

**Table J.5.2**  
**HOLE DIAMETER  $D_h$  FOR TYPE C, D, F, AND T SCREWS**

screw size	Metal Thickness (in.)											
	0.050	0.060	0.083	0.109	0.125	0.140	3/16	1/4	5/16	3/8	1/2	
	Hole Diameter (in.)											
8-32	0.1360	0.1360	0.1360	0.1405	0.1405	0.1440	0.1470	0.1495	0.1495			
10-24	0.1495	0.1520	0.1540	0.1570	0.1590	0.1610	0.1660	0.1719	0.1730	0.1730		
10-32	0.1610	0.1610	0.1610	0.1660	0.1660	0.1660	0.1719	0.1770	0.1770	0.1770		
12-24		0.1770	0.1800	0.1820	0.1850	0.1875	0.1910	0.1990	0.1990	0.1990	0.1990	
¼-20			0.2055	0.2090	0.2130	0.2130	0.2210	0.2280	0.2280	0.2280	0.2280	
¼-28			0.2188	0.2210	0.2210	0.2210	0.2280	0.2344	0.2344	0.2344	0.2344	

① for material thicknesses not given, use the next smaller thickness.

### J.5.2 Minimum Spacing of Screws

The distance between screw centers shall not be less than 2.5 times the nominal diameter of the screw.

1) for 0.060 in.  $\leq L_e \leq 0.125$  in. (1.5 mm  $\leq L_e \leq 3$  mm)

$$R_n = K_s D L_e F_{ty2} \quad (J.5-1)$$

where

$K_s = 1.01$  for 0.060 in.  $\leq L_e < 0.080$  in. (1.5 mm  $\leq L_e < 2$  mm)

$K_s = 1.20$  for 0.080 in.  $\leq L_e \leq 0.125$  in. (2 mm  $\leq L_e \leq 3$  mm)

$F_{ty2}$  = tensile yield strength of member not in contact with the screw head

$D$  = nominal diameter of the screw

2) for 0.125 in.  $< L_e < 0.25$  in. (3 mm  $< L_e < 6.3$  mm)

$$R_n = 1.2DF_{ty2}(0.25 - L_e) + 1.16A_{sn}F_{tu2}(L_e - 0.125) \quad (J.5-2)$$

where

$A_{sn}$  = thread stripping area of internal thread per unit length of engagement

$F_{tu2}$  = tensile ultimate strength of member not in contact with the screw head

3) for 0.25 in.  $\leq L_e \leq 0.375$  in. (6.3 mm  $\leq L_e \leq 10$  mm)

$$R_n = 0.58 A_{sn} L_e F_{tu2} \quad (J.5-3)$$

b) For spaced threads (screw types AB, B, BP, BF, and BT)

1) for 0.038 in.  $\leq L_e \leq 2/n$  (1 mm  $\leq L_e \leq 2/n$ )

$$R_n = K_s D L_e F_{ty2} \quad (J.5-4)$$

where

$K_s = 1.01$  for 0.038 in.  $\leq L_e < 0.080$  in. (1 mm  $\leq L_e < 2$  mm)

$K_s = 1.20$  for 0.080 in.  $< L_e < 2/n$  (2 mm  $< L_e < 2/n$ )

2) for  $2/n < L_e < 4/n$

$$R_n = 1.2D F_{ty2} (4/n - L_e) + 3.26D F_{tu2} (L_e - 2/n) \quad (J.5-5)$$

3) for  $4/n \leq L_e \leq 0.375$  in. ( $4/n \leq L_e \leq 8$  mm)

$$R_n = 1.63D L_e F_{tu2} \quad (J.5-6)$$

### J.5.3 Minimum Edge Distance of Screws

The distance from the center of a screw to an edge of a part shall not be less than 1.5 times the nominal diameter of the screw. See Section J.5.5.1 for the effect of edge distance on the bearing strength.

### J.5.4 Screwed Connection Tension

The tensile strength of a screwed connection is the least of the pull-out, pull-over, and screw tensile rupture strengths. The design tensile strength  $\phi R_n$  and the allowable tensile strength  $R_n/\Omega$  shall be determined as follows:

$\phi = 0.50$  (LRFD)

$\Omega = 3.0$  (ASD building-type structures)

$\Omega = 3.5$  (ASD bridge-type structures)

The nominal strength  $R_n$  for the limit state of pull-out shall be determined in accordance with Section J.5.4.1.

The nominal strength  $R_n$  for the limit state of pull-over shall be determined in accordance with Section J.5.4.2.

The nominal strength  $R_n$  for the limit state of screw tensile rupture shall be determined in accordance with Section J.5.4.3.

For screws subjected to tension, the head of the screw or washer, if a washer is provided, shall have a nominal diameter not less than 5/16 in. (8 mm). Washers shall have a nominal thickness not less than 0.050 in. (1.3 mm).

#### J.5.4.1 Pull-Out

##### J.5.4.1.1 Screws in Holes

The nominal strength  $R_n$  for the limit state of pull-out of a screw in a hole is:

a) For UNC and UNF threads (screw types C, D, F, G, and T)