

MIM process technology range

1. Parts weight 0.2g - 200g
2. The projected area is 100 square centimeters
3. The size accuracy above 10MM is $\pm 0.5\%$
4. The maximum wall thickness is 10MM
5. Minimum size 0.2MM

Table1: Properties of MIM thermal management alloys)

Material	Density (g/m 3)	Tensile Strength (Mpa)	elastic modulus (Gpa)	(thermal conductivity) W/(mk)	(Thermal Expansion) 10 ⁻⁶ /k
Copper(Cu)	8.9	100	130	250	13
Invar(fe-36ni)	8	300	205	20	5
Kovar Or F15 (Fe- 29ni-17co)	8.0	480	200	17	4.9
Molybdenum-copper (Mo-15cu)	10	210	280	170	7
Molybdenum-copper (Mo-20cu)	9.9	200	280	145	6.5
Tungsten-copper (W- 10cu)	17	500	340	209	6
Tungsten-copper (W- 20cu)	16	560	290	247	7
Tungsten-copper (W- 30cu)	14	420	260	260	11

MIM-Fe8Ni	Bal	7.5-8.5		0.4-0.65						
MIM-430L	Bal			0.05 max	1.0 max	16-18		1.0		

Table3: Typical mechanical properties for the low alloy steels and stainless steels

Material	Density g/cm ³	Typical Values					Un-notched Charpy Impact Energy, J	Hardness, Rockwell	
		Tensile Properties			Young's modulus, Gpa	Macro (apparent)		Micro (converted)	
		UTS. Mpa	Y.S. (0.2%), Mpa	Elongation (in 25.4mm) %					
MIM-Fe2Ni	7.5	280	115	25			55 HRB	≥50HRC	
MIM-Fe8Ni	7.5	450		12			84HRB	≥50HRC	
MIM-2200 (as sintered)	7.65	290	125	40.0	190	135	45 HRB		
MIM-2700 (as sintered)	7.6	415	255	26.0	190	175	69 HRB		
MIM-4605 (as sintered)	7.5	440	205	15.0	200	70	62 HRB		
MIM-4605 (Q&T)	7.5	1655	1480	2.0	205	55	48 HRC	55 HRC	
MIM-304L	7.7	500		70			60 HRB		
MIM-316L (as sintered)	7.8	520	175	50.0	190	190	67 HRB		
MIM-410	7.25	900		7				40 HRC	
MIM-420 (heat treated)	7.25	1380	1200	< 1.0	190	40		45HRC	
MIM-430L (as sintered)	7.55	410	240	25.0	210	150	65 HRB		

MIM-440C	7.5	700	590	15				45HRC
MIM-17-4PH (as sintered)	7.5	900	730	6.0	190	140	27 HRC	
MIM-17-4PH (heat treated)	7.5	1190	1090	6.0	190	140	33 HRC	40 HRC

