Laboratory	**Quality Control Laboratory of Jindal Saw Ltd., Village Nanakapaya, Taluka Mundra, Dist. Kutch, Gujarat**
Accreditation Standard	**ISO/IEC 17025: 2017**
Certificate Number	**TC-5831** **Page 1 of 3**
Validity	**18.02.2019 to 10.02.2020** **Last Amended on --**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection

CHEMICAL TESTING

I.	**METALS & ALLOYS**			
1.	**Carbon Steel (Low Carbon, Medium Carbon & High Carbon Steel)**	Carbon	ASTM E 415 : 2017	0.005% to 0.80%
		Manganese	ASTM E 415 : 2017	0.050% to 2.20%
		Phosphorous	ASTM E 415 : 2017	0.004% to 0.050%
		Sulphur	ASTM E 415 : 2017	0.0005% to 0.035%
		Silicon	ASTM E 415 : 2017	0.01% to 0.60%
		Copper	ASTM E 415 : 2017	0.008% to 0.25%
		Nickel	ASTM E 415 : 2017	0.015% to 0.50%
		Chromium	ASTM E 415 : 2017	0.025% to 1.00%
		Molybdenum	ASTM E 415 : 2017	0.005% to 0.070%
		Aluminium	ASTM E 415 : 2017	0.01% to 0.060%
		Nitrogen	ASTM E 415 : 2017	0.004% to 0.015%
		Niobium	ASTM E 415 : 2017	0.002% to 0.075%
		Titanium	ASTM E 415 : 2017	0.001% to 0.016%
		Vanadium	ASTM E 415 : 2017	0.001% to 0.11%
		Boron	ASTM E 415 : 2017	0.0002% to 0.0035%
		Calcium	ASTM E 415 : 2017	0.0005% to 0.0025%

Laboratory	**Quality Control Laboratory of Jindal Saw Ltd., Village Nanakapaya, Taluka Mundra, Dist. Kutch, Gujarat**
Accreditation Standard	**ISO/IEC 17025: 2017**
Certificate Number	**TC-5831** **Page 2 of 3**
Validity	**18.02.2019 to 10.02.2020** **Last Amended on --**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection

MECHANICAL TESTING

I.	**MECHANICAL PROPERTIES OF METALS**			
1.	**Ferrous materials, alloys & products, Welds & welded test specimens**	Tensile test Yield Strength Ultimate Tensile Strength Elongation	ASTM E 8 : 2016 ASTM A 370 : 2017	4 kN to 2000 kN 1% to 60%
		Elevated Tensile test Yield Strength Ultimate Tensile Strength Elongation	ASTM E 21-2009	4 kN to 2000 kN (-) 23^0C to 620^0C 1% to 60%
		Vickers Hardness - Micro Vickers - Vickers Hardness	ASTM E 384 : 2017	50 to 600 at HV0.1 50 to 550 at HV1
			ASTM E 92 : 2017	50 to 550 at HV5 50 to 550 at HV10 50 to 550 at HV30
		Rockwell Hardness	ISO 6508-1 : 2016	40 HRBW to 100 HRBW 20 HRC to 70 HRC
		Charpy - V Notch - Shear Area	ASTM E 23 :2016 ASTM A 370 :2017	0.30 J to 600 J 60 % to 100 % (-) 70°C to 60°C
				10 J to 320 J 60 % to 100 % (-) 70°C to 60°C
		CTOD test	BS 7448 -1 :1991 ISO 12135 : 2016 ASTM E 1820 - 2017	1 kN to 100 kN (-) 70°C to 60°C
		Bend	ASTM A 370 : 2017	Qualitative (Mandrel Diameter: 20 mm, 25 mm, 30 mm, 40 mm, 45 mm, 50 mm, 51 mm, 55 mm, 60 mm, 70 mm, 75 mm, 80 mm,

Nitan Garg
Convenor

N. Venkateswaran
Program Manager

Laboratory	**Quality Control Laboratory of Jindal Saw Ltd., Village Nanakapaya, Taluka Mundra, Dist. Kutch, Gujarat**	
Accreditation Standard	**ISO/IEC 17025: 2017**	
Certificate Number	**TC-5831**	**Page 3 of 3**
Validity	**18.02.2019 to 10.02.2020**	**Last Amended on --**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
				84 mm, 90 mm, 105 mm, 110 mm, 125 mm, 135 mm, 153 mm, 180 mm, 205 mm, 250 mm, 300 mm)
		Drop Weight Tear - Shear Area	API RP 5L3 : 2014 API 5L - 45th Edition (2013) Cl. 10.2.4.4	Qualitative 60% to 100% 6.5 mm to 50 mm (-) 70°C to 60°C
II.	**METALLOGRAPHY TEST**			
1.	**Ferrous materials, alloys & products, Welds & welded test specimens**	Hydrogen Induced Cracking (HIC)	NACE TM 0284 : 2016 API 5L – 45th Edition (2013) Cl. H.4.3	Qualitative 50X to 200X
		Sulphide Stress Cracking (SSC) - Four Point Bend Method B - Tensile Method A	NACE TM 0177 : 2016 ASTM G 39 : 2016 API 5L – 45th Edition (2013) Cl. H.4.5	Qualitative 1X to 10 X
		Full Ring - CAPCIS Test	OTI 95 635 -1998 BS 8701:2016	Qualitative 406.4 mm to 1524 mm
		Average Grain Size - Comparison method	ASTM E 112:2013	1 to 10 at 100X
		Micro Structure Analysis	ASM Metal Hand Book Vol. IX – Metallography and Microstructures ASTM E 3 : 2011 (2017)	Qualitative (50X, 100X, 200X, 500X, 800X)
		Macro Structure Analysis - Visual Examination	ASTM E 340 : 2015 API 5L – 45th Edition (2013) Cl. 10.2.5	Qualitative (1 X, 10X)

Nitan Garg
Convenor

N. Venkateswaran
Program Manager