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
LC	1.0000	PM20149	** See below	P1489621

CHEMICAL COMPOSITION

C: 0.1680 Mn: 0.6670 P: 0.0110 S: 0.0014 Si: 0.2260 Cr: 0.2500 Ni: 0.2000 Cu: 0.2200

STANDARD INFORMATION

**** All ground flat stock supplied by Precision Marshall Steel complies with DFARS requirements that state certain specialty metals must be melted and produced in the US or a qualifying country.**

STANDARD CHEMICAL COMPOSITION

AISI / SAE	UNS	Carbon	Manganese	Silicon	Phosphorous (Max)	Sulfur (Max)	Chromium	Vanadium	Tungsten	Molybdenum
A2	T30102	.95/1.05	.40/.60	.20/.35	.025	.005	4.90/5.30	.15/.20	--	.90/1.10
O1	T31501	.90/1.00	1.00/1.15	.20/.35	.020	.020	.40/.60	.30 Max	.40/.60	--
S7	T41907	.48/.53	.50/.70	.20/.40	.035	.003	3.10/3.40	.20/.30	--	1.30/1.60
NT	G41420	.38/.46	.70/1.00	.15/.30	.035	.040	.80/1.15	-	--	.15/.25
D2	T30402	1.50/1.60	.20/.40	.20/.60	.030	.020	11.25/12.00	.80/1.00	--	.70/.80
LC	G10180	.15/.25	.60/.90	--	.040	.050	--	--	--	--
LC (Under .250")		.03/.25	.90 Max	--	.040	.050	--	--	--	--
440C	S44004	1.05	.40	.40	--	--	17.00	--	--	.40
410	S41000	.13	.05	.40	--	--	12.00	-	--	--
420	S42000	.46	.40	.40	--	--	13.00	.30	--	--
M2	T11302	.78/1.05	.15/.40	.20/.45	.030	.030	.20/.45	1.75/2.20	5.50/6.75	4.50/5.50
H13	T20813	.32/.45	.20/.60	.80/1.25	.030	.030	4.75/5.5	.80/1.20	--	1.10/1.75

SPECIFICATIONS

GRADE	AISI	SAE	ASTM	FEDERAL	HARDNESS BRINELL	MACHINABILITY RATING
A2	A-2	J-437	A681-08	QQ-T-570 Rev.C	200-235	65
O1	O-1	J-437	A681-08	QQ-T-570 Rev.C	177-212	95
S7	S-7	J-437	A681-08	QQ-T-570 Rev.C	188-223	95
NT	4140/42	--	A-322	--	262-321	85
D2	D-2	J-437	A681-08	QQ-T-570 Rev.C	220-255	50
LC	C-1018	--	A1018	635	168 MAX	--
440C	440C	--	A276-17	QQ-S-763	--	--
410	410	--	A240	QQ-S-763	--	--
420	420	--	A276-17	QQ-S-763	--	--
M2	M-2	--	A600	QQ-T-590	255 MAX	--
H13	H13	J467	A681	QQ-T-570	235 MAX	75

SURFACE TOLERANCE AND SQUARENESS

	Regular (in)	Oversize (in)
Thick. 18-36	+/-.001	+.010/+.015
Thick. 72	+/-.002	
Width	+.005/-.000	+.010/+.015
Length 18	+.125/+.250	+.125/+.250
Length 24	+.1875/+.375	+.1875/+.375
Length 36	+.250/+.500	+.250/+.500
Length 72	+.250/+.750	+.250/+.750
Squares	+/-.001	+.010/+.015
	Metric (mm)	
Thick.	+/- .0254	
Length	+6.35 / +12.7	

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

Material is RoHs, REACH, and Conflict Mineral compliant. The letter confirming compliance can be found on our website or distributor portal.

Certified: *Adam Helphenstine*
Support Services

Date: 8/28/2023

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CERTIFICATION OF DRILL ROD

PRODUCT INFORMATION

Grade	Thickness	Heat #	Country of Origin	Purchase Order
W1	0.8750	PM20173	Brazil	P1489621

CHEMICAL COMPOSITION

C: 0.9300 Mn: 0.3900 P: 0.0050 S: 0.0110 Si: 0.2400 Cr: 0.0600 Mo: 0.0200 Ni: 0.0500 Cu: 0.1100 V: 0.0010

STANDARD INFORMATION

STANDARD CHEMICAL COMPOSITION

AISI	Carbon	Manganese	Silicon	Sulfur	Chromium	Vanadium	Tungsten	Molybdenum	Phosphorous	Nickel
W1	.90/1.05	.30/.40	.10/.25	.025 Max	.30 Max	.10 Max	.15 Max	.10 Max	.025 Max	-
O1	.85/1.00	1.00/1.40	.10/.50	0.030 Max	.40/.70	.30 Max	.40/.60	--	.030 Max	-
A2	.95/1.05	.40/1.00	.50 Max	0.030 Max	4.75/5.50	.15/.50	--	.90/1.40	.030 Max	-
S7	.45/.55	.20/.90	.20/1.00	0.030 Max	3.00/3.50	.35 Max	--	.10 Max	.030 Max	-
D2	1.40/1.60	.10/.60	.10/.60	0.030 Max	11.00/13.00	.50/1.10	--	.70/1.20	.030 Max	-
M2	.78/1.05	.15/.40	.03/.02	.03 Max	3.75/4.50	1.75/2.20	5.50/6.75	4.50/5.50	.40 Max	-
H13	.40	--	1.00	.100	5.25	1.00	-	1.35	--	-
304L	.03 Max	2 Max	1 Max	.03 Max	18/20	--	-	-	.045 Max	8/12

SPECIFICATIONS / **MACHINEABILITY**

AISI	SAE	ASTM	FEDERAL	UNS	Rating
W1	J-437	A686-92(2010) (1)	QQ-T-580 Rev.C	T72301	100
O1	J-437	A681-08 (2)	QQ-T-570 Rev.C	T31501	90
A2	J-437	A681-08 (2)	QQ-T-570 Rev.C	T30102	65
S7	J-437	A681-08 (2)	QQ-T-570 Rev.C	T41907	95
D2	J-437	A681-08 (2)	QQ-T-570 Rev.C	T30402	50
M2	J438-B	A600-92a(2016)	QQT-570 Rev. C	T11302	65
H13	J-437	A681-08 (2)	QQ-T-570 Rev.C	--	75
304L	S30403	A276	QQ-S-766	S30403	70

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

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

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

HARDNESS

Size	W1	O1	A2	S7	D2	H13	M2	304L
.0000-.1250	166,000 psi	116,000 psi	128,000 psi	123,000 psi	131,000 psi	40-48 HRC	248 HRB	215 HRB
.1251-.2500	28 HRC	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 HRB	215 HRB
.2501-.5000	23 HRC	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 HRB	215 HRB
.5001-2.000	96 HRB	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 HRB	215 HRB

** 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

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 as set forth above.

Material is RoHs, REACH, and Conflict Mineral compliant. The letter confirming compliance can be found on our website or distributor portal.

Certified: Adam Helphenstine
Manager of Materials

Date: 8/28/2023