



BRI-STEEL MANUFACTURING

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2015 May 21

BSM-0639 NPS 24 T40 Pipe Impact Testing at -20°F

Bri-Steel was requested to perform impact testing on a sample of BSM-0639 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.

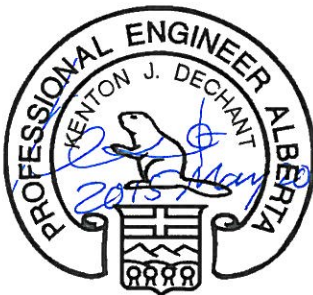
The Charpy V-Notch (CVN) impact test was performed in accordance with ASTM A370 and ASTM E23. The test specimen size was 10x10mm (full size), and three specimens were tested. The recorded test temperature was -20°F (-28.9°C). In accordance with ASTM A370, no temperature deration is required. The samples 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	32.5	24.0	0	0.60
Specimen 2	32.0	23.6	0	0.65
Specimen 3	32.5	24.0	0	0.68
Average	32.3	23.8	0	0.64

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



Mill Test Certificate

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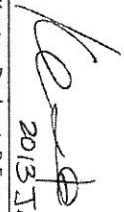
Product: **Seamless Carbon Steel Pipe** Product Heat Number: **BSM-0639** Product Size: **NPS 24 TRUE40** Production Date: **January 7, 2013**
 Production Method: **Hot Expansion** Product Heat Treatment: **As-rolled**
 Product Standards: **ASME B36.10-2004, API SL-44th Ed. Grade B PSL1, ASTM/ASME A/SA106-2011 Grade B/C NDE, A/SAS3-2012 Grade B Type S, NACE MR0175-2009, MR0103-2010**
 Product Markings: **BRI-STEEL MFG <API> SL-0898 API SL GR B PSL1 ASTM/ASME A/SA106 GR B/C A/SAS3 GR B NPS 24 TRUE40 HEAT BSM-0639 (PIPE H LENGTH MASS) 171.2lb/ft NDE 1370 PSI 5ML5 NACE MR0175 2013/01 MADE IN CANADA.**

Product Details				Non-Destructive Testing												
Heat	Test Type	NPS	Wall Thickness	Pieces	Length	DRIL	Mass lb/ft	Gelger	Res. Mag.	Visual Insp.	OD	UT WT	UT ASTM E213	ET ASTM E309	HydroTest	End Condition
BSM-0639	Heat	24	TRUE40	16	171.20	<5	<20	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Plain End

Steelmaking Method		Chemical Analysis (wt%)														
Heat	Blast Furnace: EAF; Ladle Refining;	C	Mn	P	S	Si	Cr	Cu	Mo	NI	V	Ti	Nb	B	CE	CE
	Vacuum Degass; Fully Killed	Heat	0.19	0.87	0.010	0.014	0.23	0.04	0.04	0.01	0.07	-	-	-	0.0002	-
BSM-0639	Product	0.18	0.85	0.008	0.014	0.22	0.04	0.11	0.01	0.06	0.002	0.001	0.001	0.0001	0.34	0.35

Heat		Mechanical Properties										
Heat	Test Type	Microstructure	Hardness	Flattening Test	Tension Test			Yield (Rt0.5)	Yield (Rp0.2)	Tensile (Rm)	Y/T	Elongation (A)
	Heat	Ferrite & Pearlite	HRBW	Pass	50mm GL	Transverse; 38.1mm x WT	Longitudinal; 38.1mm x WT	psi	psi	psi	(Rt0.5/Rm)	%
BSM-0639	Heat		73	Pass			45,600	47,000	71,000	0.68	55	
							45,600	45,900	70,500	0.65	53	

Additional Details:
 ✓ We hereby certify that this pipe product was manufactured, sampled, tested and inspected by Bri-Steel Manufacturing Inc. in accordance with API SL-44th Ed., ASTM/ASME A/SA106-2011, A/SAS3-2012 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:

 2013 Jan 18
 Kenton Dechant, P.Eng.
 Manager of Quality and R&D