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	0.5000	PM20086	United States	P1446448

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	.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

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: 3/14/2022

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CERTIFICATION OF DRILL ROD

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W1	0.2500	PM20086	United States	P1446448

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	.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

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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
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CERTIFICATION OF DRILL ROD

PRODUCT INFORMATION

Grade	Thickness	Heat #	Country of Origin	Purchase Order
W1	1.2500	PM20087	Brazil	P1446448

CHEMICAL COMPOSITION

C: 0.9200 Mn: 0.3600 P: 0.0070 S: 0.0060 Si: 0.2000 Cr: 0.0700 Mo: 0.0100 Ni: 0.0400 Cu: 0.0800 V: 0.0010

STANDARD INFORMATION

STANDARD CHEMICAL COMPOSITION

AISI / SAE	UNS	Carbon	Manganese	Silicon	Phosphorous	Sulfur	Chromium	Vanadium	Tungsten	Molybdenum
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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
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SPECIFICATIONS

AISI	SAE	ASTM	FEDERAL
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** 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

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Size	W1	O1	A2	S7	D2	H13	M2
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