PRECISION MARSHALL STEEL COMPANY
One Northpoint Court, Bolingbrook IL 60440
Toll Free: 1-800-258-2558 - www.pmsteel.com

CERTIFICATION OF GROUND FLAT STOCK

PRODUCT INFORMATION

Grade	Thickness	Heat #	Country of Origin	Purchase Order
W1	0.8750	PM20086	United States	P1431687

CHEMICAL COMPOSITION

C: 0.9100 Mn: 0.3900 P: 0.0080 S: 0.0080 Si: 0.1900 Cr: 0.0800 Mo: 0.0200 Ni: 0.0600 Cu: 0.1100 V: 0.0010

STANDARD INFORMATION

STANDARD CHEMICAL COMPOSITION

AISI / SAE	UNS	Carbon	Manganese	Silicon	Phosphorous	Sulfur	Chromium	Vanadium	Tungsten	Molybdenum
W1	T72301	.90/1.05	.30/.40	.10/.25	.025 Max	.025 Max	.30 Max	.10 Max	.15 Max	.10 Max
O1	T31501	.85/1.00	1.00/1.40	.10/.50	.030 Max	0.030 Max	.40/.70	.30 Max	.40/.60	--
A2	T30102	.95/1.05	.40/1.00	.50 Max	.030 Max	0.030 Max	4.75/5.50	.15/.50	--	.90/1.40
S7	T41907	.45/.55	.20/.90	.20/1.00	.030 Max	0.030 Max	3.00/3.50	.35 Max	--	.10 Max
D2	T30402	1.40/1.60	.10/.60	.10/.60	.030 Max	0.030 Max	11.00/13.00	.50/1.10	--	.70/1.20
M2	T11302	.85 Max	.30 Max	.20/.45	--	--	4.00 Max	2.00 Max	6.00 Max	5.00 Max
H13	--	.40	--	1.00	--	.100	5.25	1.00	-	1.35

SPECIFICATIONS

AISI	SAE	ASTM	FEDERAL
W1	J-437	A686-92(2010) (1)	QQ-T-580 Rev.C
O1	J-437	A681-08 (2)	QQ-T-570 Rev.C
A2	J-437	A681-08 (2)	QQ-T-570 Rev.C
S7	J-437	A681-08 (2)	QQ-T-570 Rev.C
D2	J-437	A681-08 (2)	QQ-T-570 Rev.C
M2	J438-B	A600-92a(2016)	QQT-570 Rev. C
H13	J-437	A681-08 (2)	QQ-T-570 Rev.C

1 Certain heats may not meet the ASTM specification for Manganese
2 Certain sizes may not meet the ASTM specification for hardness.

SURFACE / STRUCTURE

Size	Finish (Max)	Quality (Max Defect)
.000-.1250	10 RMS	0.000
.1251-.2500	15 RMS	0.000
.2501-.8750	20 RMS	0.000
.8751-2.000	30 RMS	0.000
All CD Flats	50 RMS	.008/side

** Grain Size: 5-8 (McQuade-Ehn)*
** Microstructure: 85% min. spheroidization*

MACHINABILITY

Grade	Rating
W1	100
O1	90
A2	65
S7	95
D2	50
M2	65

HARDNESS

Size	W1	O1	A2	S7	D2	H13
.0000-.1250	166,000 psi	116,000 psi	128,000 psi	123,000 psi	131,000 psi	40-48 HRC
.1251-.2500	28 HRC	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC
.2501-.5000	23 HRC	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC
.5001-2.000	96 HRB	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC

** For sizes under 5/32" diameter, a tensile strength is obtained.*

SIZE / LENGTH

Diameter	Tolerance	Length	Tolerance
.0000-.1249	+/-.0003	3'	36" +1/8,-0
.1250-.499	+/-.0005	6'	72" +1,-0
.500-3.00	+/-.001	12'	144" +2,-0

All material RoHS Compliant

Precision Marshall Steel Company hereby attests that drill rod items as supplied have been tested and certified to meet all of the standards and limitations for drill rod as set forth above.

Certified: *PM Support Services*
Support Services

Date: 8/23/2021

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CERTIFICATION OF GROUND FLAT STOCK

PRODUCT INFORMATION

Grade	Thickness	Heat #	Country of Origin	Purchase Order
W1	0.4375	PM20086	United States	P1431687

CHEMICAL COMPOSITION

C: 0.9100 Mn: 0.3900 P: 0.0080 S: 0.0080 Si: 0.1900 Cr: 0.0800 Mo: 0.0200 Ni: 0.0600 Cu: 0.1100 V: 0.0010

STANDARD INFORMATION

STANDARD CHEMICAL COMPOSITION

AISI / SAE	UNS	Carbon	Manganese	Silicon	Phosphorous	Sulfur	Chromium	Vanadium	Tungsten	Molybdenum
W1	T72301	.90/1.05	.30/.40	.10/.25	.025 Max	.025 Max	.30 Max	.10 Max	.15 Max	.10 Max
O1	T31501	.85/1.00	1.00/1.40	.10/.50	.030 Max	0.030 Max	.40/.70	.30 Max	.40/.60	--
A2	T30102	.95/1.05	.40/1.00	.50 Max	.030 Max	0.030 Max	4.75/5.50	.15/.50	--	.90/1.40
S7	T41907	.45/.55	.20/.90	.20/1.00	.030 Max	0.030 Max	3.00/3.50	.35 Max	--	.10 Max
D2	T30402	1.40/1.60	.10/.60	.10/.60	.030 Max	0.030 Max	11.00/13.00	.50/1.10	--	.70/1.20
M2	T11302	.85 Max	.30 Max	.20/.45	--	--	4.00 Max	2.00 Max	6.00 Max	5.00 Max
H13	--	.40	--	1.00	--	.100	5.25	1.00	-	1.35

SPECIFICATIONS

AISI	SAE	ASTM	FEDERAL
W1	J-437	A686-92(2010) (1)	QQ-T-580 Rev.C
O1	J-437	A681-08 (2)	QQ-T-570 Rev.C
A2	J-437	A681-08 (2)	QQ-T-570 Rev.C
S7	J-437	A681-08 (2)	QQ-T-570 Rev.C
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All CD Flats	50 RMS	.008/side

** Grain Size: 5-8 (McQuade-Ehn)*
** Microstructure: 85% min. spheroidization*

MACHINABILITY

Grade	Rating
W1	100
O1	90
A2	65
S7	95
D2	50
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HARDNESS

Size	W1	O1	A2	S7	D2	H13
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