintain. As they are normally mounted on both sides of the wall and are equipped with heavy hardware, they are somewhat difficult to operate and therefore objectionable as enclosures for emergency exits.

They are not at present available with inspection manifest.

1311. Setting Wall Frames.

Plate steel fire doors shall be mounted on steel wall frames, which should be set perfectly level and plumb and concreted or bricked into wall. If the frame is installed in an old wall, the opening should be cut larger than the frame and the masonry built up to the frame and well bonded to the wall, using cement mortar and thoroughly pointing up around the frame. (See Rule 1108 for the construction of wall frame.)

1320. Sliding Plate Steel Doors.

1321. Size of Doors.

Doors shall be designed for openings not exceeding 80 square feet in area or 12 feet in either dimension. Doors in excess of four feet in width shall overlap the sides of wall frame at least two inches and at least one inch at top. Angle at bottom of sliding door shall extend at least one inch into groove at sill. The angle at bottom of door and groove in sill may be omitted for doors four feet and less in width. (See Figures 28, 29 and 30.)

1322. Top and Bottom Channels.

(a) Doors shall operate in channels or grooves at top and bottom. The groove at bottom may be omitted for doors four feet and less in width. Length of upper channel shall be equal to twice the width of the opening in the wall frame plus eight inches.

Upper channel shall be provided with a ½ by ½-inch steel strip to serve as a track for the wheels of the door hangers. Lower channel or groove, where used, shall extend beyond the wall frame at least 12 inches on the side toward which the door opens. (See Figures 28, 29 and 30.)

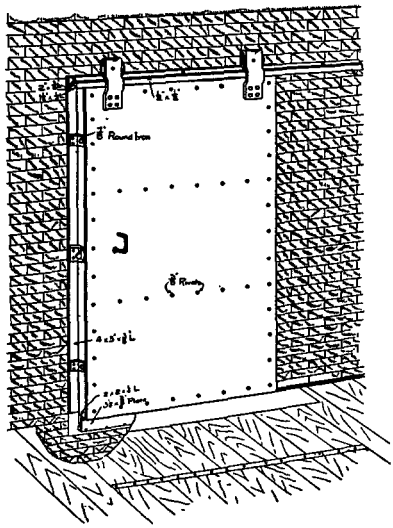

Fig. 28. Sliding Plate Steel Door, Closed.

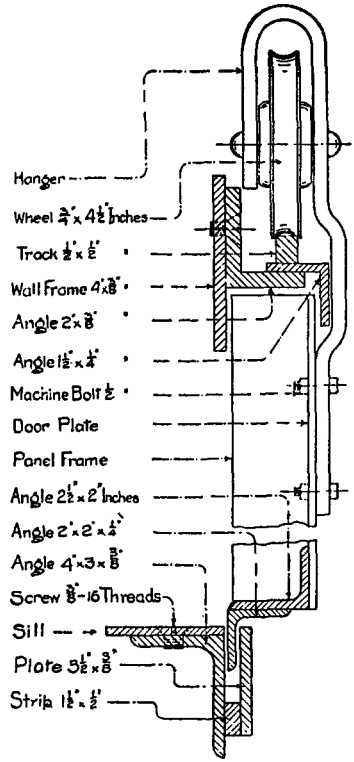

Fig. 29. Detail Showing Hanger and Top and Bottom Channels for Sliding Plate Steel Doors.

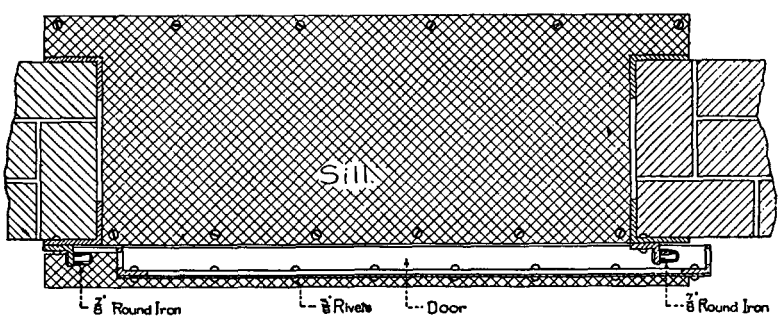

Fig. 30. Horizontal Section of Sliding Plate Steel Door, Showing Position of Lugs or Binders.

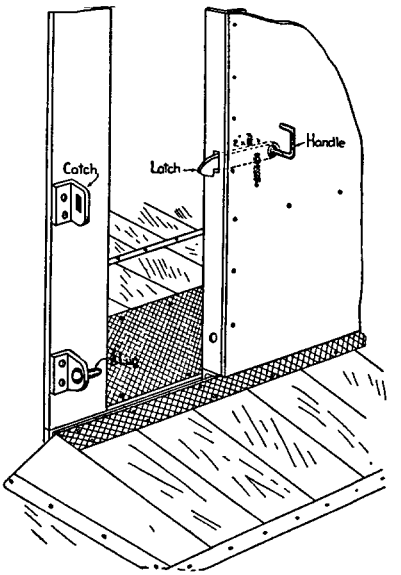

Fig. 31. Detail Showing Latch, Binder and Incline to Sill for Sliding Plate Steel Doors.

(b) Upper and lower channels shall be attached to wall frame by ⅜-inch rivets or bolts spaced not exceeding 12 inches.

Upper channels shall be attached to wall by ¾-inch through bolts spaced not exceeding 14 inches.

1323. Mounting Sliding Doors.

(a) Door should slide freely and should be forced close to the wall frame by the binders when closed and latched.

NOTE.—Plate steel doors should be practically completed before they leave the shop. The binders and catches should be attached to the wall frame and holes provided for the attachment of the channels at the top and bottom of the frame. The hangers and latch should be attached to the door.

(b) When necessary a framework of pipe or slats should be built outside of sliding doors to prevent piling of stock, etc., against them.

1324. Automatic Sliding Doors.

Automatic door closing device to be installed as described for tin-clad doors. (See Rule 1222 (n) and Figures 22 and 23.)

1330. Swinging Plate Steel Doors.

1331. Size of Doors.

(a) Single swinging doors shall not exceed sizes suitable for openings four feet in width or ten feet in height. Door plates shall overlap the sides and top of wall frame at least one inch.

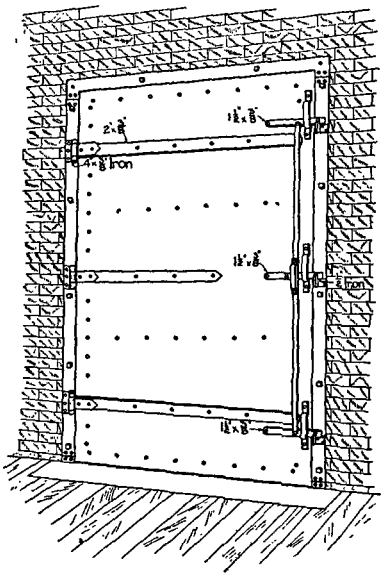

Fig. 32. Swinging Plate Steel Door, Showing Hinges, Latches and Catches.

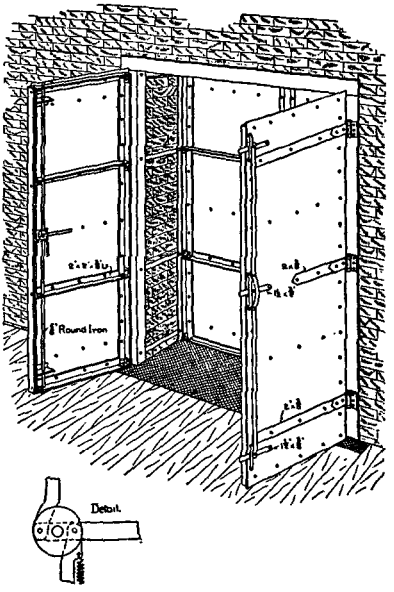

Fig. 33. Double Swinging Doors in Pairs. Showing Spring Catch.

(b) Single swinging doors in pairs shall not exceed sizes suitable for openings eight feet in width or ten feet in height. Door plates shall overlap the sides and top of wall frame at least one inch, and the swinging door shall overlap the standing door at least one inch where they come together.

1332. Mounting Single Swinging Doors.

Doors should turn easily and freely on the hinges. The latches should operate freely and ride up the inclines on the catches and snap into position when the door is slammed shut or closed with moderate force. (See Figure 32.)

NOTE.—Plate steel doors are provided with at least three hinges and at least three latches working together. The doors and frames are completed and the hardware attached at the factory.

1333. Mounting Swinging Doors in Pairs.

The rules for mounting single doors apply to doors in pairs. Standing door of the pair shall be provided with spring bolts at top and bottom which enter substantial strike plates or catches at head and sill. (See Figure 33.)

NOTE.—The wall frames and doors, including the attachment of the hardware and astragal, are completed before they leave the factory.

1334. Automatic Swinging Doors.

Automatic door closing devices shall be installed as described for tin-clad doors. (See Rule 1232 (f), and Figure 26.)

1400. Sheet Metal Fire Doors.

1401. Standard sheet metal fire doors are fairly substantial in construction, practical under most conditions and easy to install. Doors on both sides of wall furnish a high degree of resistance to fire and a sufficiently high resistance to the transmission of heat for many situations. They resist fire streams well, are non-combustible, durable and easy to maintain. As they are normally mounted on both sides of the wall and are equipped with heavy hardware, they are somewhat difficult to operate and therefore objectionable as closures for emergency exits.

Inspection manifest applies to doors only.

1410. Sliding Sheet Metal Doors.

1411. Size and Shape of Doors.

Doors shall be designed for openings not exceeding 120 square feet in area or twelve feet in either dimension. Doors shall overlap sides and top of wall openings four inches. Where steel lintels are used, doors shall overlap the masonry four inches above upper edge of steel unless such lintels are fireproofed in a manner satisfactory to the inspection department having jurisdiction. Top of door shall conform to incline of track ¾-inch to one foot.

1412. Mounting Sliding Doors.

(a) The rules for mounting sliding tin-clad doors should be followed except as specified in the following rules:

NOTE.—Parts of the hardware for mounting sheet metal doors are especially designed, and members such as chafing strips, bumper shoes, handles and necessary reinforcements may be installed before the doors leave the shop.

(b) MOUNTING TRACK. The space between the top of the door and the track shall be at least ¾-inch to allow for the upward expansion of the door when heated.

NOTE.—Sheet metal doors are provided with track binders or lugs which engage the track and hold the door in position in case the hanger wheels are lifted from the track by expansion.

(c) ATTACHING HANGERS. Hangers shall be bolted to door when in position.

NOTE.—Sheet metal doors may be provided with bolt holes and any necessary reinforcements for the attachment of the hangers before they leave the shop.

(d) ATTACHING BINDERS. Track binders shall lap the track at least ½-inch, and be located two inches to one side of the center line of the wall bolts when the door is closed.

NOTE.—The track binders are located to one side of the track bolts so that they will clear the track brackets when the door expands upward.

Doors not exceeding eight feet in height shall be provided with two front binders as specified for tin-clad doors. Doors exceeding eight feet in height shall be provided with three binders, the additional binder being located midway between the top and bottom binders. Sliding doors are also to be provided with one rear binder for openings up to ten feet in height and two binders for doors exceeding ten feet in height, in addition to the front binders

and stay roll as specified for tin-clad doors. Such rear binders shall be equally distributed between top and bottom of door and attached by through bolts, as specified for front binders.

1420. Swinging Sheet Metal Doors.

1421. Size and Shape of Doors.

(a) Single swinging sheet metal doors shall not exceed sizes suitable for wall openings 6 feet in width or 12 feet in height; shall shut into rabbets in walls, into approved wall frames or when acceptable to inspection departments having jurisdiction, doors may overlap as required for sliding doors.

(b) Single swinging doors in pairs shall not exceed sizes suitable for wall openings 12 feet in either dimension or 120 square feet in area; shall shut into rabbets in walls, into approved wall frames or when acceptable to inspection departments having jurisdiction, doors may overlap top and sides of wall openings as required for sliding doors.

1422. Mounting Single Swinging Doors.

(a) Rules for mounting swinging tin-clad doors apply to sheet metal doors except that the number and length of hinges and latches may vary with the product of different manufacturers, as swinging fire door hardware for doors of this type is designed for each manufacturer's particular pattern of doors. (See Rules 1232 and 1233.)

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. 3 in.	5	4
12 ft. 4 in. to 14 ft. 4 in.	5	5

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

(b) ASTRAGAL. An astragal shall be provided for one door of each pair of swinging doors mounted in pairs. Construction of this astragal may vary, as each manufacturer has tested doors of his own design. In all cases astragal shall extend the full height of the door and when in place, shall extend at least 1 inch beyond the vertical edge of the door to which it is attached.

1500. Rolling Steel Fire Doors.

1501. Standard rolling steel fire doors are substantial in construction and practical under most conditions, but are somewhat difficult to install. Doors on both sides of the wall furnish a high degree of resistance to fire for long periods and a sufficiently high resistance to the transmission of heat for many situations. They resist fire streams well, are incombustible, durable if protected against corrosion and fairly easy to maintain. They are capable of being installed in locations where space limitations prevent the installation of other types of doors. Some types of rolling doors are difficult to operate after they have closed automatically. Doors of this type should be

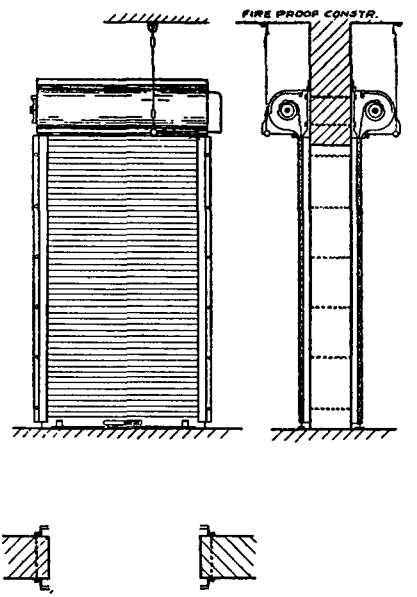

Fig. 34. Rolling Steel Doors. Face of Wall Installation.

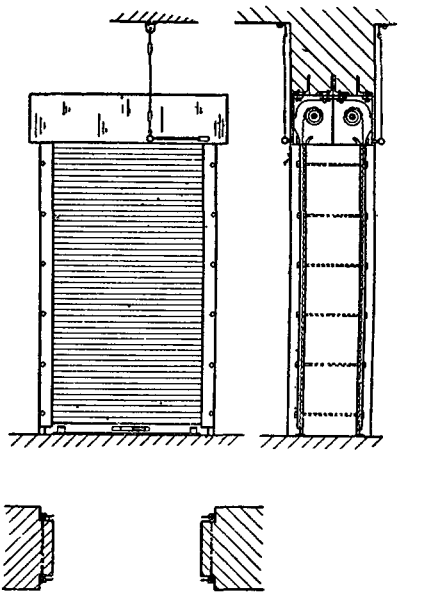

Fig. 35. Rolling Steel Doors. Between Jamb Installation.

used only for openings not intended for emergency exits. The type and use of these doors in any given case should be considered in its relation to the effect upon hazard to life.

Inspection manifest applies to door, hardware and guides.

1511. Position of Doors.

(a) Doors subject to damage from falling materials at time of fire shall be mounted in reveal of wall so that no portion projects beyond the face of the wall. (See Figures 34, 35 and 36.)

NOTE.—The brackets and hood of rolling steel doors mounted on the face of the wall project materially from the wall and are especially subject to damage by falling material at time of fire.

(b) Doors not subject to damage from falling materials at time of fire may be mounted on the face of the wall. Inspection department having jurisdiction should be consulted before installation.

NOTE.—Doors mounted on the face of fire walls should usually be confined to fireproof buildings where there is little if any danger of the collapse of the building and injury to the door from falling materials.

1512. Size and Shape of Doors.

Doors shall be designed for openings not exceeding 80 square feet in area or 12 feet in either dimension. Curtain shall engage guides secured to

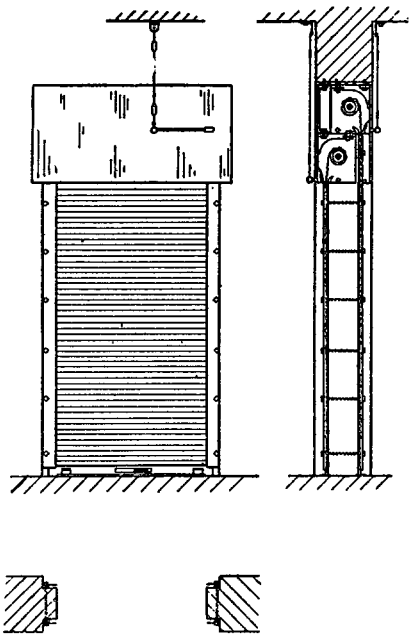

Fig. 36. Rolling Steel Doors. Between Jamb Superimposed Installation.

sides of the wall opening. Hood must fit closely against the lintels, or where the door is mounted on the face of the wall the hood shall be placed above the top of the opening so that bottom of the curtain will be flush with or above the top of the opening when the door is fully open.

1513. Mounting Rolling Doors.

Rolling steel doors are complicated in construction and not easily installed by workmen unfamiliar with them. Their installation should be under the supervision of the manufacturer. Specifications and blueprints should be furnished covering the details of installation.

Rolling steel doors mounted between jambs or in reveals shall be provided with steel or iron plates above and below the mechanism, and at ends, or with an enclosed metal box on the outside of the bracket in order to prevent the loose masonry from interfering with the normal operation of the door or with the automatic mechanism.

(a) GUIDES. Shall be plumb, with proper clearance for expansion allowed between the guide and the sill. Guides shall be bolted together through the wall using ⅜-inch through bolts and special washers.

(b) BRACKETS. Brackets mounted on the face of the wall shall be bolted to the wall by not less than ½-inch through bolts to each bracket. Brackets

mounted between jambs shall be secured at the steel lintel by not less than two ½-inch machine screws to each bracket.

1600. Hollow Metal Fire Doors.

1601. Standard Class A hollow metal fire doors are substantial in construction, practical under most conditions, fairly easy to install and permit the use of concealed hardware. Mounted on both sides of the wall they furnish a high degree of resistance to fire and a fair degree of resistance to the transmission of heat for long periods of exposure. They resist fire streams well, are durable, easy to operate and easy to maintain. Except for the fact that they are normally mounted on both sides of the walls, they are unobjectionable as closures for emergency exits.

Inspection manifest covers door and hardware.

1620. Swinging Hollow Metal Doors.

1621. Size and Shape of Doors.

(a) Single swinging doors shall not exceed four feet in width or ten feet in height. They shall shut into rabbets formed by the stops on the wall frame and fit the opening closely.

(b) Single swinging doors in pairs shall not exceed eight feet in width or ten feet in height and shall shut into rabbets formed by the stops on the wall frame, shall fit the opening closely, and be provided with an astragal.

1622. Mounting Single Swinging Doors.

(a) Shall be mounted in standard wall frames properly installed in the wall.

(b) Doors not exceeding four feet in width or five feet in height shall be provided with at least two hinges. Doors in excess of five feet in height shall be provided with one hinge for each 2½ feet of height or fraction thereof.

(c) Shall be equipped with three-point locking mechanism. The latch bolts shall engage catches in the jamb of the wall frame at least ⅝-inch.

1623. Mounting Swinging Doors in Pairs.

(a) Doors shall be mounted in standard wall frame properly installed in wall.

(b) Each door shall be provided with hinges as specified for single doors. (See Rule 1622 (b).)

(c) The active door of the pair shall be provided with an approved three-point locking mechanism as specified for single doors. The latch bolts shall engage catches in the stile of the opposite door at least ⅝-inch.

(d) The standing or normally stationary door shall be provided with an approved two-point locking mechanism engaging catches in the head and sill at least ⅝-inch.

(e) Doors shall be equipped with an approved interference device to prevent the wrong door from closing first.

1624. Operation of Doors.

Doors shall be mounted in such a manner that they will swing easily and freely on their hinges and close accurately against the stops on the wall

frame, fitting the opening snugly but without binding. The latch bolts should operate easily and register properly with the catches securely fastening the door when closed easily or with considerable force.

NOTE.—Doors installed in new buildings may require several readjustments of the locking mechanism to insure proper operation of locks and engagement of the latches, as slight settlements in new buildings are practically unavoidable and sometimes disarrange the proper registration of the latch bolts.

Constant operation of the door causes the hinges to wear, and this wear may in time be sufficient to cause the door to bind in the frame. Hinges should, therefore, be examined at fairly frequent intervals, and repaired or replaced when necessary.

CLASS B—PROTECTION OF OPENINGS IN ENCLOSURES TO VERTICAL COMMUNICATIONS THROUGH BUILDINGS.

2001. Enclosures to vertical openings through buildings are of the greatest importance in safeguarding life, are next in importance to fire walls in preventing the spread of fire, and require the use of doors that can be reliably operated at exits, and fire doors of a high order at all wall openings. While these enclosures are subject to fire exposure of the same severity as fire walls, the conditions in these situations in buildings are such that a single fire retardant can be safely employed in standard shafts.

This is made possible by the fact that the failure of two fire retardants, always located a considerable distance apart, must occur before fire can pass from one fire section to another or from story to story.

2002. Only such fire retardants are included in this class as have been shown by experience and tests to furnish a high degree of fire protection when installed on one side of the wall.

2003. Fire retardants fulfilling the Class A requirements can be employed for openings into vertical shafts where the type and pattern are suitable.

2004. Wherever a wall of the shaft is a fire wall containing an opening into the shaft and another wall of the shaft is of sub-standard construction, the fire wall opening into the shaft shall be provided with two fire doors (one on each side of the wall). At least one of these doors should fulfill the requirements for Class A situations and the other for either Class A or Class B situations.

NOTE.—Standard vertical shaft wall construction is defined in the Building Code, recommended by the National Board of Fire Underwriters.

2100. General Standards—Class B.

2101. Number of Vertical Openings.

Shall be sufficient in number and so located as to provide for the safe exit of the occupants obliged to use them at time of fire, otherwise to be as few as the nature of the business will permit.

2102. Size of Wall Openings.

Openings used as exits shall be at least six feet six inches in height and wide enough to provide means of rapid egress, otherwise to be as small as the nature of the business will permit.

NOTE.—Inspection departments having jurisdiction should be consulted regarding size before openings are made, especially in cases of non-standard shafts or where the nature of the business requires openings of unusual size.

2103. Number of Doors.

(a) Each opening in standard shafts communicating with more than one building or section of a building shall be provided with a fire door approved for Class A or B situations. Doors shall be the normally closed or automatic type.

NOTE.—Normally closed doors are preferable where the nature of the business is such that they are not likely to be blocked open.

(b) Each opening in sub-standard shafts communicating with more than one building or section of a building shall be provided with an approved fire door for Class A or B situations, and in addition, each opening into the shaft, through the fire wall shall be provided with an approved door for Class A situations. Doors shall be of the normally closed or automatic type.

2104. Types of Doors.

The following types of doors when of standard construction are considered suitable for Openings in Vertical Shafts (Class B situations) with size limitations at present in effect as given in the table.

Type of Door	Maximum Size of Opening Not to Exceed Area Sq. Ft.	Height Ft.	Width Ft.
*Hollow Metal, Sliding	—	8	8
Hollow Metal, Swinging, in pairs	—	10	8
Hollow Metal, Swinging, single	—	10	4
Metal Clad, Paneled, Swinging, in pair	—	8	8
Metal Clad, Paneled, Swinging, single	—	8	4
Sheet Metal, Sliding, single	120	12	12
Sheet Metal, Sliding, in pairs	120	12	12
Sheet Metal, Swinging, in pairs	—	12	10
Sheet Metal, Swinging, single	—	12	6
Steel, Counterbalanced	—	10	8
Steel, Rolling and Lift-Up Type	120	12	12
Tin-Clad, 2-Ply, Counterbalanced	—	10	8
Tin-Clad, 2-Ply, Sliding, single	80	10	10
Tin-Clad, 2-Ply, Swinging, in pairs	80	10	10
Tin-Clad, 2-Ply, Swinging, single	—	10	6

NOTE.—Fire doors containing wood, cork or similar materials may emit considerable smoke when heated; this should be considered when selecting doors for hospitals, stair-towers, etc.

*When specially designed and labeled for use in Class B openings.

2105. Masonry at Wall Openings.

(a) Wall shall be plumb and true, and present smooth masonry surfaces without combustible trim at openings.

(b) Where swinging, tin-clad or sheet metal fire doors shut into masonry rabbets, rabbets shall be at least two by three inches, and have true sides and angles so that door will close snugly into same.

2106. Sills.

(a) In buildings with non-combustible floors no special sill construction is necessary if the floor structure is extended through the opening.

(b) Any of the sills shown by illustrations may be used in shaft openings.

(c) Shall be substantial metal threshold plates, preferably with anti-slip surface and extending into the masonry at each side of the opening or anchored to the masonry beneath them.

NOTE.—Where the threshold plates specified above are used in connection with metal frames, they may be attached to such frames in lieu of projection into the masonry at the sides of the openings.

2107. Direction of Operation.

(a) Doors at openings to stairways shall be of the swinging type where practicable, and open in the direction of exit travel in such manner as not to obstruct the passage or the operation of the other doors.

NOTE.—Properly installed swinging doors are easier to operate, especially under emergency conditions than any other type and offer less resistance to rapid and emergency egress.

(b) Horizontally sliding doors may be used at openings to stairways where conditions prevent the use of swinging doors. They shall open in such manner as not to obstruct the passage or the operation of other doors.

NOTE.—Horizontally sliding doors are more difficult to operate than swinging doors, especially at times of emergency, but are less objectionable at exits than vertical-sliding or rolling doors.

(c) Vertically sliding doors and rolling doors shall not be used at openings to stairways or openings intended for emergency exits.

NOTE.—Doors of this type are usually difficult to operate, and the method of operating them is not obvious or as well understood as the methods of operating swinging or horizontally sliding doors. They may be safely employed at openings in enclosures to vertical shafts that are not used as emergency exits.

2108. Lintels.

Any of the lintels specified in Rule 1107 for Class A openings may be used in shaft openings.

2109. Wall Frames.

(a) Any of the frames specified in Rule 1108 for Class A openings may be used in shaft openings.

(b) Frames shall be made of substantial structural steel channels at the sides and top of the opening. Channels shall be securely fastened together at the upper corners and to the sill, or threshold plate where used. In case no sill is used, channels at sides of opening shall extend into or be secured to the floor structure as specified for Class A. Jambs shall be securely anchored to masonry at sides of opening. Where swinging doors are used, head and jambs shall be provided with metal door stops projecting at least 5/8-inch and securely fastened to the frame members. These stops may be formed of special sheet metal channels overlapping the structural steel channels.

Where channel iron frames do not overlap both sides of the wall, anchors shall extend back in such a manner as to engage the masonry at the middle of the wall.

(c) Standard channel iron or sheet metal frames furnished complete by manufacturer and bearing inspection manifest.

2110. Measurement for Size of Fire Doors.

Openings in walls shall be carefully measured before doors are built and maximum dimensions used in determining overlap of doors. Where wall frames are employed the size of the door is determined by the opening in the frame.

NOTE.—Openings in walls frequently vary from the sizes given on plans. It is important, therefore, that the opening be measured before the doors are built. The size and shape of the opening in wall frames are frequently altered by distortion incidental to shipment and erection.

2111. Closing of Doors.

Doors at openings to enclosure to vertical communications through buildings shall be of the normally closed or automatic types. Doors shall not be provided with attachments that will prevent the operation of the closing devices.

NOTE.—Normally closed doors are doors arranged to close by gravity, or doors equipped with an approved door check or device to insure proper closing after the door has been opened. Automatic doors are doors equipped to close by the action of heat if left open.

2112. Care and Maintenance. (See Rule 1112.)

2200. Hollow Metal Fire Doors.

2201. Standard Class B hollow metal fire doors in moderate sizes are substantial in construction, practical under most conditions, fairly easy to install, and permit the use of concealed hardware. Mounted on one side of vertical shaft walls, they furnish a high degree of resistance to fire and a fairly high degree of resistance to the transmission of heat for fairly long periods of exposure. They resist fire streams well, are durable and easy to operate, and fairly easy to maintain.

They are incombustible and suitable as closures for emergency exits.

2202. Inspection manifest for swinging hollow metal doors applies to door including reinforcements for hardware. Frames provided with separate manifest.

Inspection manifest for sliding hollow metal doors applies to door assembly and frame. A separate manifest is applied to hangers and also to closers.

2210. Sliding Hollow Metal Doors.

2211. Size of Doors.

Sliding hollow metal door assembly shall be designed for openings not exceeding eight feet in width and eight feet in height, no one section of the assembly shall exceed four feet in width and eight feet in height.

2212. Mounting Sliding Hollow Metal Doors.

(a) The doors shall be installed in frames specially designed for each type of door assembly.

(b) The jambs and head of the frame and door shall be provided with binders and the door shall close into pockets in the jamb.

(c) The door shall move in grooves in the sill.

(d) Each jamb and head of the frame shall be provided with anchors.

(e) Center parting doors shall interlock where they come together at the center of the opening.

(f) Each door section shall be provided with two hangers.

(g) The door shall be closed and held in a closed position by closers operated manually, by air, or by electricity.

(h) Chain operated center-parting doors to have center lock either on the hanger or closing mechanism, in order to hold the door section in position at the center in case of failure of the chain, or of the chain slipping from position on the sprockets.

2213. Operation of the Doors.

The doors shall be mounted so as to slide easily and freely on their hangers and close accurately without binding in the frame.

NOTE.—Normally closed doors are preferable where the nature of the business is such that they are not likely to be blocked open.

2220. Swinging Hollow Metal Doors.

2221. Size of Doors.

(a) Swinging doors shall not exceed four feet in width or ten feet in height, and shall shut into rabbets formed by stops on the wall frame and fit the opening closely.

(b) Single swinging doors in pairs shall not exceed eight feet in width or ten feet in height, and shall shut into rabbets formed by the stops on the wall frame. They shall fit the opening closely and be provided with rabbeted edges or an astragal where they come together.

2222. Mounting Single Swinging Doors.

(a) Shall be mounted in standard wall frames properly installed in the wall.

(b) Doors not exceeding four feet in width or five feet in height shall be provided with at least two approved hinges. Doors in excess of five feet in height shall be provided with one hinge for each 2½ feet of height or fraction thereof.

(c) Doors not exceeding eight feet in height shall be equipped with a standard three-point locking mechanism or a rugged mortise or unit lock

having a throw of not less than ¾-inch. Doors exceeding eight feet in height shall be equipped with a standard three-point locking mechanism.

2223. Mounting Swinging Doors in Pairs.

(a) Shall be mounted in standard wall frames properly installed in wall.

(b) Each door shall be provided with approved hinges as specified for single doors.

(c) The active door of the pair shall be equipped with single or three-point locks as specified for single doors.

(d) The standing or normally stationary door shall be equipped with approved door bolt at top and bottom and with catches for the latches on the active door.

(e) Doors shall be provided with an approved interference device to prevent the wrong door from closing first.

2224. Operation of Doors.

Doors shall be mounted so as to swing easily and freely on their hinges and close accurately against the stops on the wall frame without binding. The latches should engage positively with the catches when the door is slammed shut or closed with moderate force.

2400. Tin-clad Fire Doors.

2401. Standard Class B tin-clad fire doors are the same as Class A tin-clad doors, except that the cores are made of two plies. In moderate sizes they are fairly substantial in construction, practical under most conditions, and easy to install. Mounted on one side of the wall they furnish a high degree of resistance to fire and to the transmission of heat for fairly long periods of exposure, and resist fire streams fairly well. Under adverse conditions of service they are liable to deteriorate rapidly, and are difficult to maintain. They are constructed largely of combustible material and generate considerable smoke when exposed to fire. As they are normally equipped with a rough heavy type of hardware, they are somewhat difficult to operate and, therefore, more objectionable as closures for emergency exits than doors of some other types.

2402. Inspection manifest covers doors only. Standard frames and hardware for such doors covered by separate manifest.

2411. General.

The rules covering vent holes, shape of doors and mounting sliding and swinging Class A tin-clad doors apply to 2-ply tin-clad fire doors for Class B situations.

Two-ply doors shall be designed for openings not exceeding 80 square feet in area or 10 feet in either dimension. (See Rules 1211 to 1242, inclusive.)

2500. Sheet Metal Fire Doors.

2501. Standard sheet metal fire doors are fairly substantial in construction, practical under most conditions and easy to install. Mounted on one side of the wall, they furnish a high degree of resistance to fire and a sufficiently high resistance to the transmission of heat for many situations. They resist fire streams well, are non-combustible, durable, and easy to maintain.

As they are normally equipped with a rough heavy type of hardware, they are somewhat difficult to operate and, therefore, more objectionable as closers for emergency exits than doors of some other types.

2502. Inspection manifests apply to doors only. Frame and hardware are covered by separate manifest.

2503. The rules covering the installation of sheet metal fire doors in Class A situations apply here. (See Section 1400.)

2600. Rolling Steel Elevator Doors.

2601. Standard rolling steel doors are substantial in construction, practical under most conditions, but are somewhat difficult to install. Mounted on one side of vertical shaft walls they furnish a high degree of resistance to fire for long periods of exposure and sufficient resistance to the transmission of heat in many situations. They are incombustible, resist fire streams well, are durable, fairly easy to maintain, and capable of being installed in locations where space limitations prevent the installation of other types of doors.

2602. Some types of rolling steel elevator doors are difficult to operate after they have closed automatically. These doors should be used only for openings not intended for emergency exits. The type and use of rolling doors in any given case should be considered in its relation to effect upon hazard to life.

2603. Inspection manifest applies to entire assembly.

2611. Position of Doors.

(a) Doors in enclosing walls of elevator shafts which communicate with more than one fire section, and which are subject to damage from falling materials at time of fire, shall be mounted in reveal of wall so that no portion projects beyond the face of the wall.

(b) Doors in enclosing walls of elevator shafts which do not communicate with more than one fire section, and doors which are not subject to damage from falling material at time of fire, may be mounted on the face of the wall. Inspection departments having jurisdiction should be consulted before installation.

NOTE.—Doors mounted on the face of the wall should usually be confined to elevator shafts in fireproof buildings, and to elevator shafts serving a single fire section only.

2612. Size of Doors.

Doors shall not exceed sizes suitable for openings 80 square feet in area or twelve feet in either dimension, and shall engage guides secured to the wall at the sides of the opening. Hood shall fit closely against the lintel, or where the door is mounted on the face of the wall, hood shall be placed above the top of the opening so that the bottom of the curtain will be flush with or above the top of the opening when the door is fully open.

2613. Mounting Rolling Doors.

The rules for mounting rolling steel doors at openings in fire walls shall be followed, except that doors are installed only on one side of wall. (See Rule 1513.)

2700. Counterbalanced Elevator Doors.

2701. Standard steel counterbalanced elevator doors are substantial in construction, practical in many elevator enclosures and are somewhat difficult to install. Mounted on one side of shaft walls they furnish a high degree of resistance to fire for long periods of exposure and a sufficient resistance to the transmission of heat in many situations. They resist fire streams well, are non-combustible, durable and generally easy to maintain.

2702. Standard metal-clad counterbalanced doors are substantial in construction, practical in many elevator enclosures, but somewhat difficult to install. Mounted on one side of shaft walls they furnish a high degree of resistance to fire and to the transmission of heat for long periods of exposure and resist fire streams well; being constructed largely of combustible material they generate considerable smoke. Under adverse conditions of service they are liable to deteriorate rapidly and are difficult to maintain.

2703. Counterbalanced doors of either type to be used only for openings not intended for emergency exits.

2704. Inspection manifest applies to doors, guides, and hardware.

2711. Size.

(a) Counterbalanced doors shall not exceed sizes suitable for openings eight feet in width and ten feet in height, and shall lap the openings at least two inches on the sides, at least three inches at top and at least two inches at bottom, or shall fit the sill closely when not designed to lap it.

(b) Door sections shall engage the guides on each side at least one inch with ½-inch clearance in each guide for lateral expansion.

2712. Mounting Counterbalanced Elevator Doors.

Counterbalanced elevator doors are not easily installed by workmen unfamiliar with them. Their installation should be under the supervision of the manufacturer. Specifications and blueprints should be furnished covering the details of installation and elevators should be available during erection.

(a) MOUNTING WALL GUIDES. Guides should be plumb, with attachments on each guide directly opposite each other on a horizontal line and fastened to the wall with through bolts and washers.

NOTE.—The guides are assembled at the shop in unit lengths approximately equal to story heights, space being allowed between units for clearance and expansion. The guides are provided with one round hole in each unit. All other holes being slotted.

(b) Where the doors are mounted on non-standard enclosing walls, the ends of the wall guides should be securely anchored to the floor structure at floor levels.

NOTE.—If securely attached to the floor, the wall guides serve as structural supports to both door and wall.

Wall guides may be attached to the standard steel channel frames by bolts. (See Rules 1108 and 2109.)

2800. Metal-clad Doors.

2801. Standard Class B metal-clad fire doors are provided with framed wooden cores, covered with sheet metal, with stiles and rails at least 1½ inches in thickness and with depressed or flush panels. In moderate sizes they are

fairly substantial in construction, practical under most conditions and fairly easy to install. Mounted on one side of vertical shaft walls they furnish a high degree of resistance to fire and to the transmission of heat for fairly long periods of exposure, and resist fire streams fairly well. Being constructed largely of combustible material, they generate considerable smoke. Under adverse conditions of service, they are liable to deteriorate rapidly and are difficult to maintain.

2802. Inspection manifest applies to door only. Standard frames carry separate label.

2820. Swinging Metal-clad Doors.

2821. Size of Doors.

(a) Swinging doors shall not exceed four feet in width or eight feet in height, and shall shut into rabbets formed by stops on the wall frame and fit the opening closely.

(b) Single swinging doors in pairs shall not exceed eight feet in width or eight feet in height, and must shut into rabbet formed by the stops on the wall frame. They shall fit the opening closely and be provided with an astragal.

(c) Locks and hinges of the mortise type shall be secured to steel reinforcements secured to the inner face of the metal covering of the rails and stiles.

2822. Mounting Single Swinging Doors.

(a) Shall be mounted in standard wall frames properly installed in the wall.

(b) Doors not exceeding four feet in width or five feet in height shall be provided with at least two approved hinges fastened to the door by through bolts or to reinforcements installed in the style. Doors in excess of five feet in height shall be provided with one hinge for each 2½ feet of height or fraction thereof.

(c) Doors not exceeding eight feet in height shall be equipped with a standard three-point locking mechanism or rugged mortise or unit lock having a throw of not less than ¾-inch. Doors exceeding eight feet in height shall be equipped with standard three-point latching mechanism, installed as nearly as possible in the manner specified for swinging tin-clad fire doors.

2823. Mounting Swinging Doors in Pairs.

(a) Shall be mounted in standard wall frames properly installed in the wall.

(b) Each door shall be provided with approved hinges as specified for single doors.

(c) The active door of the pair shall be equipped with single or three-point latch as specified for single doors.

(d) The standing or normally stationary door shall be equipped with approved door bolt at top and bottom with catches for the latches on the active door.

(e) Doors shall be provided with an approved interference device to prevent the wrong door from closing first.

2824. Operation of Doors.

Doors shall be mounted so as to swing easily and freely on their hinges and close accurately against the stops on the wall frame without binding. The