

This section should assist the designer in choosing the correct hinge for the application.

How To Determine Applied Loads:

Nomenclature:

F = Thrust load or maximum door weight

P_{1A} = In plane radial load caused by moment arm of the door width

ΣP_{1B} = Sum of any other in plane radial loads (such as those caused by a seismic event)

P_{2A} = Out of plane radial load caused by moment arm of very thick doors

ΣP_{2B} = Sum of any other out of plane radial loads (such as those caused by wind, seismic or blast)

P_{tot} = Resultant radial load

Formulae:

$$P_{1A} = Fx / y$$

$$P_{2A} = Fz / y$$

$$P_{tot} = \sqrt{(P_{1A} + \sum P_{1B})^2 + (P_{2A} + \sum P_{2B})^2}$$

(general equation for resultant radial load applied to a single hinge)

Application:

A heavy duty industrial door weighs 2,300 lbs, is 22' high, 10' wide and is subjected to a 20 lb/ft² wind load.

$$x = 5'$$

$$y = 20'$$

$$z = 3.063''$$

Step 1:

Calculate P_{tot} and choose a hinge with a radial capacity greater than or equal to P_{tot} .

$$P_{1A} = (2,300 \text{ lbs})(5') / 20' = 575 \text{ lbs}$$

$$P_{2B} = 1,100 \text{ lbs}$$

$$P_{2A} = (2,300 \text{ lbs})(3.063'' / 12) / 20' = 29 \text{ lbs}$$

$$P_{2b} = 1,100 \text{ lbs}$$

(one hinge's share of the wind load)

$$P_{tot} = \sqrt{(575 + 0)^2 + (29 + 1,100)^2} = 1,270 \text{ lbs}$$

Choose a W100HD since the radial capacity of a W100HD (1,630 lbs) is greater than 1,270 lbs.

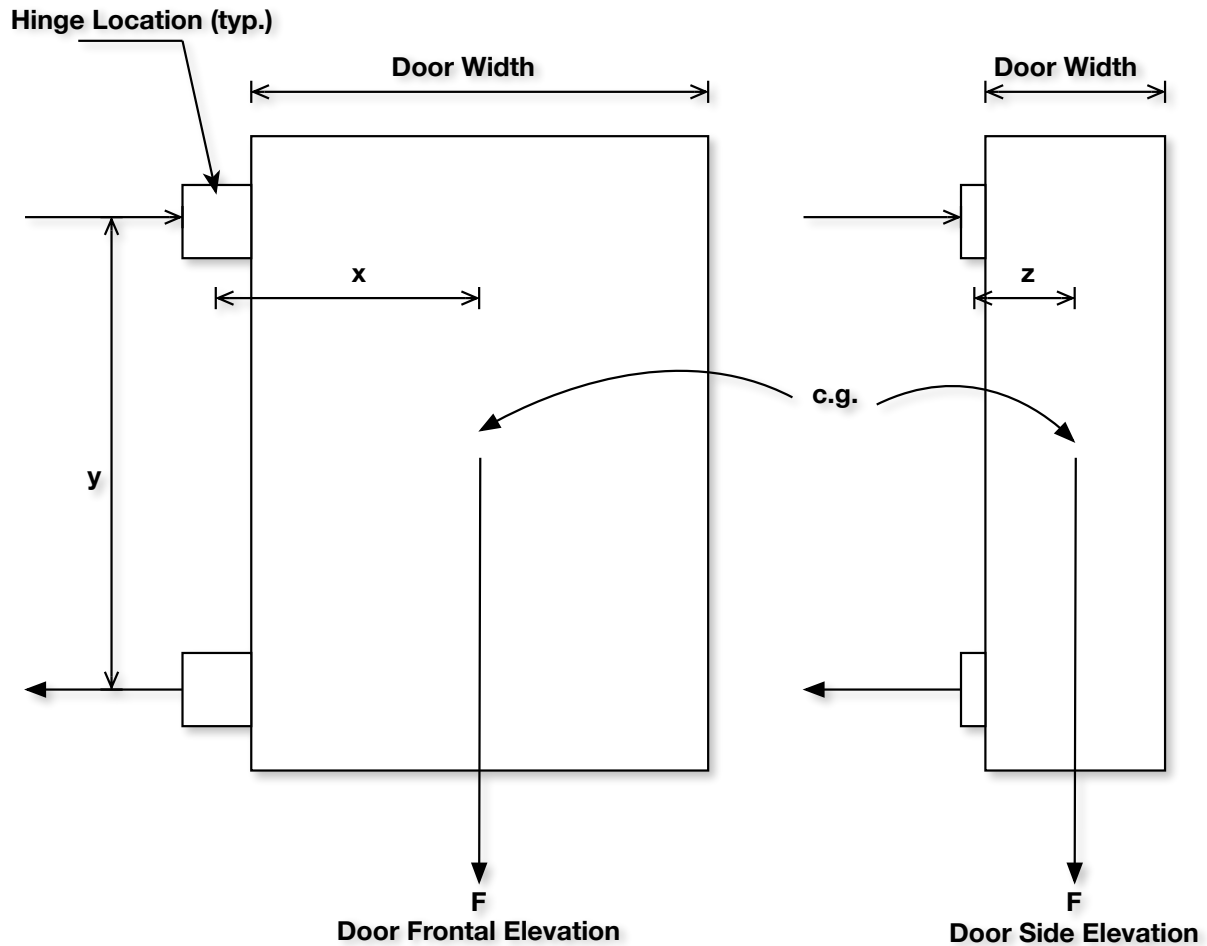


Fig. 1

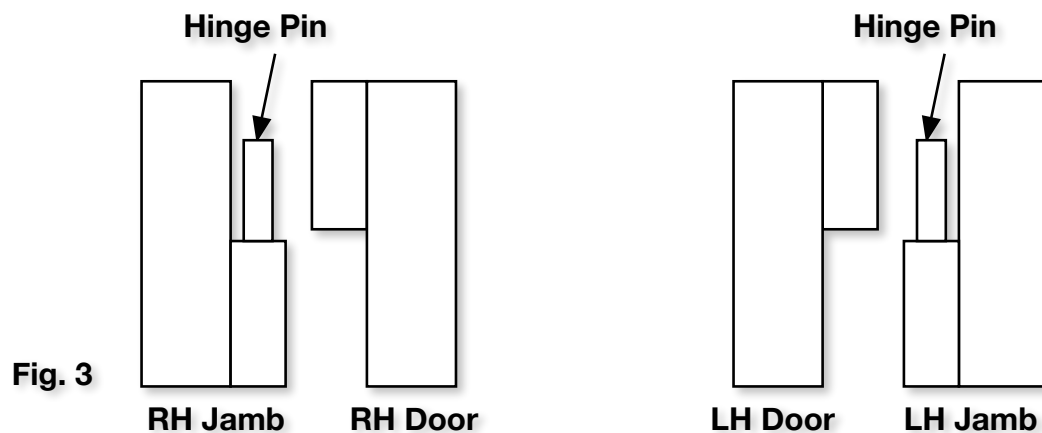
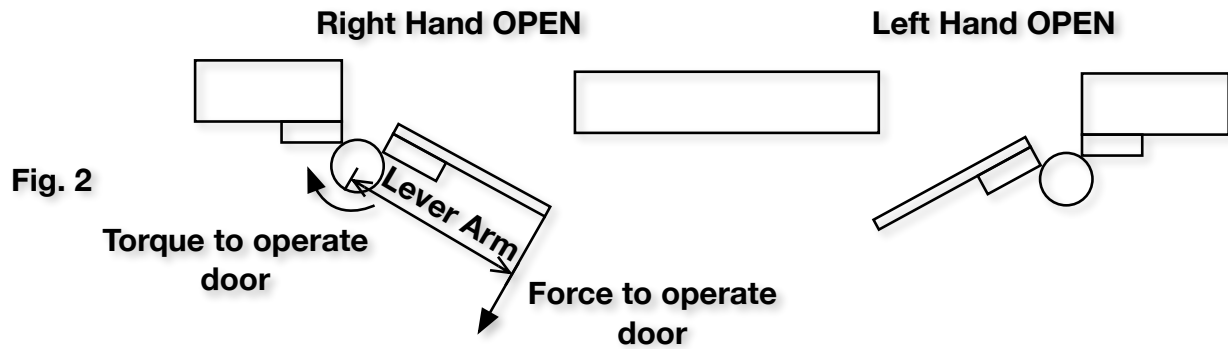
Step 2:

Check applied thrust load or door weight and choose a thrust capacity equal to or greater than the applied load.

Thrust capacity of W100 is 4,000 lbs.

Since 4,000 lbs is greater than 2,300 lbs, (2) W100HD hinges are acceptable for this application.

How to Determine Hand of Hinge:



How to Determine Door Operating Force:

Door Operating Force = Torque to Operate Door in (lb-inch) / Lever Arm in (inches)