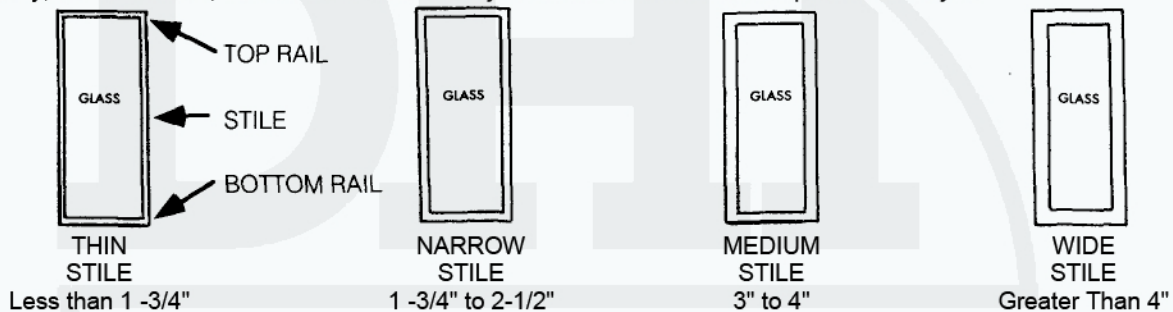


ALUMINUM STOREFRONT DOORS

by the Aluminum Door Manufacturers Liaison Committee

STILE-AND-RAIL DOORS

Only a small number of companies manufacture and distribute aluminum storefront doors on a national basis. The number of regional manufacturers is much larger. National or regional, the aluminum door industry identifies the different modes of the three most common styles, generally, as *narrow stile*, *medium stile* and *wide stile*. Another less used description is *thin stile*.

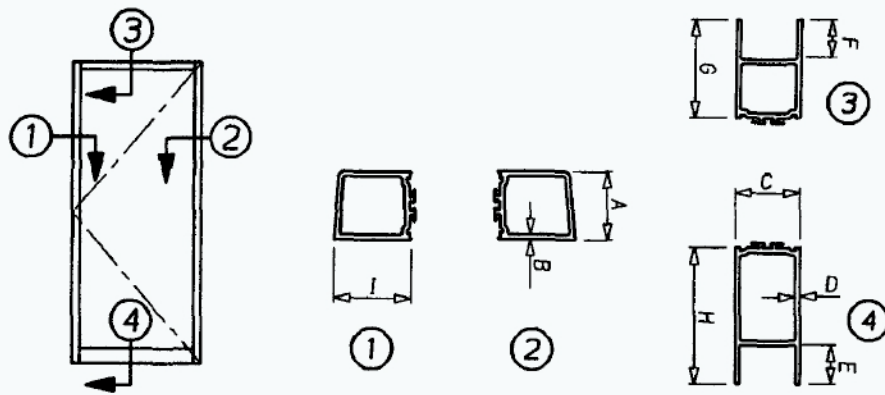


NOTE: Dimensions are face width of stiles, exclusive of glazing stops.

CONSTRUCTION

As with wood doors, the vertical and horizontal components of aluminum doors are called *stiles* and *rails*, respectively. The chart below lists the major dimensions of eight of the larger U.S. door manufacturers.

Particularly noteworthy for hardware suppliers are Columns E, F and G. The wide variations in these dimensions will give some perspective into possible problems in applying specific hardware items to specific manufacturers' doors.



COMPANY	DIM A	DIM B	DIM C	DIM D	DIM E	DIM F	DIM G	DIM H	DIM I	TIE RODS
'A'	1.750	0.109	1.740	0.109	1.550	0.500	2.115	3.295	2.300	
'B'	1.750	0.115	1.740	0.125	0.700	0.620	2.272	3.990	1.900	
'C'	1.760	0.125	1.740	0.125	0.365	0.250	2.120	4.000	2.125	YES
'D'	1.750	0.094	1.625	0.094	1.640	0.625	2.500	3.500	2.000	YES
'E'	1.760	0.125	1.750	0.125	1.615	0.635	1.984	3.259	2.128	
'F'	1.740	0.110	1.680	0.110	1.550	0.875	2.159	3.435	2.088	YES
'G'	1.762	0.095	1.726	0.108	1.670	0.500	2.115	3.880	2.000	
'H'	1.750	0.113	1.664	0.113	1.000	1.000	2.500	3.500	1.984	YES

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CORNER FABRICATION:

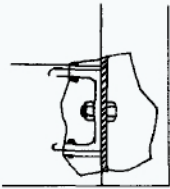


FIGURE 1

The basic aluminum door is comprised of two stiles and two rails. These members are held together in a number of ways. The most common corner joinery is by clipping the rails to the stiles as shown in Figure 1.

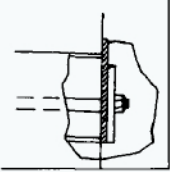


FIGURE 2

Other manufacturers run a 3/8" steel threaded rod (tie rod) through the void in the rails and into each stile. Inside the stile you will usually find a reinforcing plate and locking nut as shown in Figure 2.

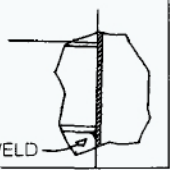


FIGURE 3

Some specifiers will call additionally for the corner to be welded at the concealed points of contact of the rail webs and stiles. This can be done to either of the above corner types and appears in Figure 3.

The major item of which to be aware in the construction of aluminum doors is that the clip bolt or tie rod ends may interfere with the pullman latches of concealed exit devices. Likewise any through-bolting of rail hardware may encounter a tie rod. In either case the door manufacturers may be able to alter some construction features to accommodate hardware items.

STOREFRONT FRAMING

The last quarter century has brought a multiplicity of framing designs and configurations. In many cases the sidelite frame glass has been brought forward to the same plane as the door face or door glass. This has made storefront framing much more complex around the perimeter of the door. Hence some hardware items and some frame types are going to be incompatible.

On the brighter side, the store front manufacturers all use butt hinges, pivots, door holders, electric releases, etc. Therefore, in many framing systems the manufacturers have the necessary adapters or appliances to accommodate much of what the design professional is specifying.

CONCLUSION:

While some hardware will not work on some storefront combinations it would be inappropriate to feel this is usually the case. The best and safest approach is to secure a preliminary set of shop drawings from the aluminum storefront supplier on your specific project. Work closely with him for clarifications and this will provide the smoothest path.

HARDWARE CHARACTERISTICS and SELECTION:

1. FULL MORTISE HINGES

- a. Most aluminum door manufacturers use a full mortise hinge, although there is at least one major manufacturer who uses a slip-in type.
- b. Aluminum door manufacturers standardly use a swaged hinge to allow for smaller clearances between the door stile and the jamb. Use of hinges designed for hollow metal and wood doors often will require increasing this clearance by up to 1/16". A special hinge swage, although preferred, is not required.
- c. Rounded corners are preferred because cutouts are made by routers. Square corner hinges require hand filing, which may increase the fabrication charges. Rounded corners should be compatible to the aluminum door industry standard, which is 5/32". When used with steel frames, frame portion should be squared corner.
- d. Hinge height should be 4-1/2" or 5".
- e. Hinge width should be 4" or 4-1/2".
- f. Heavy weight hinges (.180-.190 ga. metal) may be required for heavy duty installations.
- g. As most aluminum doors are used on the building exterior and are not fire rated, non-ferrous hinges should be used.
- h. Additional fabrication charges are associated with increased height of the hinge, special reinforcement required by the architect, or anchor (pivot reinforced) type hinges. Insert or slip-in leaf hinges may require special coordination with the door and frame manufacturers.

2. CONTINUOUS HINGES

- a. Continuous hinges are available for many installations. They can be used on standard or special requirement installations. They are available in full mortise, surface and other combinations.
- b. Continuous hinges may require special clearances at jambs and between pairs of doors.

3. OFFSET PIVOT SETS

- a. Offset pivot sets are available in 3/4" (standard) and 1-1/2" offsets. A set includes top and bottom pivots with optional intermediate pivots.
- b. Top and intermediate pivot sets normally are available with square corners but are available with rounded corners at an additional cost from the manufacturer.
- c. Intermediate offset pivots require the edge of the hinge stile to be beveled 1/8" in 2". The trailing edge

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of the hinge stile should have a minimum radius of 3/16". For doors having a flat stile or bevel other than 1/8" in 2", special pivots must be ordered or the door manufacturer must position the pivot reinforcement in such a manner as to compensate for the different bevel.

- d. Bottom pivots are floor mounted and can attach to the jamb or be independent of the jamb. Careful attention to the floor condition, frame type and threshold specified is required.
- e. Gasketing (weatherstripping) is part of the frame or stop.

4. CENTER PIVOT SETS

- a. Center pivot sets are made up of top and bottom pivots. They are double acting but can be used as single acting with an optional stop. Although normally used with floor closers or overhead concealed closers, they can be used independently with a surface closer. When used independently the door position within the frame is not fixed and the door can be moved to the front, middle or back of the frame, regardless of the door swing.
- b. The center line of the pivot usually is 2-3/4" from the edge of the pivot stile but can vary.
- c. A radiused or bullnose stile is used and gasketing (weatherstripping) for the stile usually is supplied by the door manufacturer.
- d. Reduced clear opening and gasketing are major drawbacks.

5. FLOOR CLOSER (CHECKING FLOOR HINGE)

- a. Floor closers are available with offset or center pivots.
- b. Floor closers with offset pivots have a standard 3/4" and optional 1-1/2" offset. These doors can have a beveled or straightedge stile. Gasketing normally is included in the frame.
- c. Floor closers with center pivots can be single or double acting. A radiused or bullnose stile is used and gasketing is integral to the stile.

6. OVERHEAD CLOSERS

- a. Surface Applied
 - 1. Top rails vary with stile width. Drop plates are required for parallel arm and regular arm applications. Drop plates should be furnished when required and should be shown in the hardware schedule and on the shop drawings.

2. A spacer for blade stops should be furnished with parallel arm packages. Also, for this application a support angle bracket may be required. Both items should be shown in the hardware schedule and on the shop drawings.

3. Fasteners are machine screws, or for more abusive applications, nutserts or through-bolts. Since wall thickness is usually 1/8" nominal at doors and door frames, most manufacturers do not install closer reinforcing.

b. Overhead Concealed Closers

- 1. Type must be determined before the aluminum door and frame supplier can quote their doors and frames.
- 2. Consideration must be given to transom bar rigidity and any possible interference with necessary reinforcements on wide span applications.
- 3. Certain closers require non-standard web depths or transom bar height, which necessitates changes to the top rail or transom bar.

c. General Considerations

- 1. Degree of Desired maximum opening should be specified, particularly when a dead stop or hold open condition exists.
- 2. Consider interference with other doors relative to desired swing and hold open requirements.
- 3. Determine that no interference occurs when used with other items of hardware such as overhead holders, pivots, anchor hinges, etc.

7. EXIT DEVICES

- a. Devices to fit aluminum doors must be given careful consideration, particularly on narrow stile and thin stile doors. Most manufacturers' catalogs show limitations of their devices when used singly or in pairs. Also, the type of frame used or use of a mullion determines the selection of the device required.
- b. When concealed devices are used, through-bolted outside trim must be detailed carefully to prevent interference with the concealed rods or mechanism.
- c. Exit device strike numbers should be part of the hardware schedule, even if furnished as standard.

8. LOCKS

- a. Locksets and deadbolts normally furnished with aluminum doors also are available to the hardware

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supplier and should be scheduled in preference to other like items.

- b. Backset requirements should be verified with the aluminum door supplier.
- c. Fronts and strikes should have corners rounded to fit the manufacturer's standard radius preparation.
- d. Deadbolts with less than 3/4" throw do not provide adequate security on pairs of doors. Face plates and strikes should be convex for use with radiused stiles (i.e. single center pivoted door or pairs of doors).

9. AUTOMATIC DOOR OPERATORS

- a. Specifications should identify who is to supply automatic operators. If supplied under other than the aluminum door or hardware section, reference should be made to applicable section. Installation and preparation responsibilities must be stated clearly.

10. THRESHOLDS

- a. Specifications should identify the threshold height or manufacturer's number and type.
- b. Width of thresholds should be determined by the depth of the jamb and the sill condition.
- c. When exit device type thresholds are used, the stop face for the door side should be perpendicular to the top of the threshold and provided with gasketing.
- d. Proper fasteners should be supplied with thresholds for installation.
- e. Thresholds should not be sent to the door manufacturer's plant, except when so requested.

11. PUSH/PULLS

- a. These should be mounted back to back for sets. Independently mounted pulls and free ends of the push/pull set can be fastened with through-bolts or concealed fasteners. The hardware schedule should state the type of fasteners to be used.
- b. Care should be taken so through bolts and other fasteners do not interfere with any concealed hardware used.

12. ELECTRICAL HARDWARE

- a. The aluminum door or hardware section of the specifications should include information on the final (security) system requirements when electrical hardware components are to be supplied, and the

remainder of the system is supplied under another section.

13. FASTENERS

- a. Screws for aluminum should be made of stainless steel or other non-ferrous materials. If ferrous metal screws are used, a high quality plating is recommended, to deter galvanic corrosion.
- b. Through-bolts should be used in high traffic and abusive conditions.

14. FINISHES

A. Anodized

- 1. Clear or Natural Anodized
- 2. Bronze Anodized
 - a. Dark Bronze Anodized is the most common, but light and medium bronze anodized are available.

B. Painted

- 1. Architecturally specified paint comes in many colors. The hardware finish must be stated in the specifications for bidding of the hardware.

15. GENERAL NOTES AND COMMENTS

- a. Narrow stile doors have limitations on adaptability of hardware and should be checked carefully for compatibility. Medium and wide stile doors are adaptable to a greater variation of hardware types and styles.
- b. When doors and frames are produced by different manufacturers, special coordination of hardware must be arranged.
- c. The aluminum door and frame manufacturer should be consulted as to which hardware is required for fabrication.
- d. Close coordination between the aluminum door supplier and hardware supplier is essential for profitable and trouble-free projects. Shop drawings and hardware schedules contain information of value to both parties and should be updated for the respective party, along with the architect and the general contractor.
- e. Whenever possible, aluminum doors should be allowed to swing past 90 degrees to at least 100 to 105 degrees.

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