Method For Calculating Bolt Lengths

The following formulas were used in establishing length on pages 40,42 and 44. They are given for convenience in determining lengths not given in the tables.

L CSB (See Note 1) = A + n

L CMB (See Note 1) = B + n

Where:
A = 2(C + t + d) + G + F - a, (i.e. stud bolt length exclusive of negative tolerance n).

B = 2(C + t) + d + G + F + p - a, (i.e. machine bolt length exclusive of negative tolerance n).

C = Minimum flange thickness.

F = Total height or depth of ring-joint groove for both flanges, see Table F1.

G = 0.12 in. (3.2mm) gasket thickness for raised face, M & F and T & G flanges; also approximate distance between ring-joint flanges.

L CMB = Calculated machine bolt length as measured from underside of head to end of point.

L SMB = Specified machine bolt length (from underhead to end, excluding end point) which is L CMB rounded off to the next larger 0.25 in. increment; see Figure F2.

L SSB = Specified stud-bolt length (effective thread length, excluding end points) which is L CSB rounded off to the next larger 0.25 in. increment; see Figure F1.

a = Zero, except where the small female face is on the end of pip, a = 0.19 in.

d = Heavy nut thickness (equals nominal bolt diameter, see ANSI B18.2.2).

n = Negative tolerance on bolt length

p = Allowance for height of point of machine bolt (= 1.5 times thread pitch).

t = Plus tolerance for flange thickness.

Weldbend Notes:

1. For lap-joints, calculate stud-bolt and machine bolt lengths as follows:
   For ring-joint groove facing

   L CSB = (A - pipe thickness for each lap) + n

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L CMB = (B + pipe thickness for each lap) + n
For other than ring-joint facing

L CSB = (A - Thickness) + n
L CMB = (B - Thickness) + n

2. 0.06 in. (1.6mm) raised face in included in minimum flange for Class 150, 300, flanges.
3. The equations used on this page are calculated bolt lengths established to assure full thread engagement of heavy hexagon nuts when worst case tolerances occur on all relevant dimensions of the flanged joint.

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