

2.4 Press Fits

A press fit is used when available space and torque to be transmitted is limited. Tolerances of mating parts have to be closely controlled to assure a minimum and avoid all excessive interference.

Formulas for press fit are:

$$p = \frac{eE}{2d} \left[1 - \left(\frac{d}{D} \right)^2 \right] \text{ and } T = \frac{p}{2} pmd^2L,$$

from here $T = 0.785mdLeE \left[1 - \left(\frac{d}{D} \right)^2 \right]$ (lb in) (17)

$$S = \frac{2P}{1 - \left(\frac{d}{D} \right)^2} \text{ or } S = \frac{eE}{d} \quad (18)$$

where:

p = unit pressure on the interfering surfaces (lb/in²)

e = amount of interference (in)

E = modulus of elasticity (psi)

d = shaft diameter (in)

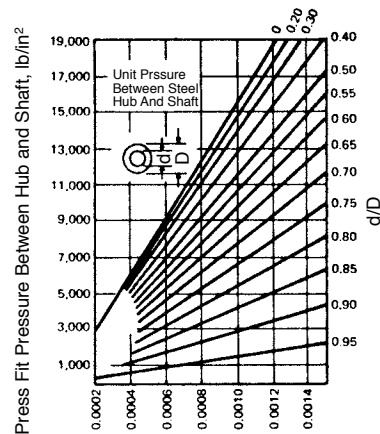
m = coefficient of friction (assume 0.1-0.2)

L = length of interference surfaces (in)

S = combined stress resulting from circumferential tension and radial compression (psi)

T = slip torque (to be divided by safety factor of 2) (lb in)

Graph gives value of p for different d/D ratios and different values of e.



Allowance Per Inch of Shaft Diameter, e

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Table 2-4

Running Clearance		Running Clearance		
Proper running clearance for bearings depends, to a great extent, on the particular item. Only minimum recommended clearances for oil-impregnated bearings used with ground steel shafting are listed.		Shaft Size in.	Clearance, min. in.	
			Bronze Base	Iron Base
		Up to 0.760	0.0005	0.001
		0.761 to 1.510	0.001	0.0015
		1.511 to 2.510	0.0015	0.002
		Over 2.510	0.002	0.0025

Press Fits		Recommended Press Fits		
Plain cylindrical journal bearings are commonly installed by press fitting the bearing into a housing with an insertion arbor. For housings rigid enough to withstand the press fit without appreciable distortion and for bearings with thickness approximately one-eighth of the bearing outside diameter, the press fits shown are recommended.		Outside Dia. in.	Press Fit, in.	
			Minimum	Maximum
		Up to 0.760	0.001	0.003
		0.761 to 1.510	0.0015	0.004
		1.511 to 2.510	0.002	0.005
		2.511 to 3.010	0.002	0.006
		Over 3.010	0.002	0.007