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

CERTIFICATION OF DRILL ROD

PRODUCT INFORMATION

Grade	Thickness	Heat #	Country of Origin	Purchase Order
W1	0.3750	PM20130	United States	P1456096

CHEMICAL COMPOSITION

C: 0.9400 Mn: 0.3500 P: 0.0120 S: 0.0060 Si: 0.2100 Cr: 0.0900 Mo: 0.0200 Ni: 0.0500 Cu: 0.1100 V: 0.0030

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	.78 / 1.05	.15 / .40	.03 / .20	.40 Max	.03 Max	3.75 / 4.50	1.75 / 2.20	5.50 / 6.75	4.50 / 5.50
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	M2
.0000-.1250	166,000 psi	116,000 psi	128,000 psi	123,000 psi	131,000 psi	40-48 HRC	248 HRB
.1251-.2500	28 HRC	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 HRB
.2501-.5000	23 HRC	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 HRB
.5001-2.000	96 HRB	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 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 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: Wendy Gabauer
Manager of Materials

Date: 7/13/2022

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

CERTIFICATION OF DRILL ROD

PRODUCT INFORMATION

Grade	Thickness	Heat #	Country of Origin	Purchase Order
O1	1.3125	PM20122	Brazil	P1456096

CHEMICAL COMPOSITION

C: 0.9400 Mn: 1.1300 P: 0.0160 S: 0.0010 Si: 0.2700 Cr: 0.5100 Mo: 0.0600 Ni: 0.0900 Cu: 0.0700 V: 0.2000 W: 0.4400

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	.78 / 1.05	.15 / .40	.03 / .20	.40 Max	.03 Max	3.75 / 4.50	1.75 / 2.20	5.50 / 6.75	4.50 / 5.50
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	M2
.0000-.1250	166,000 psi	116,000 psi	128,000 psi	123,000 psi	131,000 psi	40-48 HRC	248 HRB
.1251-.2500	28 HRC	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 HRB
.2501-.5000	23 HRC	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 HRB
.5001-2.000	96 HRB	100 HRB	27 HRC	25 HRC	28 HRC	40-48 HRC	248 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 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: Wendy Gabauer
Manager of Materials

Date: 7/13/2022