



# Mill Test Certificate

**Bri-Steel Manufacturing**  
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Product: **Seamless Alloy Steel Pipe** Product Heat Number: **BSM-2977** 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: **0003079**

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-2977 (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 lb/ft	Geiger μR/hr	Res. Mag. Gauss	Visual Insp.	OD	UT WT	UT ASTM E213	ET ASTM E309	HydroTest 2800 psi/5s	End Condition					
BSM-2977	Heat	NPS 18 X 0.818 in. WT	4	DRL	150.11	<5	<20	Pass	Pass	Pass	Pass N12.5	-	Pass	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	
Blast Furnace; EAF; Ladle	Heat	0.09	0.44	0.011	0.001	0.30	8.48	0.05	0.98	0.17	0.190	0.001	0.079	0.0004	0.043	0.008	0.002	5.4	
Refining: Vacuum Degass; Fully Killed	Product	0.08	0.42	0.01	0.001	0.27	8.45	0.04	0.99	0.15	0.18	0.002	0.080	0.0005	*	*	*	*	
	Product	0.08	0.42	0.01	0.001	0.27	8.50	0.04	0.99	0.15	0.18	0.002	0.081	0.0005	*	*	*	*	
Mechanical Properties																			
Microstructure	Hardness HRBW	Tension Test			Yield (Rt0.5) psi	Tensile (Rm) psi		Y/T (Rt0.5/Rm)	Elongation (A) %										
		Flattening Test	50mm GL	12.7mm Round Bar		12.7mm Round Bar													
Tempered Martensite & Fine Carbides	95	Pass	Pass	Pass	85,900	101,400	103,000	0.85	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.

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

Mill Test Certificate approved by:

*[Signature]*  
 2016 Dec 9  
 Kenton Dechant, P. Eng.  
 Manager of Quality and R&D