ATOMET 4001

ATOMET 4001 is a highly compressible water atomized low alloy steel powder containing 0.50% molybdenum designed for high performance, high strength powder metallurgy and powder forging applications.

- **Hardenability** - the molybdenum level of **ATOMET 4001** enhances heat-treated properties without sacrificing compressibility.
  - Improved hardness and tensile strength
- **Compressibility** - the outstanding compressibility of **ATOMET 4001** extends the benefits of low alloy compositions to high-density applications above 7.0 g/cm^3.
  - Higher strength, higher density PM parts
  - Reduced tool stress
- **Consistency**- lot-to-lot consistency is ensured by a stable ore-based feedstock, modern steelmaking practices and statistically controlled manufacturing processes.
  - Low part-to-part variation
- **Purity and cleanliness**- unique ore-based feedstock and state-of-the-art clean steel practice ensure low residuals and exceptional cleanliness.
  - Improved mechanical and dynamic properties of PM and PF parts
  - Improved machinability of PM and PF parts.

PHYSICAL AND CHEMICAL PROPERTIES

Chemistry, wt%

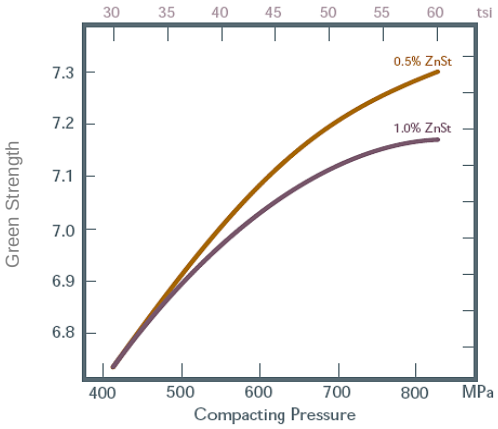
C	O	S	Mn	Mo	Ni	Cr	P	Si	Cu	Fe
0.004	0.10	0.009	0.15	0.50	0.07	0.05	0.01	0.01	0.02	99+

	Particle Size Analysis, wt%						A.D.	Flow	Density*
U.S. mesh	+60	+100	+140	+200	+325	-325	**g/cm^3**	**s/50g**	**g/cm^3**
µm	+250	+150	+105	+75	+45	-45	2,92	27	7.10
	Trace	12	19	21	27	21			*@43.5 tsi @600 MPa

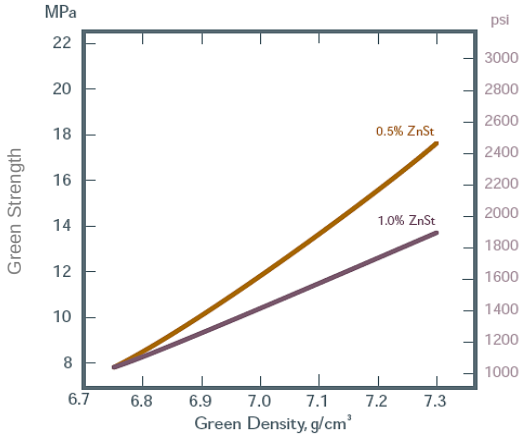
COMPACTING PROPERTIES

ATOMET 4001 + ZnSt

Compressibility



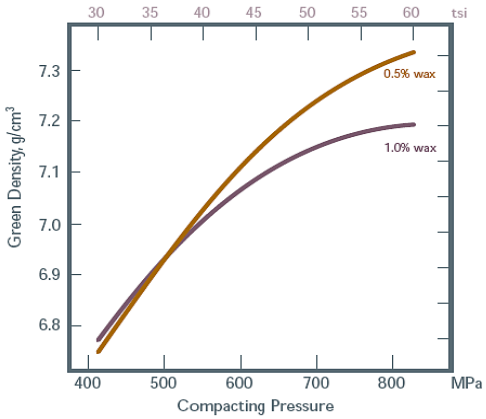
Green Strength



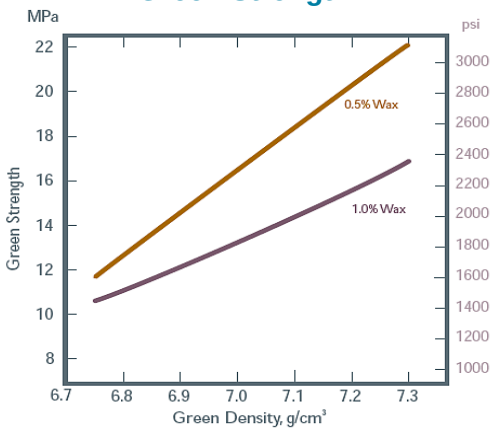
COMPACTING PROPERTIES (continued)

ATOMET 4001 + Wax

Compressibility

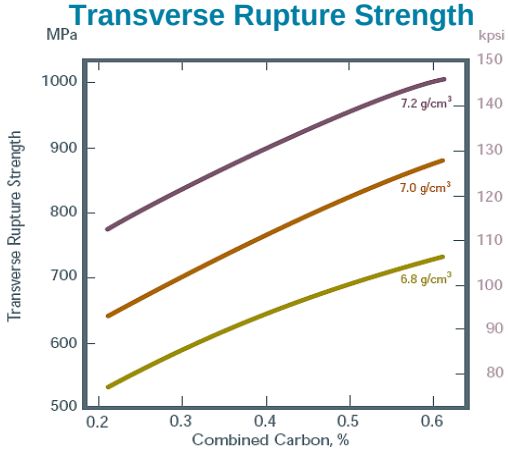


Green Strength

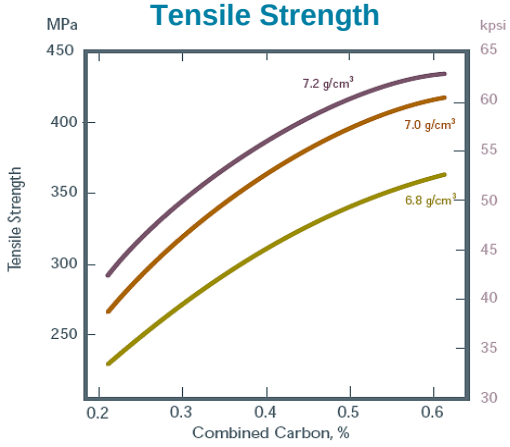


SINTERED PROPERTIES - Carbon steels

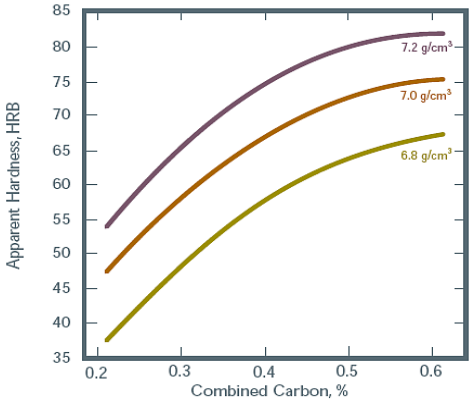
Transverse Rupture Strength



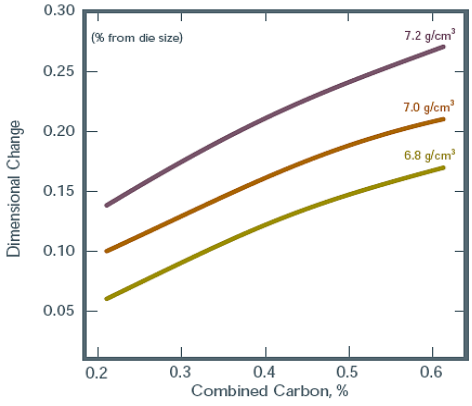
Tensile Strength



Apparent Hardness



Dimensional Change



SINTERED PROPERTIES - Carbon steels (continued)

Composition: ATOMET 4001 + graphite + 0.75% ZnSt.
Sintered in a nitrogen-based atmosphere at 1120°C (2050°F) for 25 minutes.

Sintered Density	Added Graphite	Sintered Carbon	Transverse Rupture Strength		Apparent Hardness	Dimensional Change	Ultimate Tensile Strength		Yield Strength		Elongation	Impact Energy	
g/cm^3	%	%	MPa	kpsi	HRC	%	Mpa	k psi	MPa	kpsi	%	ft-lb	J
6.80	0.30	0.21	538	78	38	0.06	228	33	159	23	4.0	8	11
7.00	0.30	0.21	641	93	47	0.10	269	39	179	26	4.5	11	15
7.20	0.30	0.21	772	112	55	0.14	290	42	200	29	5.0	15	20
6.80	0.55	0.43	662	96	60	0.13	324	47	255	37	1.5	6	8
7.00	0.55	0.43	786	114	69	0.17	372	54	297	43	1.6	8	11
7.20	0.55	0.43	917	133	77	0.22	400	58	317	46	1.7	9	12
6.80	0.75	0.61	731	106	67	0.17	366	53	297	43	1.3	5	7
7.00	0.75	0.61	883	128	75	0.21	414	60	338	49	1.4	7	9
7.20	0.75	0.61	1007	146	82	0.27	434	63	352	51	1.4	8	11

POWDER FORGED PROPERTIES

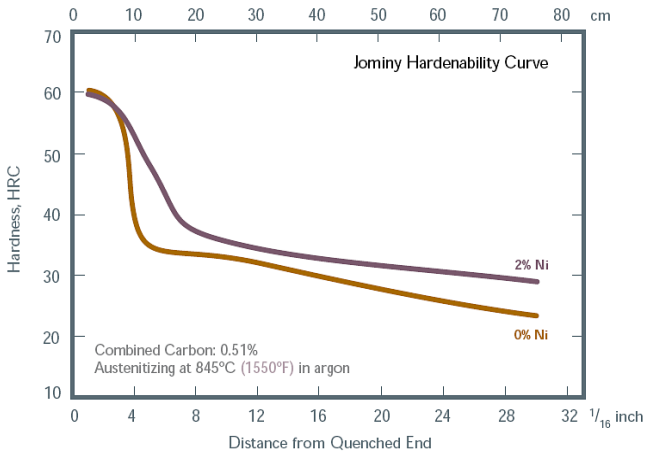
Cleanliness

A) Fraction of surface occupied by inclusions: **0.014%**

B) Non-metallic inclusion count:

Length um	Number/ 100 mm^2
30/50	2.0
50/100	0.5
>100	0.0

Hardenability at Full Density



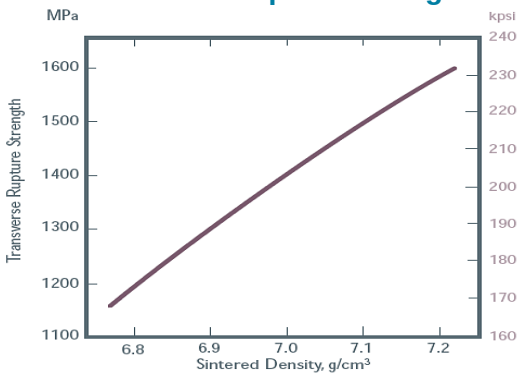
HEAT-TREATED PROPERTIES

Composition: **ATOMET 4001** + 0.55% graphite + 0.75 % ZnSt.
Sintered in a 90% nitrogen-based atmosphere at 1120ºC (2050ºF) for 25 minutes.
Heat treatment: 15 minutes at 845ºC (1550ºF) in an atmosphere with 0.8% C potential.
Oil quenched and tempered for 1 hour at 185ºC (365ºF)

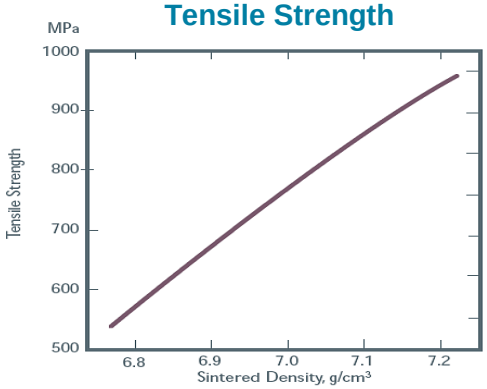
Sintered Density	Added Graphite	Sintered Carbon	Transverse Rupture Strength		Apparent Hardness	Ultimate Tensile Strength	
g/cm^3	%	%	MPa	1000 psi	HRC (HRB)	MPa	1000 psi
6.80	0.55	0.40	1207	175	35	593	86
7.00	0.55	0.40	1400	203	37	772	112
7.20	0.55	0.40	1600	232	40	959	139

ATOMET 4001 + 0.55% graphite

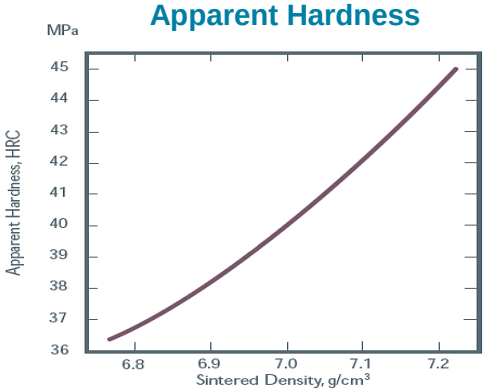
Transverse Rupture Strength



Tensile Strength



Apparent Hardness



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