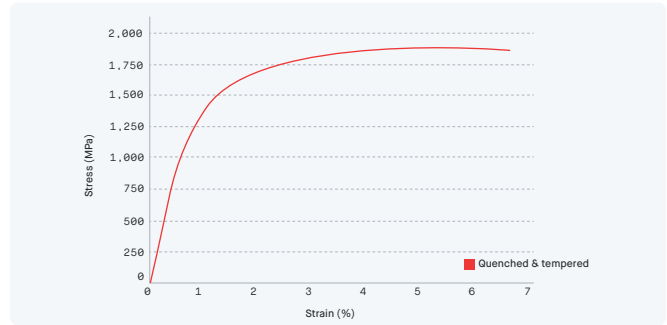


[Material Data Sheet]

4140

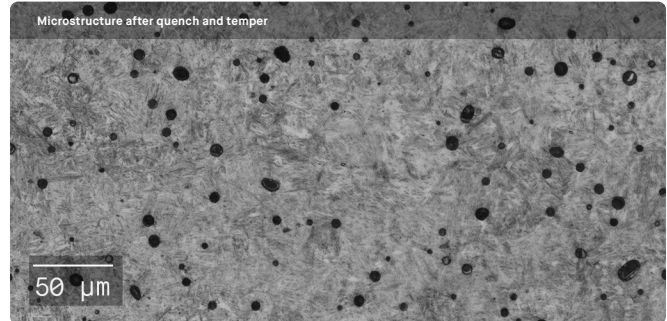
Low-Alloy Steel

PureSinter Furnace



COMPOSITION % (AISI/SAE 4140)

C	0.3 - 0.5
Cr	0.8 - 1.2
Mn	1.0 (max)
Mo	0.2 - 0.3
Si	0.6 (max)
Fe	Balance



MECHANICAL PROPERTIES IN DESKTOP METAL PURESINTER FURNACE

	Standard	Production System™ Quenched & Tempered	ASTM B883 / MPIF 35 (min - typ) Quenched & Tempered
Ultimate tensile strength ¹ (MPa)	ASTM E8M	1,780 ± 70	1,380 – 1,650
Yield strength ¹ (MPa)	ASTM E8M	1,420 ± 60	1,070 – 1,240
Elongation at break (%)	ASTM E8M	4.8 ± 1	3 – 5
Young's modulus (GPa)	ASTM E111	187 ± 6	205
Hardness (HRC)	ASTM E18	47 ± 1.3	46
Un-notched Charpy impact energy (J)	MPIF 59	84 ± 7	75
Density (g/cm ³)		7.48	7.5

ATTRIBUTES & APPLICATIONS

Low-Alloy heat-treatable steel used in applications requiring high strength, hardness, & toughness

Good elongation with quality impact & abrasion resistance

Automotive parts, armament components, jigs, fixtures, tooling, gears, sprockets, wrenches, & structural housings

Mechanical components (static & dynamically loaded)

Impact components (e.g. golf iron heads, hammers, crash cans)

OTHER STANDARD DESIGNATIONS

UNS G41400

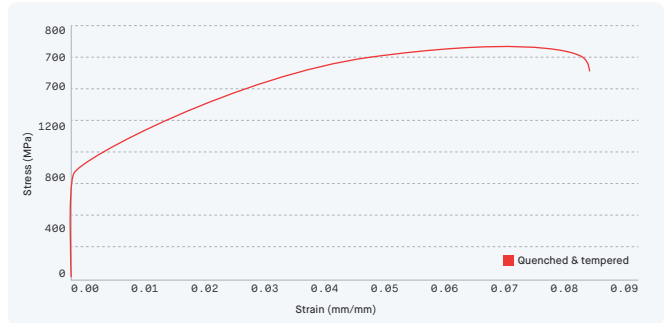
EN 1.7225

42CrMo4

1. YS, UTS, Elongation, and Young's modulus properties noted represent Xy orientation
 2. Listed designations are for reference purposes only. Composition and mechanical properties may vary.
 3. Per MPIF Standard 35, Materials Standards for Metal Injection Molded Parts (MPIF 35-MIM, 2018). End-use material performance is impacted (+/-) by certain factors including but not limited to part geometry and design, application and evaluation conditions, etc.

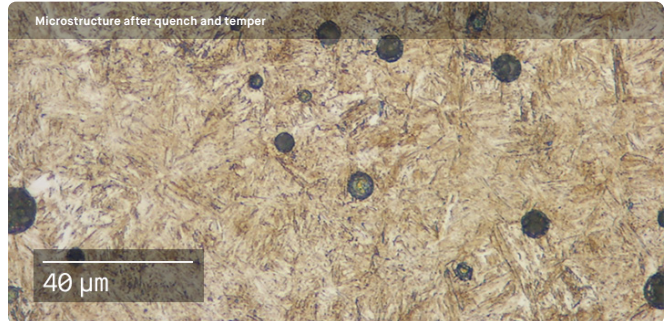
[Material Data Sheet]

4140 Low-Alloy Steel



COMPOSITION % (AISI/SAE 4140)

Fe	Balance
C	0.3 - 0.5
Cr	0.8 - 1.2
Mn	1.0 (max)
Mo	0.2 - 0.3
Si	0.6 (max)



MECHANICAL PROPERTIES SINTERED IN THIRD-PARTY COMMERCIAL FURNACE

	Standard	Production System™ Quenched & Tempered	Production System™ HIP + Quenched & Tempered	ASTM B883 / MPIF 35 (min - typ) Quenched & Tempered
Ultimate tensile strength ¹ (MPa)	ASTM E8/E8M	1,880 ± 29	2,055 ± 27	1,380 – 1,650
Yield strength ¹ (MPa)	ASTM E8/E8M	1,455 ± 34	1,620 ± 11	1,070 – 1,240
Elongation at break (%)	ASTM E8/E8M	4.8 ± 1.1	7.1 ± 2.3	3 – 5
Young's modulus (GPa)	ASTM E111	203 ± 9	209 ± 7	205
Hardness (HRC)	ASTM E18	47.1 ± 0.7	53 ± 1	46
Charpy Impact Strength (J)	MPIF 59	58	314	75
Density	g/cm ³	7.5	7.8	7.5
Surface roughness ² (μm Ra)	ASTM B311	3 – 8	3 – 8	-

ATTRIBUTES & APPLICATIONS

Low-Alloy heat-treatable steel used in applications requiring high strength, hardness, & toughness

Good elongation with quality impact & abrasion resistance

Automotive parts, armament components, jigs, fixtures, tooling, gears, sprockets, wrenches & structural housings

Mechanical components (static & dynamically loaded)

Impact components (e.g. golf iron heads, hammers, crash cans)

OTHER STANDARD DESIGNATIONS

UNS G41400

EN 1.7225

42CrMo4

1. YS & UTS properties noted represent mean values across Xy orientation.
 2. Surface roughness measured in Z direction after sintering & sand blasting.
 3. Stress strain curve reported in X print orientations after quenching and tempering.