

STRENGTH OF COMPONENTS

12 GAUGE STAINLESS STEEL CONTINUOUS HINGES

Leaves

Material: 12 gauge 304 stainless steel
 Tension: 85,000 P.S.I.
 Shear: 35,000 P.S.I.

Stress Analysis

The center of gravity of a door of uniform construction is located half-way between the top and bottom and half-way from edge to edge. The forces acting on the hinge are tensile and shear in the top half of the door and compression and shear in the bottom half. The leaf is 0.109 inches thick, so the cross-sectional area resisting tensile stresses is 4.5 in² for a 7-foot hinge and 6.5 in² for a 10-foot hinge.

Tensile Limits

7' door 4.5 in²
 x 85,000 P.S.I. = 385,075 lbs
 + 12 (safety factor) = 32,100 lbs

8' door 5.0 in²
 x 85,000 P.S.I. = 440,675 lbs
 + 12 (safety factor) = 36,725 lbs

10' door 6.5 in²
 x 85,000 P.S.I. = 551,850 lbs
 + 12 (safety factor) = 46,000 lbs

Shear Limits

7' door 9.0 in²
 x 35,000 P.S.I. = 317,125 lbs
 + 12 (safety factor) = 26,425 lbs

8' door 10.25 in²
 x 35,000 P.S.I. = 358,750 lbs
 + 12 (safety factor) = 29,896 lbs

10' door 13.0 in²
 x 35,000 P.S.I. = 455,000 lbs
 + 12 (safety factor) = 37,875 lbs

Fasteners

Type: 10-24 machine screw
 Material: 1035 cold rolled steel
 Tension: 83,000 P.S.I.
 Area: 0.0145 in²

7' hinge 16 fasteners
 x 0.0145 in² = 0.232 in²
 x 83,000 P.S.I. = 19,256 lbs
 + 12 (safety factor) = 1,604 lbs

8' hinge 18 fasteners
 x 0.0145 in² = 0.261 in²
 x 83,000 P.S.I. = 21,663 lbs
 + 12 (safety factor) = 1,805 lbs

10' hinge 20 fasteners
 x 0.0145 in² = 0.290 in²
 x 83,000 P.S.I. = 24,070 lbs
 + 12 (safety factor) = 2,005 lbs

Type: 1/4-20 machine screw
 Material: 1035 cold rolled steel
 Tension: 83,000 P.S.I.
 Area: 0.0269 in²

7' hinge 16 fasteners
 x 0.0269 in² = 0.430 in²
 x 83,000 P.S.I. = 35,723 lbs
 + 12 (safety factor) = 2,977 lbs

8' hinge 18 fasteners
 x 0.0269 in² = 0.484 in²
 x 83,000 P.S.I. = 40,189 lbs
 + 12 (safety factor) = 3,349 lbs

10' hinge 20 fasteners
 x 0.0269 in² = 0.538 in²
 x 83,000 P.S.I. = 44,654 lbs
 + 12 (safety factor) = 3,721 lbs

4/99



For more information contact:

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Baker

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PROJECT TITLE

RESTROOM DESIGN STANDARDS

SHEET TITLE

TOILET PARTITIONS AND DOOR HARDWARE-20

SCALE

NONE

DATE

MARCH 2005

PROJECT NO.

TASK 1314.20

B-20