

# MARSHALLOY MQ®/FM

Deluxe Plate

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

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.

## 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  $800/900^{\circ}F$  and soak one hour per inch of section thickness. Air cool or furnace cool to room temperature.

## **Annealing**

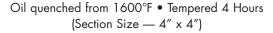
It is recommended that MARSHALLOY MQ $^{\circ}$ /FM be annealed prior to rehardening. Heat slowly and uniformly to 1500/1600 $^{\circ}$ F for four hours. Cool slowly (50 $^{\circ}$ F per hour max.) to 1200 $^{\circ}$ F and air cool.

## **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.



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Tempering Temperature (°F)	Rockwell Hardness (RC)	Tempering Temperature (°F)	Rockwell Hardness (RC)
400	42	900	36
500	41	1000	34
600	40	1100	29
<i>7</i> 00	39	1200	25
800	37	lan.	

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 1/4" 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.

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