

# 4140 Annealed



## Annealed Alloy Steel

Métaux Solutions 4140 Annealed is a high-quality, 4140 alloy steel intended for all mechanical uses where improved machinability, uniform hardness and excellent flatness are required. Product hardness-typically 200 Brinell.

Through variations in the method of heat treating 4140, an exceptionally wide range of properties can be attained. For this reason, it is often used as stock for forging, as 4140 has self scaling properties. 4140 responds readily to heat treatment and is comparatively easy to machine in the heat condition.

## Typical Analysis

Carbon	.40	Chromium	.95
Manganese	.85	Molybdenum	.20
Phosphorus	.035 max	Silicon	.25
Sulfur	.040 max		

## Applications

4140 can be used for as wide variety of applications where greater toughness and wear resistance is needed over lower carbon grades. Typical applications include strippers, hold blocks, mold bases, ejectors, back up and support tooling, fixtures, jigs, molds, cams, drill collars, bolts, stubs, couplings, reamer bodies, axles, shafting, piston rods, rams, hydraulic machinery shafts, gears, sprockets, gear racks, valves, chain links, spindles, tool bodies, tool holders, tie rods, boring bars, guides, tracks, ways, slides, wear strips or parts, forming dies, brake dies, trim dies, bolsters, machinery parts and components, etc. This material roll threads, knurls, and may be plated.

## Stress Relief

Heat slowly and uniformly to 1000°F and soak one hour per inch of section thickness. Air cool or furnace cool to room temperature.

## Annealing

Heat to 1450° - 1550°F. Cool slowly in furnace. Average BHN 187.

## Heat Treating

4140 has a hardening range of 1525° - 1625°F. Quench in oil. A wide range of mechanical properties can be obtained by tempering between 100 degrees symbol and 1200°F.

## Tempering

Temper one hour per inch of section thickness to desired hardness. Representative hardness levels after tempering are tabulated below.

### Oil quenched from 1600°F • Tempered 4 Hours (Section Size — 4" x 4")

Tempering Temperature (°F)	Hardness (RC)
400	42
500	41
600	40
700	39
800	37
900	36
1000	34
1100	29
1200	25

*Note: Variations in section size, heating rate, soak time, quench rate and tempering will cause deviations from the above values. Métaux Solutions should be consulted for specific applications.*

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### EDM

Electro-discharge machining is used in the production of various tooling. This process produces recast, rehardened and retempered layers on the EDM surface. It is recommended that 4140 Annealed be stress relieved at 50°F below the final tool tempering temperature, after the EDM process, to temper the rehardened layer produced by EDM.

### Condition

4140 Annealed is provided completely decarb free and stress relieved.

### Finish

Ground oversize to typical rms 50/75, maximum 125.

### Sizes

Available in standard thickness increments 1/4" thru 6".

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