

MARSHALLOY MQ[®]/FM

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Prehardened Alloy Steel

MARSHALLOY MQ[®]/FM, exclusively by Precision Marshall Steel, is a mold quality steel supplied in the prehardened condition. Special melting and refining practices are utilized to produce a uniform product with exceptional cleanliness. These characteristics allow MARSHALLOY MQ[®]/FM to be polished to an extremely high finish required for plastic molding. The material is tested to rigorous standards to ensure uniformity of structure and exceptionally low inclusion levels.

MARSHALLOY MQ[®]/FM is supplied prehardened to 280/321 BHN. The balanced composition ensures uniform cross-sectional hardness and is guaranteed to maintain the specified hardness throughout the plate. **Maximum variation within any plate is 30 BHN.**

MARSHALLOY MQ[®]/FM provides superior machinability while demonstrating outstanding cleanliness and soundness. It may be successfully substituted for P20 for plastic injection mold applications in addition to its usefulness in a wide range of mechanical applications, including short run tools and dies.

Chemistry

Element	Range	(Aim)	Element	Range	(Aim)
Carbon	.36 / .42	(.40)	Chromium	1.00/1.20	(1.10)
Manganese	1.10 /1.30	(1.20)	Molybdenum	.15/ .35	(.25)
Phosphorus	.010 max		Silicon	.35/ .45	(.40)
Sulfur	.010 / .022	(.015)	Nickel	.25/ .50	(.35)
			Copper	.30 max	

Stress Relief

Heat slowly and uniformly to 800/900°F and soak one hour per inch of section thickness. Air cool or furnace cool to room temperature.

Annealing

It is recommended that MARSHALLOY MQ[®]/FM be annealed prior to rehardening. Heat slowly and uniformly to 1500/1600°F for four hours. Cool slowly (50°F per hour max.) to 1200°F and air cool.

Heat Treating

MARSHALLOY MQ[®]/FM may be heat treated to higher levels of hardness for higher strength. Preheat to 1250°F and hold for one hour. Heat to 1550/1600°F and soak one half hour when material is up to temperature. Oil quench or air cool to hand warm (approximately 150°F) and temper immediately.

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

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 MQ[®]/FM 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 MQ[®]/FM is provided completely decarb free and stress relieved.

Finish

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

Sizes

Available in standard thickness increments 1/2" through 12".

Note: MARSHALLOY MQ[®]/FM sizes above 4" may have milled finish.

The following additional products are available through our authorized distributors.

DELUXE PLATES

MARSHALLOY MQ[®]/FM

MARSHALLOY[™] STD 4142

MARSHALLOY[™] 4140
(Annealed)

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

SUPER 7 S-7

NUTEC 42[®] 4142

ARISTOCRAT D-2

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 our Web site at www.pmsteel.com.

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