ATOMET 4801

ATOMET 4801 is a highly compressible, water-atomized alloy steel containing 4.0% Ni designed for use in high-strength applications, requiring high wear resistance. The sinter hardening properties of **ATOMET 4801** allow parts to be fabricated requiring no additional processing other than an optional tempering to increase strength even further. Prealloying removes all free Ni from the powder, ensuring health and safety norms are respected.

- **High strength, high hardness parts in a conventional furnace.**
  - Lower production costs
  - Elimination of quench distortion
- **Prealloyed grade**
  - Microstructure control for optimum properties
  - Environmentally friendly

PHYSICAL AND CHEMICAL PROPERTIES

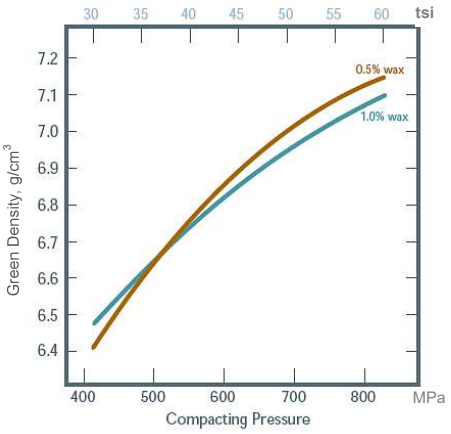
Chemistry, wt%						Particle Size Analysis, wt%					A.D.	Flow	Density*
C	O	S	Mn	Mo	Ni	U.S. mesh	+60	+100	+325	-325	g/cm^3	s/50g	g/cm^3
0.01	0.15	0.009	0.20	0.50	4.00	um	+250	+150	+45	-45	3.00	25	6.85
							Trace	10	62	28			*@43.5 tsi @600 MPa

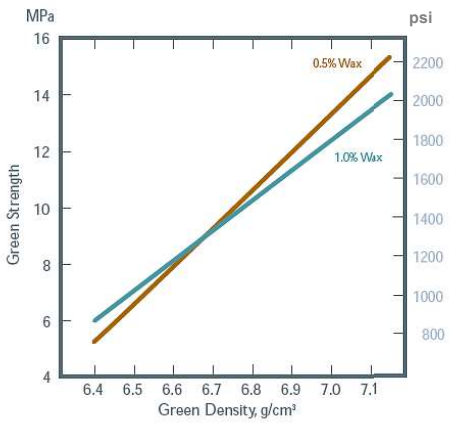
COMPACTING PROPERTIES

Compressibility

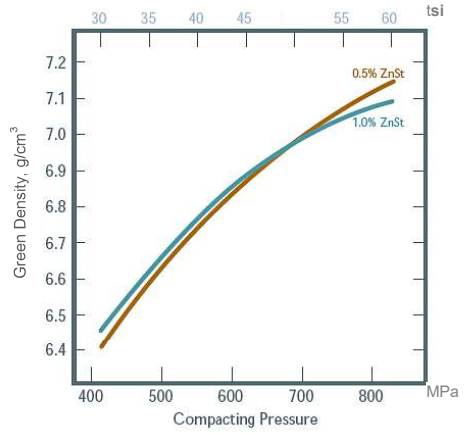
Green Strength

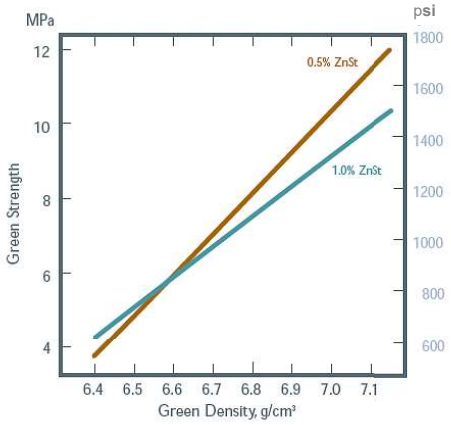
ATOMET 4801 + Wax





ATOMET 4801 + ZnSt





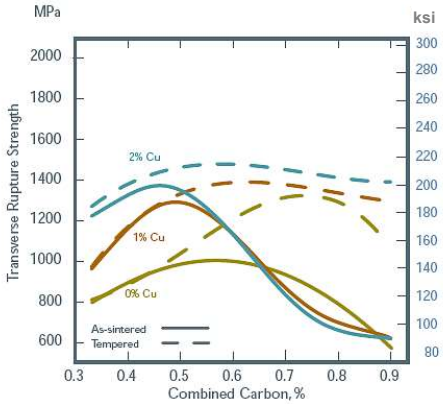
SINTERED PROPERTIES - Slow Cooled

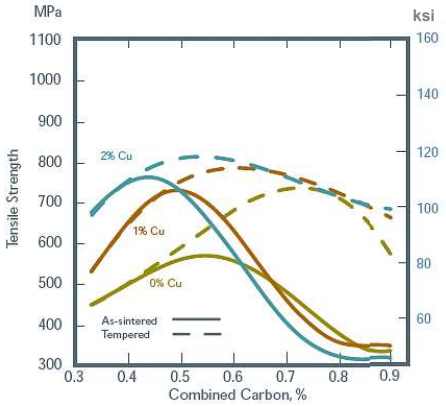
Composition: **ATOMET 4801** + copper + graphite + 0.75 % ZnSt.
Sintered in a 90% nitrogen-based atmosphere at 1120ºC (2050ºF) for 25 minutes.
Cooling rate of 0.4C/s from 650ºC (1200ºF) to 400ºC (750 ºF).

Transverse Rupture Strength

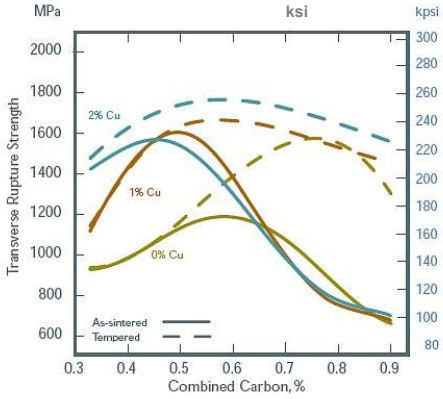
Tensile Strength

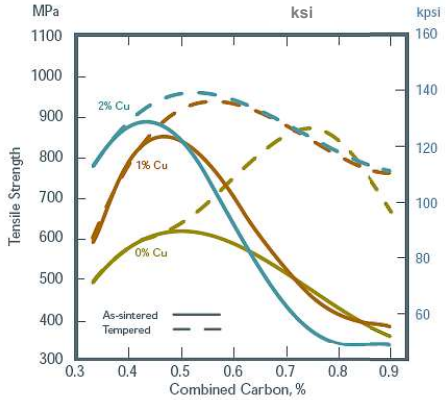
Sintered Density 6.7 g/cm^3



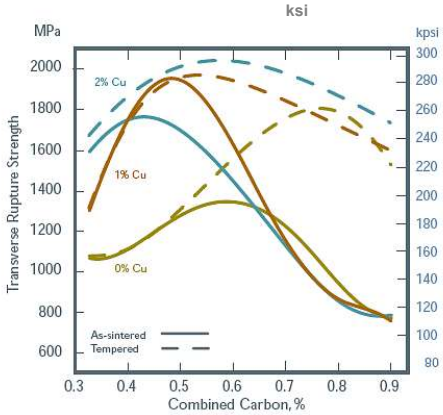


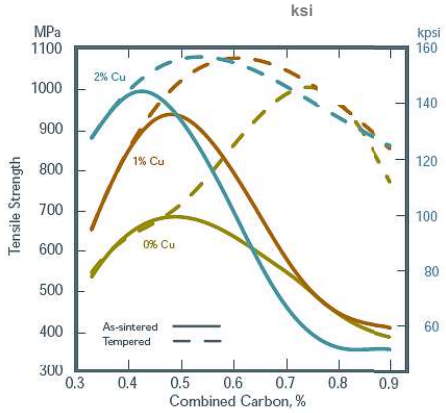
Sintered Density 6.9 g/cm^3





Sintered Density 7.1 g/cm^3





SINTERED PROPERTIES - Slow Cooled

Composition: **ATOMET 4801** + copper + graphite + 0.75% ZnSt.
Sintered in 90% nitrogen-based atmosphere at 1120ºC (2050ºF) for 25 minutes.
Cooling rate of 0.4ºC/s from 650ºC (1200ºF) to 400ºC (750ºF).
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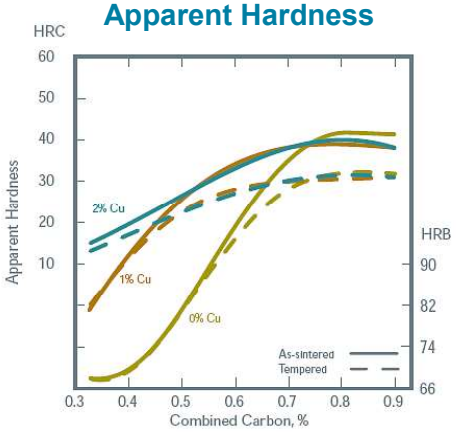
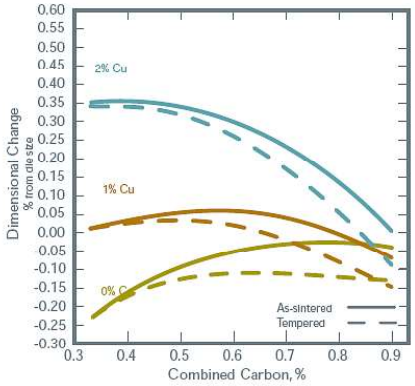
Apparent Hardness

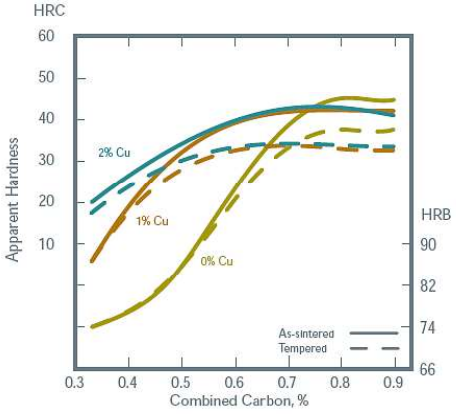
Dimensional Change

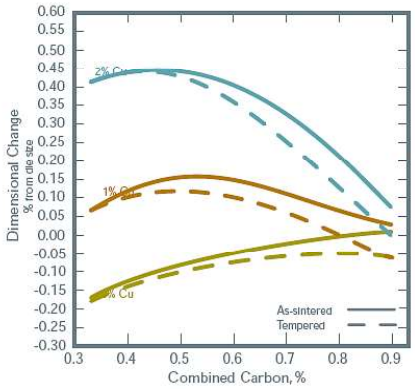
Sintered Density 6.7 g/cm^3



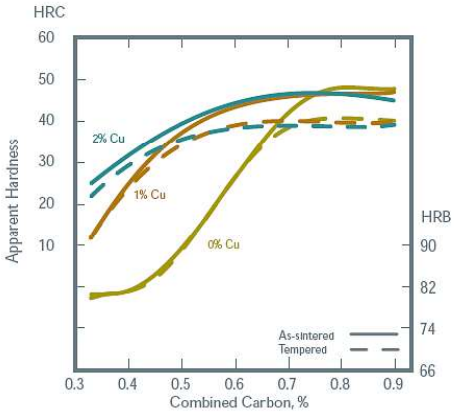


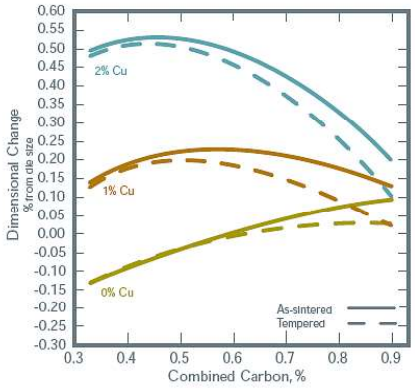
Sintered Density 6.9 g/cm^3





Sintered Density 7.1 g/cm^3





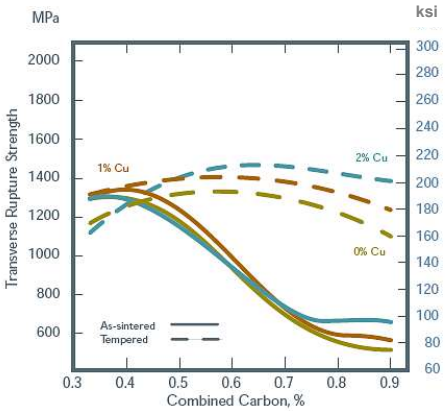
SINTERED PROPERTIES - Fast Cooled

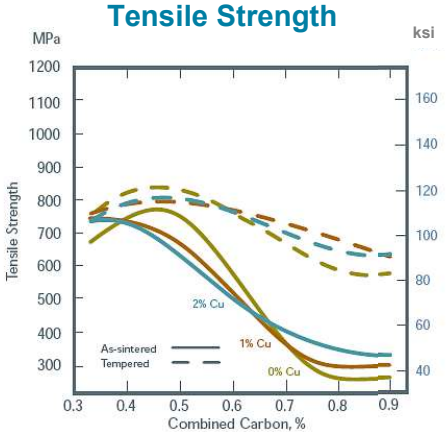
Composition: **ATOMET 4801** + copper + graphite + 0.75% ZnSt.
Sintered in a 90% nitrogen-based atmosphere at 1120°C (2050ºF) for 20 minutes.
Cooling rate of 1.5°C/s from 650°C (1200°F) to 400°C (750°F).

Transverse Rupture Strength

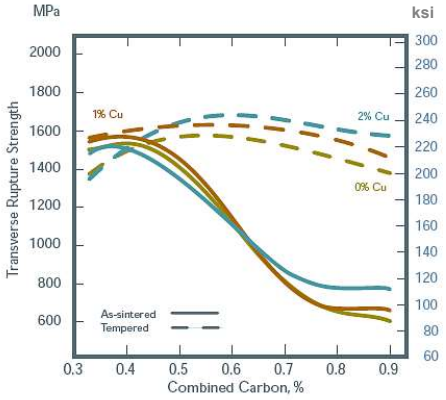
Tensile Strength

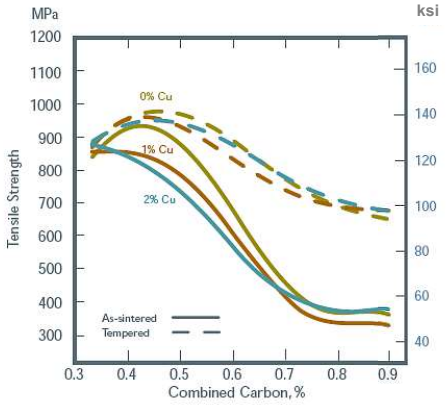
Sintered Density 6.7 g/cm³



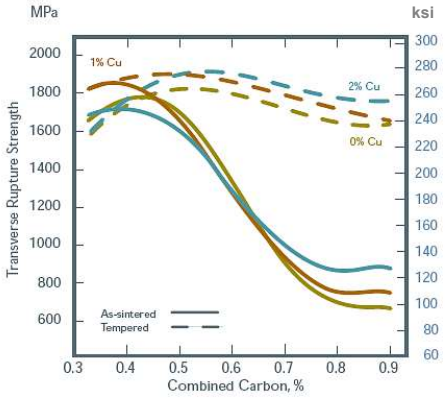


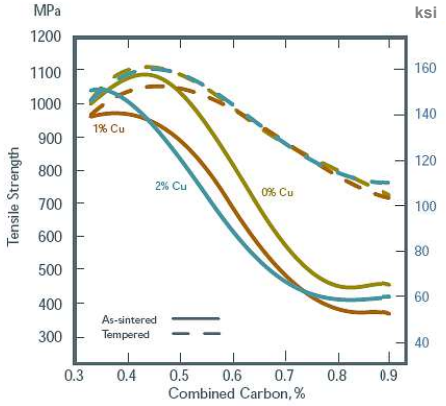
Sintered Density 6.9 g/cm³





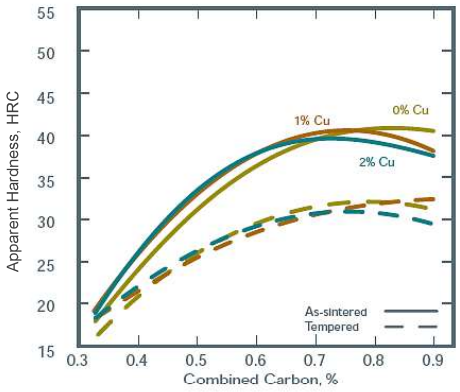
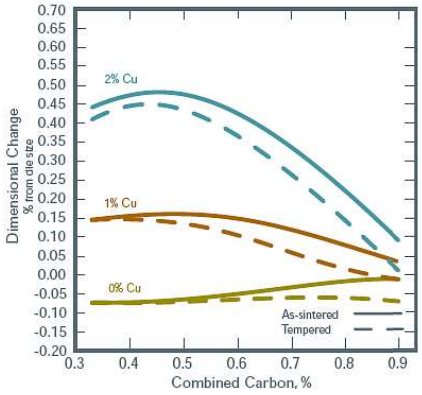
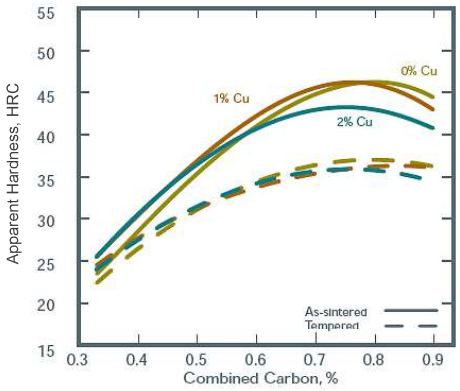
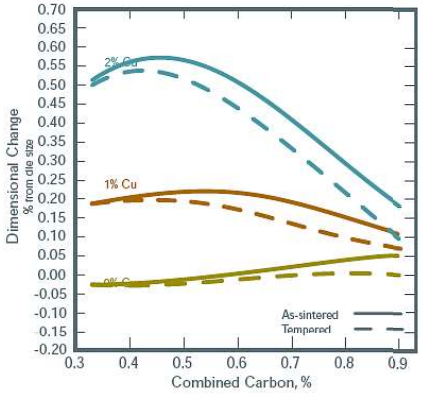
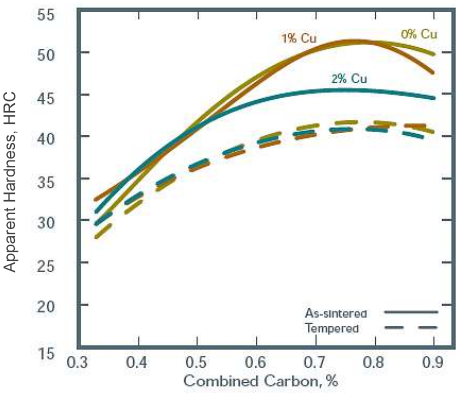
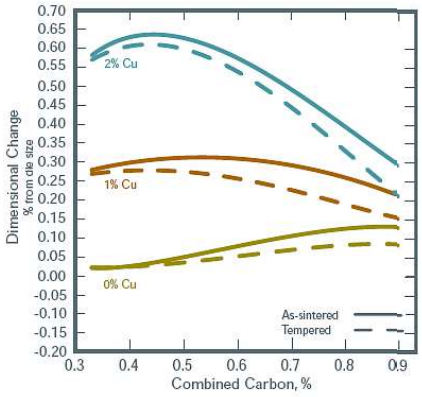
Sintered Density 7.1 g/cm³





SINTERED PROPERTIES (continued) - Fast Cooled

Composition: **ATOMET 4801** + copper + graphite + 0.75% ZnSt.
Sintered in a 90% nitrogen-based atmosphere at 1120°C (2050ºF) for 20 minutes.
Cooling rate of 1.5°C/s from 650°C (1200°F) to 400°C (750°F).

	Apparent Hardness	Dimensional Change
Sintered Density 6.7 g/cm^3		
Sintered Density 6.9 g/cm^3		
Sintered Density 7.1 g/cm^3		

AS-SINTERED PROPERTIES - Slow Cool *

Sintered Density	Added Copper	Combined Carbon	Transverse Rupture Strength		Apparent Hardness	Dimensional Change	Tensile Strength		Yield Strength		Elongation
g/cm^3	%	%	MPa	kpsi	HRC (HRB)	%	MPa	kpsi	MPa	kpsi	%
6.77	0	0.37	849	123	(71)	-0.22	462	67	331	48	1.8
6.93	0	0.37	973	141	(75)	-0.17	497	72	352	51	1.6
7.14	0	0.37	1110	161	(82)	-0.11	552	80	380	55	2.5
6.71	0	0.51	1014	147	(85)	-0.09	580	84	428	62	<1
6.90	0	0.51	1125	163	(87)	-0.08	628	91	455	66	1.2
7.13	0	0.51	1318	191	(92)	-0.03	704	102	476	69	1.4
6.72	0	0.72	932	135	37	-0.06	476	69	497	72	<1
6.97	0	0.72	1180	171	39	0.00	518	75	559	81	<1
7.11	0	0.72	1194	173	45	-0.06	545	79	587	85	<1
6.70	0	0.88	566	82	41	-0.05	331	48			<1
6.90	0	0.88	662	96	44	0.01	359	52			<1
7.15	0	0.88	787	114	49	0.11	393	57			<1
6.69	1	0.33	966	140	(82)	0.01	524	76	380	55	<1
6.92	1	0.33	1125	163	(86)	0.07	593	86	407	59	1.1
7.11	1	0.33	1339	194	(93)	0.15	676	98	435	63	1.3
6.72	1	0.51	1373	199	28	0.06	731	106	580	84	<1
6.88	1	0.51	1532	222	32	0.15	828	120	614	89	<1
7.09	1	0.51	1911	277	38	0.22	932	135	662	96	<1
6.69	1	0.71	869	126	38	0.03	435	63			<1
6.89	1	0.71	1001	145	42	0.11	490	71			<1
7.09	1	0.71	1097	159	46	0.20	531	77			<1
6.73	1	0.90	621	90	39	-0.06	359	52			<1
6.91	1	0.90	649	94	43	0.03	386	56			<1
7.12	1	0.90	780	113	47	0.13	428	62			<1
6.63	2	0.33	1139	165	13	0.32	635	92	497	72	<1
6.82	2	0.33	1366	198	19	0.39	731	106	524	76	<1
7.04	2	0.33	1539	223	23	0.47	849	123	545	79	<1
6.64	2	0.51	1318	191	29	0.32	725	105	531	77	<1
6.83	2	0.51	1463	212	34	0.41	794	115	580	84	<1
7.03	2	0.51	1670	242	38	0.50	876	127	642	93	<1
6.66	2	0.71	794	115	37	0.22	393	57			<1
6.84	2	0.71	890	129	42	0.29	407	59			<1
7.05	2	0.71	1070	155	45	0.40	435	63			<1
6.69	2	0.88	635	92	37	0.00	317	46			<1
6.90	2	0.88	676	98	40	0.07	345	50			<1
7.10	2	0.88	780	113	45	0.20	366	53			<1

* Composition: **ATOMET 4801** + 0.75 ZnSt. Sintered in a 90% nitrogen-based atmosphere at 1120°C (2050°F) for 20 minutes. Cooling rate of 0.4°C/s from 650°C (1200°F) to 400°C (750°F).

TEMPERED PROPERTIES** - Slow Cool *

Sintered Density	Added Copper	Combined Carbon	Transverse Rupture Strength		Apparent Hardness	Dimensional Change	Tensile Strength		Yield Strength		Elongation
g/cm^3	%	%	MPa	kpsi	HRC (HRB)	%	MPa	kpsi	MPa	kpsi	%
6.77	0	0.37	849	123	(70)	-0.21	469	68	345	50	1.8
6.95	0	0.37	959	139	(76)	-0.17	524	76	366	53	2.2
7.16	0	0.37	1076	156	(82)	-0.12	566	82	393	57	2.7
6.73	0	0.51	1056	153	(84)	-0.12	593	86	435	63	<1
6.92	0	0.51	1173	170	(87)	-0.08	662	96	469	68	1.4
7.13	0	0.51	1339	194	(92)	-0.03	731	106	497	72	1.6
6.74	0	0.72	1346	195	30	-0.10	766	111	600	87	<1
6.92	0	0.72	1615	234	33	-0.03	856	124	656	95	<1
7.13	0	0.72	1794	260	40	0.03	1007	146	725	105	<1
6.73	0	0.88	1076	156	33	-0.12	593	86	490	71	<1
6.92	0	0.88	1359	197	37	-0.04	676	98	559	81	<1
7.17	0	0.88	1587	230	43	0.05	807	117	662	96	<1
6.70	1	0.33	980	142	(82)	0.01	524	76	400	58	<1
6.91	1	0.33	1139	165	(87)	0.06	593	86	469	68	<1
7.12	1	0.33	1339	194	(93)	0.14	662	96	545	79	<1
6.71	1	0.51	1366	198	23	0.05	731	106	669	97	<1
6.90	1	0.51	1635	237	29	0.11	869	126	704	102	<1
7.10	1	0.51	1939	281	35	0.19	1035	150	745	108	<1
6.71	1	0.71	1408	204	30	-0.02	780	113	593	86	<1
6.91	1	0.71	1615	234	35	0.06	918	133	676	98	<1
7.11	1	0.71	1877	272	40	0.15	1056	153	780	113	<1
6.76	1	0.90	1332	193	32	-0.13	697	101	483	70	<1
6.94	1	0.90	1511	219	36	-0.04	780	113	504	73	<1
7.16	1	0.90	1649	239	41	0.05	883	128	524	76	<1
6.63	2	0.33	1201	174	11	0.32	649	94	490	71	<1
6.83	2	0.33	1394	202	17	0.38	752	109	573	83	<1
7.05	2	0.33	1635	237	21	0.46	918	133	656	95	<1
6.65	2	0.51	1373	199	24	0.29	794	115	662	96	<1
6.83	2	0.51	1677	243	29	0.38	918	133	725	105	<1
7.04	2	0.51	1932	280	34	0.48	1056	153	794	115	<1
6.68	2	0.71	1442	209	29	0.16	759	110	600	87	<1
6.86	2	0.71	1635	237	33	0.23	869	126	614	89	<1
7.06	2	0.71	1653	283	38	0.34	1001	145	628	91	<1
6.71	2	0.88	1401	203	30	-0.08	690	100	428	62	<1
6.92	2	0.88	1580	229	33	0.01	780	113	462	67	<1
7.13	2	0.88	1760	255	39	0.11	863	125	524	76	<1

* Composition: **ATOMET 4801** + 0.75 ZnSt. Sintered in a 90% nitrogen-based atmosphere at 1120°C (2050°F) for 20 minutes. Cooling rate of 0.4° C/s from 650°C (1200°F) to 400°C (750°F).
** Tempered 60 minutes at 200°C (390°F).

AS-SINTERED PROPERTIES - Fast Cool *

Sintered Density	Added Copper	Combined Carbon	Transverse Rupture Strength		Apparent Hardness	Dimensional Change	Tensile Strength		Yield Strength		Elongation
g/cm^3	%	%	MPa	kpsi	HRC	%	MPa	kpsi	MPa	kpsi	%
6.74	0	0.33	1324	192	19	0.07	703	102	558	81	1.8
6.92	0	0.33	1538	223	24	-0.02	855	124	600	87	2.2
7.12	0	0.33	1703	247	30	0.02	1020	148	655	95	2.7
6.70	0	0.51	1179	171	32	-0.05	745	108	662	96	1.0
6.9	0	0.51	1379	200	37	0.00	883	128	669	97	1.4
7.11	0	0.51	1710	248	42	0.06	1034	150			1.6
6.72	0	0.69	752	109	40	-0.03	317	46			<1
6.95	0	0.69	834	121	46	0.04	455	66			<1
7.11	0	0.69	876	127	50	0.12	538	78			<1
6.69	0	0.88	538	78	40	-0.01	276	40			<1
6.90	0	0.88	572	83	45	0.05	386	56			<1
7.15	0	0.88	731	106	49	0.16	524	76			<1
6.67	1	0.33	1276	185	18	0.14	745	108	579	84	<1
6.88	1	0.33	1496	217	25	0.19	841	122	621	90	<1
7.09	1	0.33	1806	262	32	0.27	951	138	669	97	1.3
6.67	1	0.52	1220	177	33	0.15	648	94	593	86	<1
6.88	1	0.52	1379	200	37	0.22	758	110	648	94	<1
7.07	1	0.52	1613	234	41	0.29	869	126	752	109	<1
6.66	1	0.71	703	102	40	0.11	359	52			<1
6.87	1	0.71	772	112	44	0.18	400	58			<1
7.05	1	0.71	889	129	49	0.26	414	60			<1
6.70	1	0.89	586	85	38	0.04	303	44			<1
6.88	1	0.89	627	91	42	0.10	317	46			<1
7.07	1	0.89	765	111	47	0.20	372	54			<1
6.59	2	0.34	1241	180	18	0.44	669	97	586	85	<1
6.78	2	0.34	1482	215	24	0.50	786	114	614	89	<1
6.89	2	0.34	1689	245	31	0.58	896	130	634	92	<1
6.60	2	0.53	1076	156	32	0.42	579	84	627	91	<1
6.78	2	0.53	1241	180	36	0.51	655	95	662	96	<1
6.96	2	0.53	1579	229	41	0.58	745	108	683	99	<1
6.64	2	0.72	676	98	38	0.32	372	54			<1
6.80	2	0.72	786	114	42	0.38	400	58			<1
7.16	2	0.72	958	139	46	0.47	455	66			<1
6.66	2	0.92	641	93	37	0.08	324	47			<1
6.86	2	0.92	772	112	40	0.16	365	53			<1
7.07	2	0.92	876	127	44	0.27	414	60			<1

* Composition: **ATOMET 4801** + 0.75 ZnSt. Sintered in a 90% nitrogen-based atmosphere at 1120°C (2050°F) for 20 minutes. Cooling rate of 1.5° C/s from 650°C (1200°F) to 400°C (750°F).

TEMPERED PROPERTIES** - Fast Cool *

Sintered Density	Added Copper	Combined Carbon	Transverse Rupture Strength		Apparent Hardness	Dimensional Change	Tensile Strength		Yield Strength		Elongation
g/cm³	%	%	MPa	kpsi	HRC	%	MPa	kpsi	MPa	kpsi	%
6.74	0	0.37	1220	177	17	-0.06	786	114	586	85	<1
6.92	0	0.37	1386	201	23	-0.02	883	128	683	99	<1
7.13	0	0.37	1627	236	29	0.03	1007	146	648	94	<1
6.71	0	0.51	1351	196	28	-0.08	841	122	717	104	<1
6.91	0	0.51	1503	218	32	-0.02	958	139	745	108	<1
7.12	0	0.51	1889	274	38	0.04	1089	158	772	112	<1
6.73	0	0.72	1386	201	31	-0.06	683	99	586	85	<1
6.91	0	0.72	1455	211	36	0.00	779	113	614	89	<1
7.13	0	0.72	1779	258	41	0.08	896	130	648	94	<1
6.71	0	0.88	1110	161	32	-0.07	586	85	483	70	<1
6.91	0	0.88	1386	201	36	0.00	634	92	503	73	<1
7.16	0	0.88	1641	238	43	0.10	745	108	545	79	<1
6.67	1	0.33	1289	187	18	0.14	745	108	627	91	<1
6.88	1	0.33	1489	216	24	0.18	855	124	689	100	<1
7.09	1	0.33	1758	255	30	0.27	965	140	758	110	<1
6.69	1	0.51	1448	210	26	0.13	731	106	696	101	<1
6.89	1	0.51	1600	232	31	0.19	807	117	731	106	<1
7.09	1	0.51	1917	278	37	0.27	876	127	772	112	<1
6.68	1	0.71	1303	189	30	0.21	731	106	579	84	<1
6.88	1	0.71	1510	219	35	0.13	807	117	607	88	<1
7.08	1	0.71	1765	256	40	0.06	869	126	634	92	<1
6.65	1	0.9	1227	178	32	-0.03	614	89	434	63	<1
6.90	1	0.9	1407	204	35	0.06	683	99	441	64	<1
7.02	1	0.9	1648	239	41	0.14	696	101	448	65	<1
6.72	2	0.33	1151	167	17	0.01	738	107	655	95	<1
6.79	2	0.33	1310	190	21	0.50	862	125	745	108	<1
6.69	2	0.33	1613	234	28	0.57	993	144	855	124	<1
6.61	2	0.51	1372	199	24	0.40	800	116	696	101	<1
6.89	2	0.51	1606	233	30	0.47	924	134	800	116	<1
7.09	2	0.51	1896	275	34	0.55	1055	153	896	130	<1
6.71	2	0.71	1455	211	28	0.27	662	96	552	80	<1
6.81	2	0.71	1565	227	32	0.32	752	109	586	85	<1
7.08	2	0.71	1855	269	38	0.42	876	127	689	100	<1
6.68	2	0.88	1351	196	29	0.01	552	80	379	55	<1
6.88	2	0.88	1586	230	34	0.09	641	93	407	59	<1
7.08	2	0.88	1731	251	39	0.20	772	112	455	66	<1

* Composition: **ATOMET 4801** + 0.75 ZnSt. Sintered in a 90% nitrogen-based atmosphere at 1120°C (2050°F) for 20 minutes. Cooling rate of 1.5° C/s from 650°C (1200°F) to 400°C (750°F).

** Tempered 60 minutes at 200°C (390°F).

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