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TECHNICAL BULLETIN

MARSHALLOY MQ®/FM

PREHARDENED ALLOY STEEL

MARSHALLOY MQ®/FM 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 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, including short run tools and dies.

CHEMISTRY

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

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 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 website at www.pmsteel.com.

www.lindquiststeels.com

AN ISO 9001:2008 CERTIFIED COMPANY

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