

Conventional Powder Metallurgy Design Guide

Design factors for fabrication: shape, density, pressing area, tonnage, tool design considerations: angles slopes, edges, diameters, punch thickness etc. Some of guidelines are ASCO Sintering specific

Design Do's

- The height of the part should not exceed 8 times the wall thickness
- Size of the part 5 inches (127mm) in outside diameter
- Diameter to height ratio not exceeding 1:5
- Straight knurls • Spur gears

Design Don'ts

- Simple steps exceeding 15% of overall length of part
- Surface area exceeding 5 sq in.
- Angular or Diamond shape knurls
- Long parts with thin walls
- Side holes • Helical gears

Typical Tolerances for Ferrous P/M Components

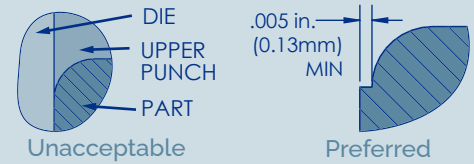
Pressed/Sintered	Practical in. mm	Possible in. mm
Length (press held)	±0.005 ± 0.130	±0.003 ± 0.075
Inside Diameter	±0.002 ± 0.050	±0.001 ± 0.025
Outside Diameter	±0.002 ± 0.050	±0.001 ± 0.025
Concentricity	±0.003 ± 0.075	±0.002 ± 0.059
Flatness on Ends	±0.002 ± 0.050	±0.001 ± 0.025
Parallelism of Ends	±0.0015 ± 0.038	±0.001 ± 0.025

If following PM guidelines, restricting from final part design or properties, secondary operations can be applied: Restrike, Heat treatment, Impregnation, Machining, Fastening and Joining, Surface treatment

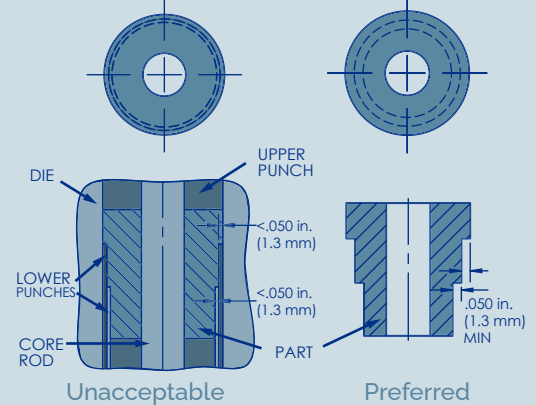
Most used P/M Material Properties

Material	Density (g/cc)	Macro Hardness	YS (MPa)	UTS (MPa)	Elongation %	Unnotched Charpy Impact Energy (J)	Young's Modulus (GPa)
FL-5305-120HT	6.8	30 HRC	830	900	<1	12	130
FX-2008-90HT	7.3	36 HRC	620	690	<1	7	130
HI-IMPAC Type I	7.7	40 HRC	830	900	1.5	19	130
SS-316N1-25	6.4	59 HRB	170	280	<1	7	130
SS-409LE-28	7.3	58 HRB	190	375	14	150	185
CZP-2002-11	7.6	73 HRH	80	160	85	37	85

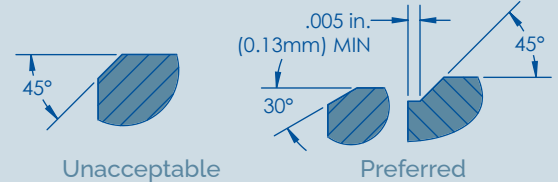
PM Flats - Radius



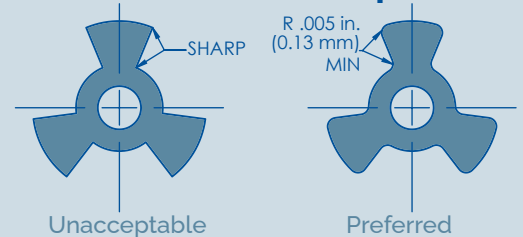
Wall thickness



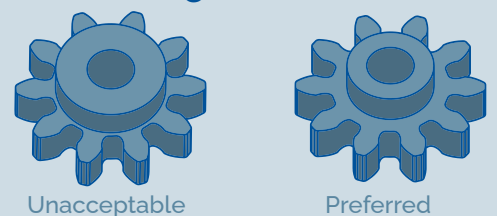
PM Flats - Chamfers



Use radii to relieve sharp corners



Hub's from gear root diameter



Relief Radius, Intersection

