Mill Test Certificate

Bri-Steel Manufacturing
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Tel: 001 (780) 469-6603
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Product: Seamless Carbon Steel Pipe Product Heat Number: BSM-2543 Product Size: NPS 24 SCH 60 Production Date: Sep 28, 2015

Production Method: Hot Expansion Product Heat Treatment: ThermoMechanical Formed Certificate No.: MTR- 001963

Product Standards: ASME B36.10-2004, ASTM/ASME A/SA333-2013 Grade 6 LT(M45C) A106-2014/SA106-2013 Grade B/C NDE, A53-2012/SA53-2013 Grade B Type S, NACE MR0175-2009 MR0103-2012

Product Markings: NPS 24 SCH 60 0.969 INCHWT SMLS 2015/09 NDE 1900PSI
HEAT BSM-2543 (PIPE # LENGTH MASS) 238.1lb/ft ASTM/ASME A/SA333 GR 6 LT(M45C) A/SA106 GR B/C A/SA53 GR B NACE MR0175/MR0103 MADE IN CANADA

Product: Details						Non-Destructive Testing								
Heat	Test Type	Product Size	Pieces	Length	Mass lb/ft	Geiger µR/hr	Res. Mag. Gauss	Visual Insp.	OD	UT WT	UT ASTM E213	ET ASTM E309	HydroTest 1900 PSI/ 5 s	End Condition
BSM-2543	Heat	NPS 24 SCH 60 0.969in. WT	2	DRL	238.1	<5	<10	Pass	Pass	Pass	Pass	Pass	Pass	Plain End

Chemical Analysis (wt%)

Heat	Steelmaking Method	Test Type	C	Mn	P	S	Si	Cr	Cu	Mo	Ni	V	Ti	Nb	B	CE(IIW)	CE(CSA)
BSM-2543	Blast Furnace; EAF; Ladle Refining; Vacuum Degas; Fully Killed	Heat	0.17	1.19	0.014	0.001	0.28	0.04	0.02	0.01	0.01	0.050	0.002	0.002	0.0005	0.39	0.39
		Product	0.18	1.17	0.012	0.003	0.28	0.04	0.01	0.01	0.01	0.053	0.003	0.001	0.0005	0.40	0.40
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Mechanical Properties

Heat	Test Type	Microstructure	Hardness	Flattening Test	Tension Test 2 in. GL	Yield (Rt0.5) psi	Tensile (Rm) psi	Y/T (Rt0.5/Rm)	Elongation (A) %
BSM-2543	Heat	Ferrite & Pearlite	76 HRBW	Pass	Longitudinal; 0.5 in. Round Bar	47,400	74,000	0.64	41
				Pass	Longitudinal; 0.5 in. Round Bar	47,600	74,500	0.64	40

Heat	Test Standard	Impact Test Sample Details	Temp °C	Impact Energy				% Shear				Lateral Expansion			
				J	J	J	AVG	%	%	%	AVG	mm	mm	mm	AVG
BSM-2543	ASTM A333	CVN Long 10 x 10 mm	-45	158.0	115.0	128.0	133.7	50	20	30	33	2.10	1.81	1.77	1.89

Additional Details:

✓ We hereby certify that this pipe product was manufactured, sampled, tested and inspected by Bri-Steel Manufacturing in accordance with ASTM/ASME A/SA333-2013, A106-2014/SA106-2013, A53-2012/SA53-2013, and the purchase order requirements, and that the results meet the corresponding requirements. Bri-Steel Manufacturing is registered and certified to ISO-9001:2008 and API Q1.

✓ This pipe product meets the sour service requirements of NACE MR0175/ISO 15156-2:2009 Annex A2 for Region 3 Sour Service , and NACE MR0103-2012 Section 2.1

✓ No weld repairs have been performed on this product.

✓ This product has not come into contact with mercury during the Bri-Steel Manufacturing processes.

✓ This certificate represents a quality control system that is compliant with EN 10204:2004 Type 3.1.

Mill Test Certificate approved by:

T. Lam Sept 30/2015

Tonya Lam, C.E.T.
Assistant QA Manager

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Product: Seamless Carbon Steel Pipe Product Heat Number: BSM-2544 Product Size: NPS 24 SCH 60 Production Date: Sep 29, 2015

Production Method: Hot Expansion Product Heat Treatment: ThermoMechanical Formed Certificate No.: MTR- 001965

Product Standards: ASME B36.10-2004, ASTM/ASME A/SA333-2013 Grade 6 LT(M45C) A106-2014/SA106-2013 Grade B/C NDE, A53-2012/SA53-2013 Grade B Type S, NACE MR0175-2009 MR0103-2012

Product Markings: NPS 24 SCH 60 0.969 INCHWT SMLS 2015/09 NDE 1900PSI
HEAT BSM-2544 (PIPE # LENGTH MASS) 238.1lb/ft ASTM/ASME A/SA333 GR 6 LT(M45C) A/SA106 GR B/C A/SA53 GR B NACE MR0175/MR0103 MADE IN CANADA

Product: Details						Non-Destructive Testing								
Heat	Test Type	Product Size	Pieces	Length	Mass lb/ft	Geiger µR/hr	Res. Mag. Gauss	Visual Insp.	OD	UT WT	UT ASTM E213	ET ASTM E309	HydroTest 1900 PSI/ 5 s	End Condition
BSM-2544	Heat	NPS 24 SCH 60 0.969in. WT	5	DRL	238.1	<5	<10	Pass	Pass	Pass	Pass	Pass	Pass	Plain End

Chemical Analysis (wt%)

Heat	Steelmaking Method	Test Type	C	Mn	P	S	Si	Cr	Cu	Mo	Ni	V	Ti	Nb	B	CE(IIW)	CE(CSA)
BSM-2544	Blast Furnace; EAF; Ladle Refining; Vacuum Degas; Fully Killed	Heat	0.17	1.19	0.014	0.001	0.28	0.04	0.02	0.01	0.01	0.050	0.002	0.002	0.0005	0.39	0.39
		Product	0.16	1.20	0.008	0.003	0.28	0.03	0.02	0.01	0.01	0.054	0.002	0.001	0.0003	0.38	0.37
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Mechanical Properties

Heat	Test Type	Microstructure	Hardness	Flattening Test	Tension Test 2 in. GL	Yield (Rt0.5) psi	Tensile (Rm) psi	Y/T (Rt0.5/Rm)	Elongation (A) %
BSM-2544	Heat	Ferrite & Pearlite	78 HRBW	Pass	Longitudinal; 0.5 in. Round Bar	46,600	73,000	0.64	42
				Pass	Longitudinal; 0.5 in. Round Bar	46,900	72,000	0.65	42

Heat	Test Standard	Impact Test Sample Details	Temp °C	Impact Energy				% Shear				Lateral Expansion			
				J	J	J	AVG	%	%	%	AVG	mm	mm	mm	AVG
BSM-2544	ASTM A333	CVN Long 10 x 10 mm	-45	92.0	150.0	132.0	124.7	20	50	30	33	1.45	2.04	1.90	1.80

Additional Details:

✓ We hereby certify that this pipe product was manufactured, sampled, tested and inspected by Bri-Steel Manufacturing in accordance with ASTM/ASME A/SA333-2013, A106-2014/SA106-2013, A53-2012/SA53-2013, and the purchase order requirements, and that the results meet the corresponding requirements. Bri-Steel Manufacturing is registered and certified to ISO-9001:2008 and API Q1.

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T. Lam Oct/05/2015

Tonya Lam, C.E.T.
Assistant QA Manager