



Mill Test Certificate

Bri-Steel Manufacturing
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Product: **Seamless Alloy Steel Pipe** Product Heat Number: **BSM-2978** Product Size: **NPS 18 X 0.818** Production Date: **December 6, 2016**

Production Method: **Hot Expansion** Product Heat Treatment: **Normalized (1060°C/25min) and Tempered (770°C/90min)** MTR Certificate: **003080**

Product Standards: **ASME B36.10-2004, ASTM A335/ASME SA335-2015 GRADE P91**

Product Markings: **BRI-STEEL MFG ASTM/ASME A/SA335 GR P91 NPS 18 X 0.818 InchWT (0.716 Inch Min Wall)
 HEAT BSM-2978 (PIPE # LENGTH MASS) 150.1lb/ft NDE(UT) 2800PSI SMLS 2016/12 MADE IN CANADA.**

Product Details						Non-Destructive Testing													
Heat	Test Type	Product Size	Pieces	Length	Mass	Geiger	Res. Mag.	Visual	OD	WT	UT	UT	ET	HydroTest	End Condition				
BSM-2978	Heat	NPS 18 X 0.818 in. WT	2	SRL	150.11	µR/hr	Gauss	Insp.	Pass	Pass	Pass	Pass	ASTM E213	ASTM E309	2800 psi/5s	PE			
Chemical Analysis (wt%)																			
Steelmaking Method	Analysis	C	Mn	P	S	Si	Cr	Cu	Mo	Ni	V	Ti	Nb	B	N	Al	Zr	N:Al	
		Heat	0.10	0.42	0.013	0.005	0.29	8.55	0.04	0.99	0.16	0.190	0.001	0.080	0.0005	0.042	0.005	0.002	8.4
		Product	0.08	0.42	0.011	0.002	0.29	8.52	0.05	0.97	0.16	0.186	0.002	0.086	0.0005	*	*	*	*
Killed	Product	0.08	0.43	0.010	0.002	0.29	8.50	0.05	0.97	0.16	0.188	0.002	0.087	0.0005	*	*	*	*	
		Mechanical Properties																	
Microstructure	Hardness	HRBW	Flattening Test	Tension Test															
				50mm GL															
				Longitudinal, 12.7mm Round Bar															
Tempered Martensite & Fine Carbides	97	Pass	Pass	Longitudinal, 12.7mm Round Bar															
				Yield (Rt0.5)	Tensile (Rm)	Y/T	Elongation (A)												
				psi	psi	(Rt0.5/Rm)	%												
				87,100	105,300	0.83	29												
				96,500	110,300	0.87	29												

Additional Details:

- ✓ We hereby certify that this pipe product was manufactured, sampled, tested and inspected by Bri-Steel Manufacturing Inc. in accordance with ASTM/ASME A/SA335-2015, and the purchase order requirements, and that the results meet the corresponding requirements.
- ✓ 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.
- ✓ No weld repairs have been performed on this product.
- ✓ Bri-Steel Manufacturing is registered and certified to ISO-9001:2008, API Q1 and PED 97/23/EC.
- ✓ Heat Treatment was performed after all hot forming operations.

Mill Test Certificate approved by:

Kenton Dechant
 2016 Dec 9

Kenton Dechant, P.Eng.
 Manager of Quality and R&D

* The product analysis instrument was not capable of measuring this element.