BRI-STEEL MANUFACTURING
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2015 May 21

BSM-0516 NPS 24 T40 Pipe Impact Testing at -20°F

Bri-Steel was requested to perform impact testing on a sample of BSM-0516 NPS 24 T40 (0.688 inchWT). Refer to the corresponding mill test report (MTR) for more information. In particular, we were requested to perform the transverse impact test at -20°F in accordance with ASTM A370.

The Charpy V-Notch (CVN) impact test was performed in accordance with ASTM A370 and ASTM E23. The test specimen size was 10x10mm (full size), and three specimens were tested. The recorded test temperature was -20°F (-28.9°C). In accordance with ASTM A370, no temperature deration is required. The samples were taken in the transverse orientation, and were procured from the mid-wall location in the pipe wall thickness.

The results of the impact tests are as follows:

	Impact Energy (J)	Impact Energy (ft-lb)	Percent Shear (%)	Lateral Expansion (mm)
Specimen 1	71.0	52.4	10	1.31
Specimen 2	72.5	53.5	10	1.29
Specimen 3	70.0	51.6	10	0.88
Average	**71.2**	**52.5**	**10**	**1.16**

We trust that you will find this information satisfactory. If you have any questions or concerns, please do not hesitate to contact me at (780) 953-0093 or kdechant@bri-steel.com

Sincerely,

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

APEGA Permit to Practice 10505

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Mill Test Certificate

Product: **Seamless Carbon Steel Pipe** Product Heat Number: **BSM-0516** Product Size: **NPS 24 TRUE40** Production Date: **October 23, 2012**

Production Method: Hot Expansion Product Heat Treatment: As-rolled

Product Standards: ASME B36.10-2004, API 5L-44th Ed. Grade B PSL1, ASTM/ASME A/SA106-2011 Grade B/C NDE, A/SA53-2012 Grade B Type S, NACE MR0175-2009, MR0103-2010

Product Markings: .BRI-STEEL MFG <API> 5L-0898 API 5L GR B PSL1 ASTM/ASME A/SA106 GR B/C A/SA53 GR B NPS 24 TRUE40 HEAT BSM-0516 (PIPE # LENGTH MASS) 171.2lb/ft NDE 1220PSI SMLS NACE MR0175 2012/10 MADE IN CANADA.

Product Details							Non-Destructive Testing								
Heat	Test Type	NPS	Wall Thickness	Pieces	Length	Mass lb/ft	Geiger µR/hr	Res.Mag. Gauss	Visual Insp.	OD	UT WT	UT ASTM E213	ET ASTM E309	HydroTest 1220 psi/5s	End Condition
BSM-0516	Heat	24	TRUE40	2	DRL	171.20	<5	<20	Pass	Pass	Pass	Pass	Pass	Pass	Plain End

Chemical Analysis (wt%)																	
Heat	Steelmaking Method	Analysis	C	Mn	P	S	Si	Cr	Cu	Mo	Ni	V	Ti	Nb	B	CE (IIW)	CE (CSA)
BSM-0516	Blast Furnace; EAF; Ladle Refining; Vacuum Degas; Fully Killed	Heat	0.20	0.92	0.018	0.002	0.30	0.04	0.07	0.01	0.03	0.003	0.002	0.001	0.0001	-	-
		Product	0.19	0.93	0.013	0.007	0.29	0.03	0.08	0.02	0.04	0.003	0.002	0.001	0.0001	0.36	0.37

Mechanical Properties										
Heat	Test Type	Microstructure	Hardness HRBW	Flattening Test	Tension Test 50mm GL	Yield (Rt0.5) psi	Yield (Rp0.2) psi	Tensile (Rm) psi	Y/T (Rt0.5/Rm)	Elongation (A) %
BSM-0516	Heat	Ferrite & Pearlite	78	Pass	Transverse; 38.1mm x WT	48,200	45,700	74,000	0.65	47
					Longitudinal; 38.1mm x WT	50,500	51,000	71,500	0.71	49

Additional Details:

✓ We hereby certify that this pipe product was manufactured, sampled, tested and inspected by Bri-Steel Manufacturing Inc. in accordance with API 5L-44th Ed., ASTM/ASME A/SA106-2011, A/SA53-2012 and the purchase order requirements, and that the results meet the corresponding requirements.

✓ This pipe product meets the sour service requirements of NACE MR0175/ISO 15156-2:2009 Annex A2 for Region 3 Sour Service, and NACE MR0103-2010 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:

2012 Nov 30

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