

### Quick Reference Chart

| Door, Frame Wall Conditions  | Frame Type    | Door Type   | Hinge Type    | Variation of Basic Hinge Type Shown Below (See Note 2) | McKINNEY Example (See Note 3) |
|--|---------------|---|---------------|--|-------------------------------|
| Flush*   | Wood or Metal | Wood or Metal   | Full Mortise  | (not applicable)                                       | TA2714                        |
| Flush*   | Channel Iron  | Wood or Metal   | Half Mortise  | (not applicable)                                       | TA2774                        |
| Flush*   | Channel Iron  | Kalamein or Fire Labeled Wood Door (see Note 1)         | Full Surface  | (not applicable)                                       | TA2771                        |
| Flush*   | Metal         | Kalamein or Fire Labeled Wood Door (see Note 1)         | Half Surface  | (not applicable)                                       | TA2772                        |
| Flush*   | Metal         | Heavy and/or High Frequency Wood or Metal               | Anchor        | Full Mortise   | TA792                         |
| Flush*   | Wood or Metal | Wood or Metal Requiring Alternative Closing Device      | Spring        | Full Mortise<br>Half Surface                           | 1502, 1572                    |
| Flush*   | Wood or Metal | Wood or Metal Required to Clear Opening at 90° of Swing | Swing Clear   | Full Mortise   | TA2895                        |
| Deep Frame Reveal  | Wood or Metal | Wood or Metal with Maximum Swing of 90° to 110°         | Raised Barrel | Full Mortise   | RBTA2714                      |
| Deep Frame Reveal with or without Trim on the Face of the Frame or a Projecting Wall | Wood or Metal | Wood or Metal with swing to 180°                        | Wide Throw    | Full Mortise   | TA2798                        |
| Wall Pocket at 90° of swing  | Metal         | Wood or Metal   | Pocket Hinge  | (not applicable)                                       | PH-4                          |

\* Includes door and frame conditions of up to 1/8" inset

Notes:

(1) Fire labeled wood door without sufficient hinge reinforcement. Door leaf is hung using back plate with grommet nuts and bolts.

(2) The four basic hinge types are full mortise, half mortise, full surface and half surface. Variations (i.e. anchor, swing clear, raised barrel, wide throw) are available in the basic types shown above but may not be available in all basic hinge types. Consult individual catalog pages for availability.

(3) Consult individual catalog pages for available sizes, weights, materials, versions, bearings and finishes. Hinges for doors beveled (1/8" in 2") on hinge side use 5000 series for 3K hinges (e.g. TA5792); use 4000 series for 5K hinges (e.g. TA4895).

### Door Weights

The following wood and metal door weights are provided as a convenience to catalog users. They are approximate and will vary slightly among door manufacturers. The weight of the door hardware should be added to the weights listed below. For any thickness not shown, the individual manufacturer's catalog should be consulted.

| Door Weights (Based upon 3'0" x 7'0" Door Size)<br>(Weights do not include hardware) |                   |                                     |                   |        |
|--|-------------------|-------------------------------------|-------------------|--------|
| Hollow Metal Door Weights by Gauge   |                   | Wood Door Weights by Door Thickness |                   |        |
| Door Gauge -   | # Per Square Foot |                                     | # Per Square Foot |        |
| 20 Gauge Door  | 4                 | Door Thickness                      | 1-3/8"            | 1-3/4" |
| 18 Gauge Door  | 5                 | Particle/Mineral Core               | 4.75              | 5.25   |
| 16 Gauge Door  | 6                 | Stave Core Wood                     | 3.75              | 4.25   |
| 14 Gauge Door  | 7                 | Hollow Core Wood                    | 1.3               | 1.5    |

# McKINNEY Hinge Catalog Reference Charts

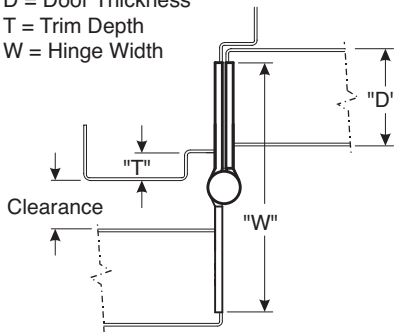
### How to Determine the Proper Hinge Width

Knowing the door thickness and trim projection, use the following formula for determining minimum hinge width of all full mortise hinges:

- (1) Door thickness
- (2) Backset
- (3) Required Clearance
- (4) Inset

Door thickness minus the backset multiplied by 2, plus the required clearance, plus the inset (if applicable) will equal the proper hinge width.

D = Door Thickness  
T = Trim Depth  
W = Hinge Width



For doors up to 2 1/2" thick:  
 $W = (2 \times D) + T$   
For doors 2 1/2" to 3" thick:  
 $W = (2 \times D) + (2 \times T) + 1/4"$

| Trim Clearance |             |                        |
|----------------|-------------|------------------------|
| Door Thickness | Hinge Width | Max Clearance Provided |
| 1 3/8"         | 3 1/2"      | 1 1/4"                 |
|                | 4"          | 1 3/4"                 |
| 1 3/4"         | 4"          | 1"                     |
|                | 4 1/2"      | 1 1/2"                 |
|                | 5"          | 2"                     |
|                | 6"          | 3"                     |
| 2"             | 4 1/2"      | 1"                     |
|                | 5"          | 1 1/2"                 |
|                | 6"          | 2 1/2"                 |
| 2 1/4"         | 5"          | 1"                     |
|                | 6"          | 2"                     |

The table above indicates the trim clearance provided by hinges of specified widths on flush doors, not inset, of standard thickness. For doors of other thicknesses, apply the proper formula.

The hinge widths of half mortise, half surface and full surface hinges are standard, depending on the hinge length. Note that in these hinge types, the amount of clearance available is determined by the amount of offset and not by the hinge width.

### Expected Frequency of Door Operation

| Installation Type             | Expected Frequency |           |         |
|-------------------------------|--------------------|-----------|---------|
|                               | Daily              | Yearly    |         |
| COMMERCIAL                    |                    |           |         |
| Commercial Store Entrance     | 5,000              | 1,500,000 | High    |
| Office Building Entrance      | 4,000              | 1,200,000 |         |
| Theatre Entrance              | 1,000              | 450,000   |         |
| School Entrance               | 1,250              | 225,000   |         |
| School Restroom Door          | 1,250              | 225,000   |         |
| Store or Bank Entrance        | 500                | 150,000   |         |
| Office Building Restroom Door | 400                | 118,000   | Average |
| School Corridor Door          | 80                 | 15,000    |         |
| Office Building Corridor Door | 75                 | 22,000    |         |
| Store Restroom Door           | 60                 | 18,000    |         |
| RESIDENTIAL                   |                    |           |         |
| Entrance                      | 40                 | 15,000    | Low     |
| Restroom Door                 | 25                 | 9,000     |         |
| Corridor Door                 | 10                 | 3,600     |         |
| Closet Door                   | 6                  | 2,200     |         |

Note: We recommend that bearing hinges be used on all above categories other than "Residential".

### Recommended Number of Hinges per Door 3'0" Wide (Wood or Metal)

| Door Height in Inches (MM) | # of Hinges Per Door |
|----------------------------|----------------------|
| Up to 60 (1524)            | 2                    |
| 60 to 90 (1524 to 2286)    | 3                    |
| 90 to 120 (2286 to 3048)   | 4                    |

One Cycle = one complete opening and closing

Note: Another hinge is required for each additional 30"

### Recommended Size of Hinges per Door (Wood or Metal)

| Door Thickness in Inches (MM) | Door Width in Inches (MM) | Hinge Height in Inches (MM) | Hinge Gauge |
|-------------------------------|---------------------------|-----------------------------|-------------|
| 1 3/8 (35)                    | Up to 36 (914)            | 3 1/2 (89)                  | .123        |
| 1 3/8 (35)                    | Over 36 (914)             | 4 (102)                     | .130        |
| 1 3/4 (44)                    | Up to 36 (914)            | 4 1/2 (114)                 | .134        |
| 1 3/4 (44)                    | Over 36 - 48 (914 - 1219) | 5 (127)                     | .134        |
| 1 3/4 (44)                    | Over 48 (1219)            | 6 (152)                     | .160        |
| 2 - 2 1/2 (51 - 64)           | Up to 42 (1067)           | 5 (127) HW                  | .190        |
| 2 - 2 1/2 (51 - 64)           | Over 42 (1067)            | 6 (152) HW                  | .203        |

\* Heavy weight hinges should be used on all extra heavy doors or those exposed to high frequency use. Consult the factory for doors wider than 3'0". Five knuckle heavy weight hinges are four bearing. The following gauges of metal may apply:

Heavy weight 4-1/2" (114) high = .180 gauge  
Heavy weight 5" (127) high = .190 gauge  
Heavy weight 6" (152) high = .203 gauge

Note:

Five knuckle 8" (203) high hinges have six bearings.

Note:

On hinge size the dimension shown is the hinge height. Where full mortise or other hinges with two dimensions are used, the first dimension given is always the height. The second dimension is the hinge width when open.

# McKINNEY Hinge Catalog Reference Charts

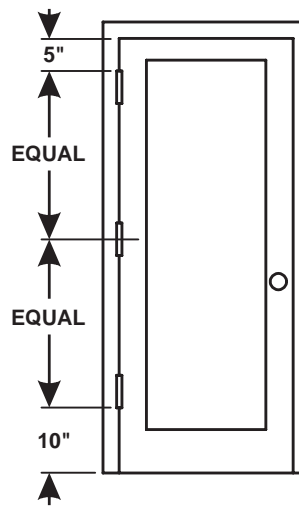
## Underwriters' Laboratories Requirements

The requirements of the Underwriters' Laboratories, Inc., for fire door hardware are determined by door label, which in turn is established by the location of the opening. The following are the classifications of Underwriter's Laboratories, Inc.

| Door Situation | Location                                       |
|----------------|--|
| Class A        | Fire Walls                                     |
| Class B        | Vertical Shafts                                |
| Class C        | Corridor & Room Partitions                     |
| Class D        | Exterior Walls (severe fire exposure)          |
| Class D        | Exterior Fire Escapes (severe fire exposure)   |
| Class E        | Exterior Walls (moderate fire exposure)        |
| Class E        | Exterior Fire Escapes (moderate fire exposure) |

On all public and some private heavy construction three hinges are required for each door. This practice is standard under U.S. Government specifications and is required under most building codes and Fire Underwriters' specifications.

Three hinges assure proper door alignment and enable other hardware



to function properly. There is less door warping and less hinge wear. On light wood doors the alignment problem is as great as on heavy doors so less than three hinges should never be considered.

The top of the top hinge should be 5" from the jamb header.

The bottom of the bottom hinge should be 10" from the finished floor.

The center of the center hinge should be equidistant from the other two.

EXCEPTION:

The McKinney Anchor Hinge mounts at the very top of the door. On doors over 7'6" high, four hinges are required.

**Table 1 Reference NFPA-80 Table 2-8.1.1 1995 Builders Hardware**

Mortise and Surface Hinges, Pivots or Spring Hinges for Swinging Doors. Doors up to 60" (1.52 m) in height shall be provided with two hinges and an additional hinge for each additional 30" (0.76 m) of door height or fraction thereof. The distance between hinges shall be permitted to exceed 30" (0.76 m). Where spring hinges are used, at least two shall be provided.

| Door Rating, Hr.                            | Maximum Door Size |                |                 | Minimum Hinge Size |     | Type Hinge  |           |               |              |  |
|---|-------------------|----------------|-----------------|--------------------|-----|-------------|-----------|---------------|--------------|--|
|   | Width ft. (m)     | Height ft. (m) | Height in. (mm) | Thickness in. (mm) |     |             |           |               |              |  |
| <b>For 1 3/4" (44.5mm) or Thicker Doors</b> |                   |                |                 |                    |     |             |           |               |              |  |
| 3   | 1 1/2             | 1              | 3/4             | 1/2                | 1/3 | 4 (1.22)    | 10 (3.05) | 4 1/2 (114.3) | 0.180 (4.57) | Steel, Mortise or Surface                                    |
| 3   | 1 1/2             | 1              | 3/4             | 1/2                | 1/3 | 4 (1.22)    | 8 (2.44)  | 4 1/2 (114.3) | 0.134 (3.40) | Steel, Mortise or Surface                                    |
|   | 1 1/2             | 3/4            |                 | 1/2                | 1/3 | 3'2" (0.96) | 8 (2.44)  | 6 (152.4)     | 0.225 (5.72) | Steel-Olive Knuckle or Paumelle                              |
| 3   | 1 1/2             | 3/4            |                 | 1/2                | 1/3 | 4 (1.22)    | 10 (3.05) | 4 (101.6)     | 0.225 (5.72) | Steel Pivots (including top, bottom and intermediate)        |
|   | 1 1/2             | 1              | 3/4             | 1/2                | 1/3 | 3 (0.91)    | 5 (1.52)  | 4 (101.6)     | 0.130 (3.30) | Steel Mortise or Surface                                     |
|   | 1 1/2             | 1              | 3/4             | 1/2                | 1/3 | 2 (0.61)    | 3 (0.91)  | 3 (76.2)      | 0.092 (2.34) | Steel, Mortise or Surface                                    |
| 3   | 1 1/2             | 1              | 3/4             | 1/2                | 1/3 | 3 (0.91)    | 7 (2.13)  | 4 1/2 (114.3) | 0.134 (3.40) | Steel, Mortise or Surface (labeled self closing spring type) |
| 3   | 1 1/2             | 1              | 3/4             | 1/2                | 1/3 | 3 (0.91)    | 7 (2.13)  | 4 (101.6)     | 0.105 (2.67) | Steel, Mortise or Surface (labeled self closing spring type) |
| <b>For 1 3/8" (34.93mm) Doors</b>           |                   |                |                 |                    |     |             |           |               |              |  |
| 3   | 1 1/2             |                | 3/4             | 1/2                | 1/3 | 3 (0.91)    | 7 (2.13)  | 3 1/2 (88.9)  | 0.123 (3.12) | Steel, Mortise or Surface                                    |
| 3   | 1 1/2             | 1              | 3/4             | 1/2                | 1/3 | 2'8" (0.81) | 7 (2.13)  | 3 1/2 (88.9)  | 0.105 (2.67) | Steel, Mortise (spring closing)                              |

Notes:

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

(2) 4 1/2" (114mm) high, 0.180" (4.57mm) thick hinges shall be permitted for use on wide and heavy doors or doors that are subjected to heavy use or unusual stress.

(3) Some manufacturers can provide fire doors with hinges of lighter weight that are not of the ball bearing type where they are part of a listed assembly and meet the test requirements of ANSI

A156.1, *Standard for Butts and Hinges*, and have been tested to a minimum of 350,000 cycles.

(4) Pivot sets made up of components that are smaller and/or of a lighter gauge than shown in Table 2-8.1.1 shall be permitted to be used, provided they meet the requirements of ANSI A156.4, *Door Controls (Closers)* and are in accordance with the manufacturers' labeled service procedures.

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