

# MARSHALLOY MQ<sup>®</sup>/FM

*Deluxe Plate*

## Prehardened Alloy Steel

MARSHALLOY MQ<sup>®</sup>/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<sup>®</sup>/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<sup>®</sup>/FM is supplied prehardened to 262/321 BHN. The balanced composition of MARSHALLOY MQ<sup>®</sup>/FM ensures uniform cross-sectional hardness and is guaranteed to maintain the specified hardness throughout the plate.

MARSHALLOY MQ<sup>®</sup>/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.

## 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<sup>®</sup>/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<sup>®</sup>/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		



*The Deluxe Company*

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.

## 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 1/4" through 8".  
Note: MARSHALLOY MQ®/FM sizes above 4" may have milled finish.

## Additional Products

### Deluxe Plates

MARSHALLOY™ STD 4142  
PRESCO O-1  
AIRTRUE A-2  
DIECRAT A-6  
SUPER 7 MQ® S-7  
ARISTOCRAT D-2  
FIRECHROME H-13  
TRM-2 M-2  
RUETOM SPECIAL 420 ESR

### Ground Flat Stock

PRESCO O-1  
AIRTRUE A-2  
SUPER 7 S-7  
NUTEC 42® 4142  
ARISTOCRAT D-2  
MARSHALLCRAT® LC

### Drill Rod

WATERCRAT W-1  
OILCRAT O-1  
AIRTRUE A-2  
SUPER 7 S-7  
ARISTOCRAT D-2  
TRM-2 M-2  
WATERCRAT W-1 Cold-drawn

## Inventory Locations

### Headquarters

99 Berry Road  
Washington, PA 15301  
T • 800 537 7528  
F • 800 350 1353

### National Distribution center

1 Northpoint Court  
Bolingbrook, IL 60440  
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E • sales@pmsteel.com

## *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](http://www.pmsteel.com).