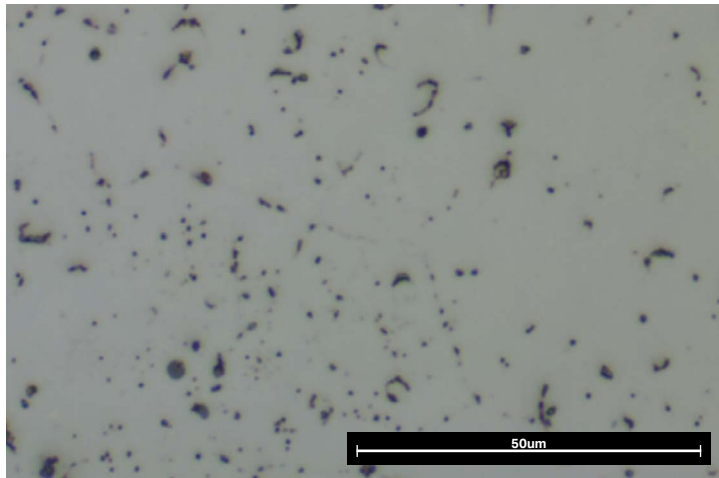
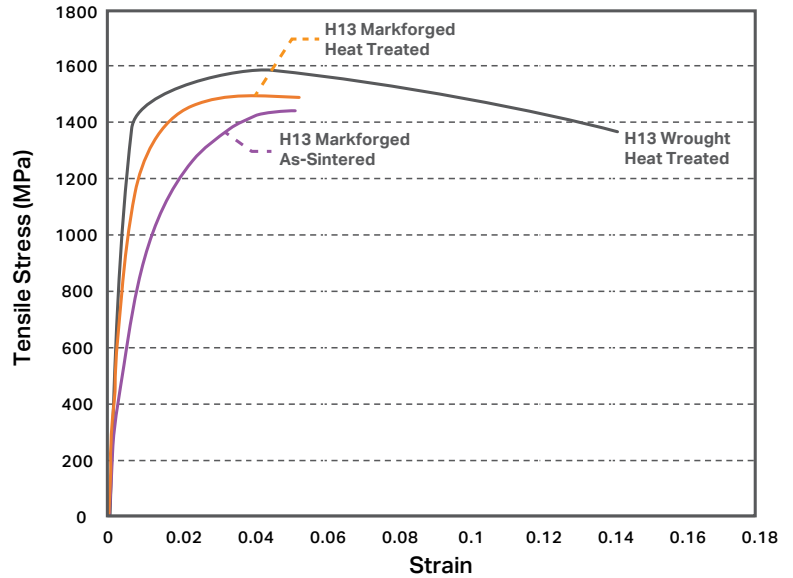


MATERIAL DATASHEET

H13 Tool Steel



Composition	Amount
Chromium	4.7-5.5%
Molybdenum	1.3-1.7%
Silicon	0.8-1.2%
Vanadium	0.8-1.2%
Carbon	0.3-0.45%
Manganese	0.2-0.5%
Phosphorous	0.03% max
Sulfur	0.03% max
Iron	bal



- **Markforged H13 As-Sintered**
 H13 Tool Steel printed on the Metal X, washed in the Wash-1, and sintered in the Sinter-1. As Sintered Microstructure is pictured to the left.
- **Markforged H13 Heat Treated**
 H13 Tool Steel printed with the Metal X system, air quenched at 1010C, and double tempered at 600C
- **Wrought H13 Heat Treated**
 Wrought H13 tool steel standard from *ASM Specialty Handbook* - air quenched at 1010C and double tempered at 600C.

Typical Mechanical Properties	Standard	Markforged As-Sintered	Markforged Heat Treated	Wrought Heat Treated*
Ultimate Tensile Strength	ASTM E8	1420 MPa	1500 MPa	1580 MPa
0.2% Yield Strength	ASTM E8	800 MPa	1250 MPa	1360 MPa
Elongation at Break	ASTM E8	5%	5%	14%
Hardness	ASTM E18	40 HRC	45 HRC	46 HRC
Relative Density	—	≥ 94.5%	≥ 94.5%	100%

These data represent typical values for Markforged H13 Tool Steel as-sintered and after heat treatment. Values were tested in house, and both material composition and "As-Sintered" data were confirmed by outside testing. These representative data were tested, measured, or calculated using standard methods and are subject to change without notice. Markforged makes no warranties of any kind, express or implied.

*Wrought Heat Treated data included in table only. Data from *ASM Specialty Handbook: Tool Materials* page 140