

ATOMET DB48, containing 4% nickel is a highly compressible diffusion-bonded steel powder, designed for high performance applications. QMP's process diffusion bonds the alloying elements to our water-atomized steel powder, giving excellent consistency and dimensional control without sacrificing compressibility or green strength.

- **Compressibility** - high compressibility extends the benefits of high alloy compositions to high density applications for improved strength and reduced tool stress.
- **Compositional homogeneity** - the diffusion process bonds alloying elements to the iron particles, giving increased compositional homogeneity over premixes of similar composition. This ensures low part-to-part variation and improved part stability.
- **Dynamic properties** - heterogeneous mixture of phases in the sintered part impedes crack growth, improving dynamic properties such as increased ductility and high impact strength and toughness.
- **Consistency** - a stable ore base, modern steelmaking practice and statistically controlled powder manufacturing ensure lot-to-lot consistency and low part-to-part variation.
- **Purity and cleanliness** - state-of-the-art clean steel practice ensures low residuals and sets new standards for cleanliness giving improved mechanical and dynamic properties.

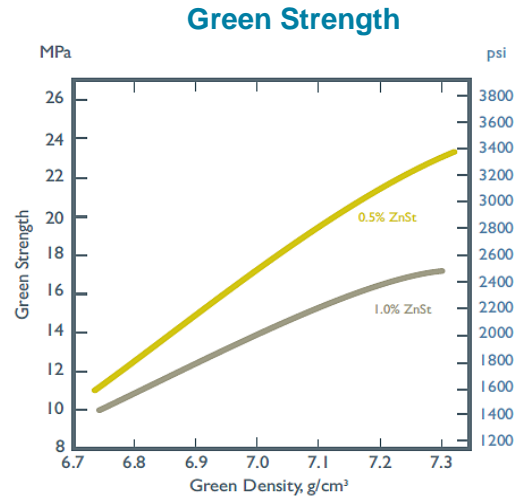
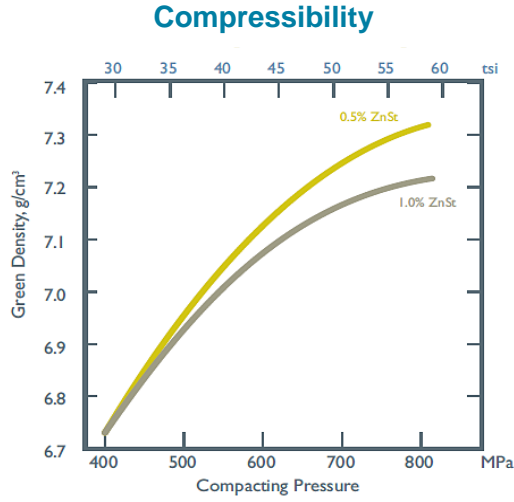
PHYSICAL AND CHEMICAL PROPERTIES

| Chemistry, wt% | | | | | | | | | |
|----------------|------|-------|------|------|------|------|------|------|------|
| C | O | S | Mn | Mo | Ni | Cr | P | Si | Cu |
| 0.005 | 0.10 | 0.009 | 0.15 | 0.50 | 4.00 | 0.05 | 0.01 | 0.01 | 1.50 |

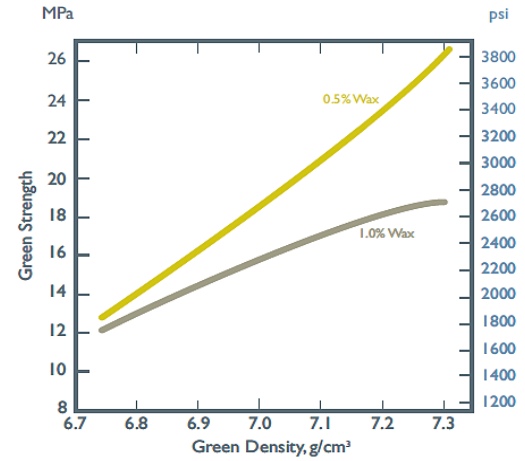
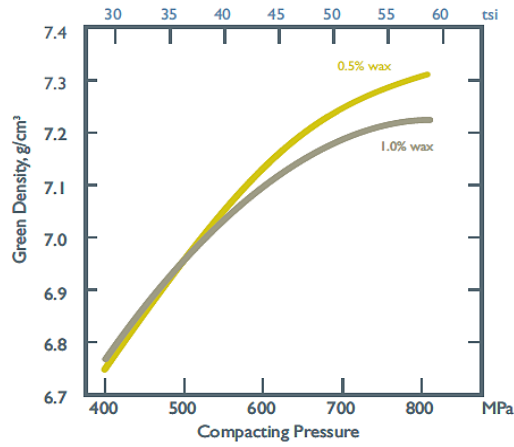
| | Particle Size Analysis, wt% | | | | A.D. | Flow | Density* |
|-----------|-----------------------------|------|------|------|-------------------|-------|------------------------|
| U.S. mesh | +60 | +100 | +325 | -325 | g/cm ³ | s/50g | g/cm ³ |
| µm | +250 | +150 | +45 | -45 | 3.02 | 24 | 7.10 |
| | Trace | 10 | 66 | 24 | | | *@43,5 tsi @600 MPa |

GREEN PROPERTIES

ATOMET DB48 + ZnSt



ATOMET DB48 + Wax

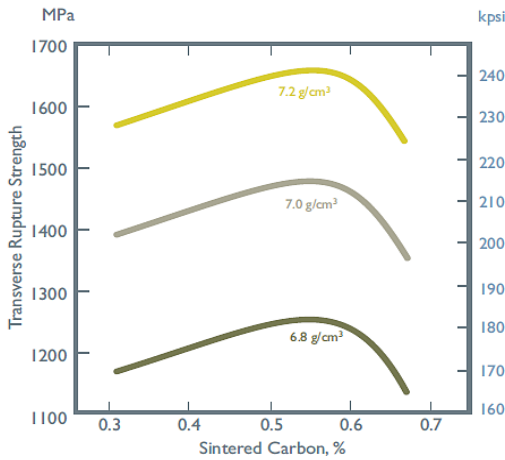


SINTERED PROPERTIES

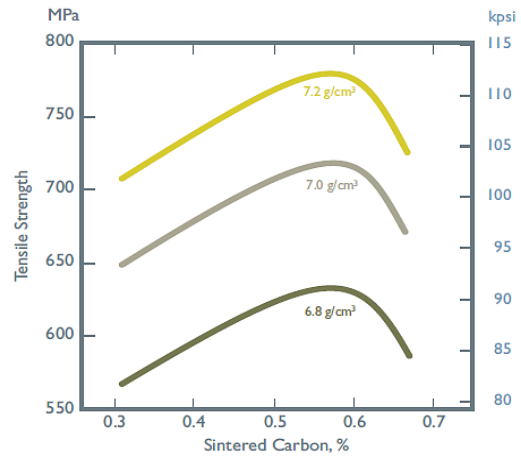
Composition: **ATOMET DB48** + graphite + 0.75 % wax.

Sintered in a 90% nitrogen-based atmosphere at 1120°C (2050°F) for 25 minutes.

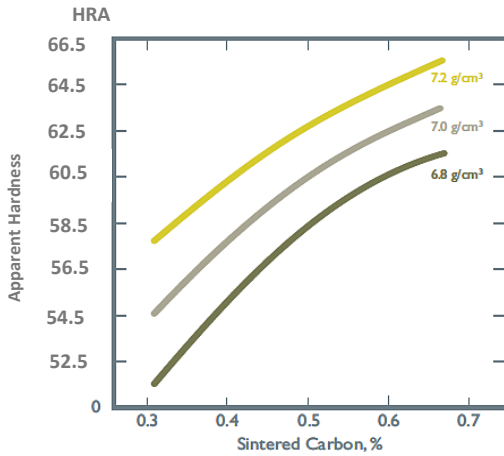
Transverse Rupture Strength



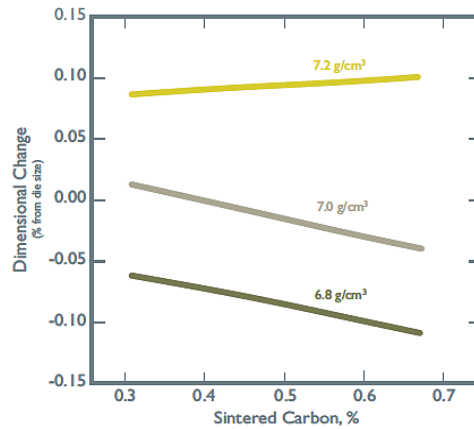
Tensile Strength



Apparent Hardness



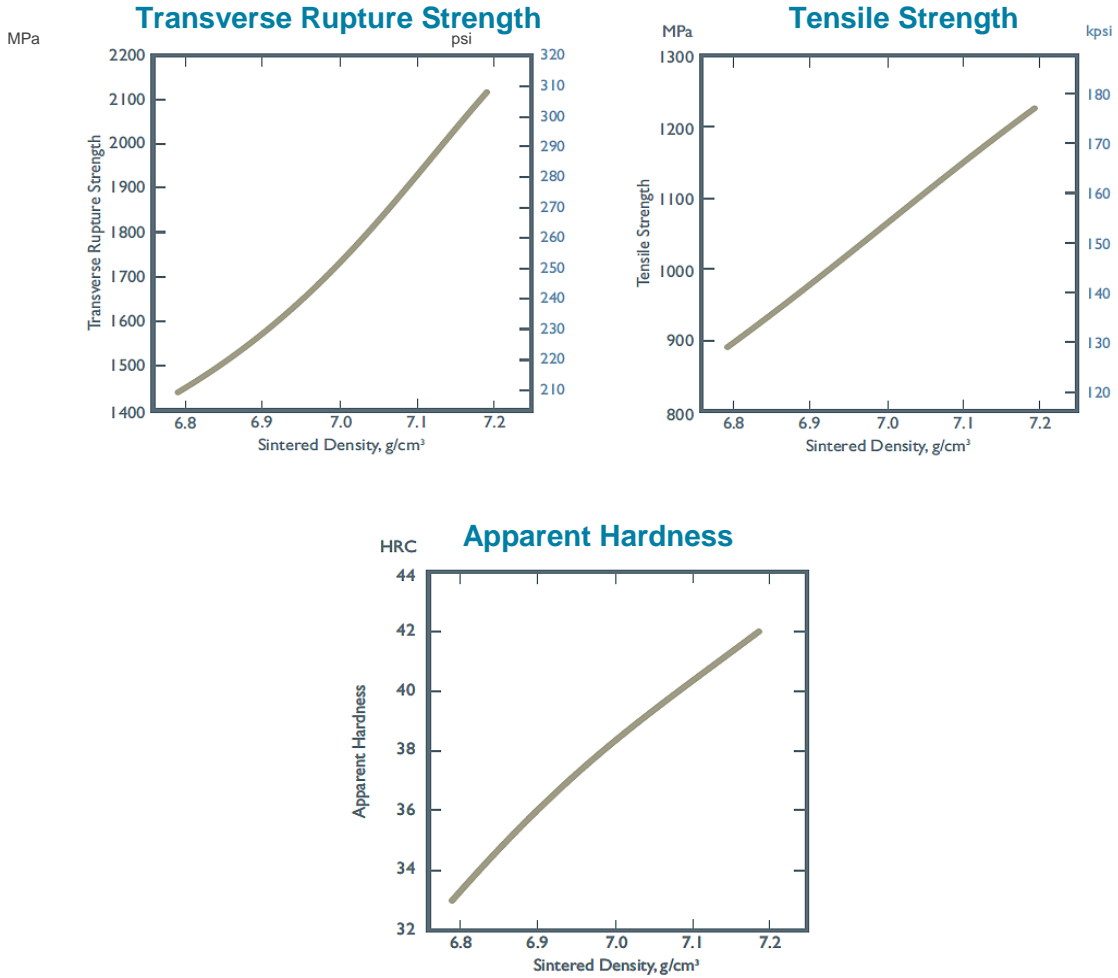
Dimensional Change



| Sintered Density | Added Graphite | Combined Carbon | Transverse Rupture Strength | | Tensile Strength | | Yield Strength | | Elongation | Apparent Hardness | Dimensional Change | Impact Energy | |
|------------------|----------------|-----------------|-----------------------------|------|------------------|------|----------------|------|------------|-------------------|--------------------|---------------|--------|
| | | | MPa | kpsi | MPa | kpsi | MPa | kpsi | | | | J | lb-fft |
| 6.80 | 0.35 | 0.31 | 1166 | 169 | 566 | 82 | 366 | 53 | 1.8 | 51.5 | -0.06 | 14 | 10 |
| 7.00 | 0.35 | 0.31 | 1386 | 201 | 641 | 94 | 393 | 57 | 2.4 | 55.0 | 0.01 | 20 | 16 |
| 7.20 | 0.35 | 0.31 | 1566 | 227 | 703 | 103 | 428 | 62 | 2.5 | 57.5 | 0.09 | 33 | 25 |
| 6.80 | 0.65 | 0.57 | 1248 | 181 | 628 | 92 | 455 | 66 | 0.8 | 60.0 | -0.09 | 14 | 10 |
| 7.00 | 0.65 | 0.57 | 1469 | 213 | 710 | 104 | 469 | 68 | 1.0 | 62.0 | -0.03 | 19 | 14 |
| 7.20 | 0.65 | 0.57 | 1648 | 239 | 779 | 113 | 524 | 76 | 1.1 | 63.8 | 0.09 | 24 | 18 |
| 6.80 | 0.75 | 0.67 | 1130 | 164 | 586 | 85 | 441 | 64 | 0.6 | 61.5 | -0.11 | 12 | 9 |
| 7.00 | 0.75 | 0.67 | 1345 | 195 | 669 | 97 | 455 | 66 | 0.7 | 62.8 | -0.04 | 18 | 13 |
| 7.20 | 0.75 | 0.67 | 1531 | 222 | 724 | 105 | 510 | 74 | 0.8 | 65.3 | 0.10 | 20 | 15 |

HEAT-TREATED PROPERTIES

Composition: **ATOMET DB48** + 0.45% graphite + 0.75% wax.
 Sintered in a 90% nitrogen-based atmosphere at 1120°C (2050°F) for 25 minutes.
 Heat-treated 15 minutes at 850°C (1560°F), atmosphere with 0.8% carbon potential.
 Oil quenched and tempered 1 hour at 175°C (350°F).



| Sintered Density g/cm ³ | Added Graphite % | Combined Carbon % | Transverse Rupture Strength | | Tensile Strength | | Yield Strength | | Apparent Hardness HRB | Impact Energy | |
|---------------------------------------|---------------------|----------------------|-----------------------------|------|------------------|------|----------------|------|--------------------------|---------------|--------|
| | | | MPa | kpsi | MPa | kpsi | MPa | kpsi | | J | lb-ftf |
| 6.80 | 0.45 | 0.40 | 1445 | 211 | 897 | 130 | 779 | 113 | 31 | 11 | 8 |
| 7.00 | 0.45 | 0.40 | 1724 | 250 | 1069 | 155 | 883 | 128 | 36 | 14 | 10 |
| 7.20 | 0.45 | 0.40 | 2145 | 311 | 1234 | 179 | 993 | 144 | 41 | 15 | 11 |

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