

## MARSHALLOY™ 4140 Annealed Deluxe Plate



### Annealed Alloy Steel

Precision Marshall's MARSHALLOY™ 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. Precision Marshall 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 MARSHALLOY™ 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

MARSHALLOY™ 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".

The following additional products are available through our authorized distributors.

#### DELUXE PLATES

MARSHALLOY MQ®/FM  
MARSHALLOY™ STD 4142  
PRESCO O-1  
AIRTRUE A-2  
SUPER 7 MQ® S-7  
ARISTOCRAT D-2  
FIRECHROME H-13

#### GROUND FLAT STOCK

PRESCO O-1  
AIRTRUE A-2  
ARISTOCRAT D-2  
SUPER 7 S-7  
NUTEC 42® 4142  
FIRECHROME H-13  
PREMAR 410  
RUETOM SPECIAL 420  
PREMAR 440 C  
MARSHALLCRAT® LC

#### DRILL ROD

WATERCRAT W-1  
OILCRAT O-1  
AIRTRUE A-2  
SUPER 7 S-7  
ARISTOCRAT D-2  
FIRECHROME H-13PH  
TRM-2 M-2  
WATERCRAT W-1  
(Cold-drawn)



#### ***The Deluxe Company's Guarantee of Quality***

*Precision Marshall's conformance to specifications is the highest in the industry. Precision Marshall assumes complete liability for any costs directly relating to a deviation from our published specifications. Any such costs, properly documented, will be reimbursed. For more information, visit us at [www.pmsteel.com](http://www.pmsteel.com).*

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