

**Laboratory**                      **Engineering Quality Inspection Services, 2/166A, Mettukuppam Main Road, Vanagaram, Chennai, Tamil Nadu**

**Accreditation Standard**    **ISO/IEC 17025: 2005**

**Certificate Number**        **TC-5316 (in lieu of T-3435, T-3436 & T-3516)**    **Page 1 of 7**

**Validity**                        **24.05.2017 to 23.05.2019**                      **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
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**CHEMICAL TESTING**

<b>AT LABORATORY</b>				
<b>I.</b>	<b>METALS AND ALLOYS</b>			
<b>1.</b>	<b>Low Alloy Steel</b>	Aluminium	IS 8811	0.005% to 0.050%
		Carbon	ASTM E415	0.010% to 1.50%
		Chromium		0.050% to 5.00%
		Copper		0.010% to 0.500%
		Manganese		0.100% to 2.00%
		Molybdenum		0.008% to 1.50%
		Nickel		0.050% to 5.00%
		Phosphorus		0.005% to 0.100%
		Silicon		0.050% to 2.00%
		Sulphur		0.005% to 0.200%
		Tin		0.005% to 0.020%
<b>2.</b>	<b>Stainless Steel</b>	Carbon	IS 9879	0.005% to 0.300%
		Chromium	ASTM E1086	5.00% to 30.00%
		Manganese		0.100% to 5.00%
		Molybdenum		0.01% to 3.00%
		Nickel		2.00% to 25.00%
		Phosphorus		0.002% to 0.050%
		Silicon		0.100% to 2.00%
		Sulphur		0.005% to 0.100%
<b>3.</b>	<b>Aluminium and its Alloys</b>	Bismuth	ASTM E 1251	0.001% to 0.100%
		Chromium		0.010% to 0.30%
		Copper		0.020% to 6.00%
		Iron		0.100% to 1.50%
		Lead		0.005% to 0.600%
		Magnesium		0.010% to 5.00%
		Manganese		0.010% to 1.20%
		Nickel		0.010% to 2.00%
	Silicon		0.100% to 15.00%	

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Convenor

**N. Venkateswaran**  
Program Director

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		Tin		0.010% to 0.500%
		Titanium		0.010% to 0.300%
		Vanadium		0.001% to 0.025%
		Zinc		0.100% to 5.00%
		Zirconium		0.001% to 0.16%
4.	Cast Iron	Carbon	ASTM E 1999	1.90% to 4.80%
		Chromium		0.025% to 2.00%
		Copper		0.015% to 0.750%
		Manganese		0.030% to 1.80%
		Molybdenum		0.010% to 1.20%
		Nickel		0.020% to 2.00%
		Tin		0.004% to 0.140%
		Silicon		0.150% to 4.00%
		Sulphur		0.010% to 0.080%
		Phosphorus		0.005% to 0.400%
		Titanium		0.003% to 0.120%
		Vanadium		0.008% to 0.220%
<b>AT SITE</b>				
I.	<b>METALS AND ALLOYS</b>			
1.	Copper & Copper Alloys	Identification of Metals	ASTM E 1916	Qualitative
		Copper		
		Iron		
		Zinc		
		Lead		
		Manganese		
		Nickel		
		Chromium		
2.	Nickel & Nickel Alloys	Identification of Metals	ASTM E 1916	Qualitative
		Nickel		
		Manganese		
		Copper		

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		Chromium		
		Molybdenum		
		Zinc		
		Vanadium		
<b>3.</b>	<b>Titanium &amp; Titanium Alloys</b>	Identification of Metals	ASTM E 1916	Qualitative
		Titanium		
		Nickel		
		Molybdenum		
		Vanadium		
		Manganese		
		Lead		
<b>4.</b>	<b>Iron &amp; Iron Alloys</b>	Identification of Metals	ASTM E 1916	Qualitative
		Iron		
		Chromium		
		Manganese		
		Nickel		
		Molybdenum		
		Niobium		
		Vanadium		
		Copper		

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**MECHANICAL TESTING**

I	<b>MECHANICAL PROPERTIES OF METALS</b>			
1.	<b>Ferrous and Non-ferrous Metals (Steel, Alloy Steel, SS, Cast Iron, SG Iron, Including Weld Metals rods, plates &amp; pipes)</b>	Tensile Test Tensile Strength Yield Strength 0.2% Proof Strength % Elongation % Reduction in Area	IS 1608 IS 7307-1 ASTM A 370 ASTM E8/E8M – 2015a ASME Sec IX AWS D 1.1 BS EN ISO 6892-1 BS EN ISO 15614-1, A2 BS EN ISO 4136	Up to 400 kN  2 % to 90 % 2 % to 80 %
		Bend Test Root Bend Test Face Bend Test Side Bend Test	IS 1599 ASTM A 370 ASME Sec IX AWS D1.1 IS 7307-1 BS EN ISO 7438 BS EN ISO 15614-1, A2 BS EN ISO 5173 , A1	Qualitative (Mandrel diameter 12mm to 100mm)
		Fracture Test of Welded Coupon	ASME Sec IX IS 7307 (Part 1) AWS D1.1 AWS D1.6	Qualitative
		Rockwell Hardness	IS 1586 (Part 1) ASTM E18 ASTM A 370 ISO 6508 (Part 1)	20 HRA to 88 HRA 45 HRB to 100 HRB 20 HRC to 70 HRC
		Flattening Test	IS 2328 ASTM A530	Qualitative
		Flaring (Flange) Test	IS 2330 ASTM A370 ASTM A450 A450M	Qualitative

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Crush Test	ASTM A370	Qualitative
		Brinell Hardness	IS 1500 (Part 1) ASTM E 10 – 2015a ISO 6506 (Part 1)	100 HBW to 600 HBW (187.5 kg to 3000 kg) (2.5 mm, 5.0 mm, 10.0 mm diameter ball)
		Charpy Impact	IS 1757 BS EN ISO 15614-1, A2 BS EN ISO 9016 ISO 148 (Part 1)	Upto 300J (Room Temp & Subzero upto -196°C)

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**NON DESTRUCTIVE TESTING**

**AT LABORATORY & AT SITE**

<b>I. RADIOGRAPHY TESTING</b>				
1.	<b>Weld Joints, Castings</b>	Radiographic Testing	ASME Sec-V Article 2,22 ASTM E-94-04 ASME B 31.1 ASME B 31.3 AWS D1.1/D1.1 M ASTM E 1030 ASTM E 1032 ASME B 16.34 BS EN ISO 17636-1 BS EN 12681	Qualitative (X ray: 02mm to 25mm Gamma ray-Iridium 192 05mm to 70mm Equivalent Steel max 2% sensitivity)
<b>II. ULTRASONIC TESTING</b>				
1.	<b>Weld Joints</b>	Ultrasonic Testing	ASME Sec-V Article 4,5 ASTM B 548-03 ASME B 31.1 ASME B 31.3 ASTM E 273 AWS D1.1/D1.1 M BS EN ISO 17640	Qualitative (3mm to 100mm)
2.	<b>Casting</b>	Ultrasonic Testing	ASME Sec-V Article 5,23 ASTM A 609/A 609M ASME B 16.34 BS EN 12680-1 BS EN 12680-2 BS EN 12680-3	Qualitative (15mm to 200mm)
3.	<b>Plates, Rods, Shafts</b>	Ultrasonic Testing	ASME Sec-V Article 5,23 ASTM A435/A435M90 ASTM A577/A577M90 ASTM A578/A578M07	Qualitative (8mm to 1000mm)

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4.	Forging	Ultrasonic Testing	ASME Sec-V Article 5,23 ASTM A 388/A 388M ASTM A 745/A 745M	Qualitative (10mm to 100mm)
5.	Sheets, Castings & Forgings	Ultrasonic Thickness Measurements	ASTM E – 797/797M	2 mm to 200 mm (Flat Surface)
III.	<b>MAGNETIC PARTICLE TESTING</b>			
1.	Weld Joints	Magnetic Particle	ASME Sec-V Article 7,25 ASTM E-709 AWS D1.1/D1.1M IS 5334 BS EN ISO 17638	Qualitative (Surface defect & Sub-surface defect up to 5mm Depth)
2.	Casting	Magnetic Particle	ASME Sec-V Article 7,25 ASME B 16.34 ASTM E 709 ASTM A 609/609M IS 10724	Qualitative (Surface defect & Sub-surface defect up to 5mm Depth)
3.	Forging	Magnetic Particle	ASME Sec-V Article 7,25 ASTM E 709 IS 7743	Qualitative (Surface defect & Sub-surface defect up to 5mm Depth)
IV.	<b>PENETRANT TESTING</b>			
1.	Weld Joints	Liquid Penetrant	ASME Sec-V Article 6,24 ASTM E 165/165M AWS D1.1/D1.1M BS EN ISO 3452-1	Qualitative (Defects open to the surface)
2.	Casting	Liquid Penetrant	ASME Sec-V Article 6,24 ASTM E 165/165M ASTM E 1219 AWS D1.1/D1.1M BS EN ISO 3452-1	Qualitative (Defects open to the surface)
3.	Forging	Liquid Penetrant	ASME Sec-V Article 6,24 ASME B 16.34 BS EN ISO 3452-1	Qualitative (Defects open to the surface)

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