



Press Fit Engineering and Design Calculator

[Torque Engineering and Design](#)
[Strength of Materials](#)

[Press Fit Engineering and Design Equations](#) (See Below)

Use this engineering calculator to determine engineering and design parameters for cylindrical press fit applications.

Enter numbers at BOLD Text Locations, Results in RED					
Loads			Interference Parameters		
Torque to be transmitted (N-mm)	torque	200	Minimum required interface pressure (N/mm ²)	rPI	2.20
Axial force to be transmitted (N)	force	0	Differential Poisson radial interference due to axial force (mm)	ddp	0.00
Coefficient of friction	mu	0.15	Differential thermal radial expansion (mm)	ted	0.00
Operating temperature (°C)	ot	20	Outer body rotating inner diameter radial displacement (mm)	robd	2.32
Stress concentration factor at interface edge	scf	2	Inner body rotating outer diameter radial displacement (mm)	ribd	1.79
Rotation speed (rpm)	rpm	1000	Total additional diametrical interference amount to be added (to ibod) (mm)	addi	-4.29
Outer body input parameters			Interference Fit Calculations (Assumes addi has been added to ibod)		
Outside diameter (mm)	obod	19.622	Maximum diametrical interference (mm)	maxdelta	4.00
Interface diameter (mm)	obid	11.998	Maximum resulting interface pressure (N/mm ²)	maxip	2.01
Plus tolerance (mm)	obptol	0.001	Minimum diametrical interference (mm)	mindelta	-4.29
Minus tolerance (mm)	obmtol	0.001	Minimum resulting interface pressure (N/mm ²)	minip	-2.16
Modulus of elasticity (N/mm ²)	obe	1.93e+5	Minimum safety margin (min obtained pressure/required pressure)		-9.83
Yield strength (N/mm ²)	obsy	172	Maximum sustainable torque (N-mm)	maxt	1.83
Poisson's ratio	obn	0.27	Minimum sustainable Torque (N-mm)	mint	-1.97
Coefficient of thermal expansion (1/°C)	obcte	1.60e-5	Minimum safety margin (min obtained torque/required torque)		-0.1
Density (g/cm ³)	obrho	8	Outer body material stresses at maximum interface pressure		
Inner body input parameters			Radial displacement of inner surface (mm)		1.54
Engagement length (mm)	L	26.830	Radial press-fit stress at ID (N/mm ²)	obsr	-2.01
Intended outside diameter (mm)	ibod	12.000	Circumferential press-fit stress at ID (N/mm ²)	obsc	4.42
Dimensioned outside diameter (mm)		12.000	Axial stress from applied axial Force (N/mm ²)	obsz	0.00
Plus tolerance (mm)	ibptol	0.001	Shear stress from applied Torque (N/mm ²)	obtau	9.58
Minus tolerance (mm)	ibmtol	0.001	Max radial centrifugal stress (N/mm ²)	obrc	5.21
Inside diameter (mm)	ibid	0	Max circumferential centrifugal stress (N/mm ²)	obcc	7.48
Modulus of elasticity (N/mm ²)	ibe	1.93e+5	Max Von Mises stress (N/mm ²)	obvm	5.70
Yield strength, obsy (N/mm ²)	ibsy	172	Resulting safety factor (Yield stress)/(scf*Von Mises stress)		1.1
Poisson's ratio	ibn	0.27	Inner body material stresses at maximum interface pressure		
Coefficient of thermal expansion (1/°C)	ibcte	1.60e-5	Radial displacement of outer surface (mm)		-4.57
Density (g/cm ³)	ibrho	8	Radial press-fit stress (N/mm ²)	ibsr	-2.01
Shrink-fit design			Circumferential press-fit stress (N/mm ²)	ibsc	-2.01
Desired assembly clearance at deltaT (mm)	ddt	0	Axial stress from applied axial Force (N/mm ²)	ibsz	0.00
Required differential temperature if heating outer body (°C)	robdT	2.08e+1	Shear stress from applied Torque (N/mm ²)	ibttau	5.89
Required differential temperature			Max radial centrifugal		

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if cooling inner body (°C)	ribdt	2.08e+1	stress (N/mm ²)	ibrc	1.29
Press-fit design			Max circumferential centrifugal stress at ID (N/mm ²)	ibcc	1.29
Maximum assembly force to press fit (N)	Fpfmax	3.06e+3	Von Mises stress at ID (N/mm ²)	ibvm	2.02
Minimum assembly force to press fit (N)	Fpfmin	-3.28e-1	Resulting safety factor (Yield stress)/(scf*Von Mises stress)		4.:

Evaluate the stresses at inside, outside and sqrt(DiDo) diameters					
For the Outer Feature					
case 1: stresses at inner radius	5.999000	Case 2: stresses at outer radius	9.811000	Case 3: stresses sqrt (DiDo)/2	
Radial press-fit stress (N/mm ²)	-20.140652		0.000000		
Circumferential press-fit stress (N/mm ²)	44.194052		24.053400		
Axial stress from applied axial Force (N/mm ²)	0.000000		0.000000		
Shear stress from applied Torque (N/mm ²)	0.095836		0.156734		
Radial centrifugal stress (N/mm ²)	0.000000		0.000000		
Circumferential centrifugal stress at ID (N/mm ²)	0.007480		0.004122		
Von Mises stress at ID (N/mm ²)	57.006109		24.059054		
For the Inner Feature					
case 1: stresses at inner radius	0.000000	Case 2: stresses at outer radius	6.000000	Case 3: stresses sqrt (DiDo)/2	
Radial press-fit stress (N/mm ²)	-20.140652		-20.140652		
Circumferential press-fit stress (N/mm ²)	-20.140652		-20.140652		
Axial stress from applied axial Force (N/mm ²)	0.000000		0.000000		
Shear stress from applied Torque (N/mm ²)	0.000000		0.589463		
Radial centrifugal stress (N/mm ²)	0.001291		0.000000		
Circumferential centrifugal stress at ID (N/mm ²)	0.001291		0.000576		
Von Mises stress at ID (N/mm ²)	20.139361		20.166225		

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