

Laboratory Delta Inspection and Research Centre, No. 108, Shanthi Nagar,
Perumbakkam, Chennai, Tamil Nadu

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-7451

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Validity 22.06.2018 to 21.06.2020

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
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CHEMICAL TESTING

I.	METALS & ALLOYS			
1.	Carbon Steel and Alloy Steels	Carbon	ASTM E 415	0.01 % to 1.50 %
		Manganese	IS 8811	0.10 % to 2.00 %
		Silicon	(OES method)	0.004 % to 2.00 %
		Sulphur		0.005 % to 0.35 %
		Phosphorus		0.005 % to 0.10 %
		Chromium		0.010 % to 2.50 %
		Nickel		0.009 % to 2.50 %
		Molybdenum		0.010 % to 1.00 %
		Aluminium		0.005 % to 1.50 %
		Tin		0.003 % to 0.130 %
		Copper		0.010 % to 0.50 %
		Cobalt		0.002 % to 0.50 %
		Titanium		0.002 % to 0.30 %
		Niobium		0.002 % to 0.35 %
		Vanadium		0.002 % to 0.50 %
	Tungsten		0.002 % to 0.50 %	
	Nitrogen		0.002 % to 0.050 %	
2.	Stainless Steel	Carbon	ASTM E 1086	0.007 % to 1.00 %
		Manganese	IS 9879	0.10 % to 10.00 %
		Silicon	(OES Method)	0.10 % to 1.00 %
		Sulphur		0.001 % to 0.30 %
		Phosphorus		0.001 % to 0.050 %
		Chromium		10.00 % to 27.00 %
		Nickel		0.10 % to 22.00 %
		Molybdenum		0.10 % to 3.00 %
		Copper		0.020 % to 2.50 %
		Titanium		0.010 % to 0.30 %
	Niobium		0.010 % to 0.25 %	
	Nitrogen		0.010 % to 0.50 %	

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3.	Nickel & Nickel Alloys	Carbon	DIRC/VAL-Ni/5.4-01 (OES Method) Issue No.: 01 Issued on: 13-Sep-2017 ASTM E 3047	0.010 % to 0.10 %
		Manganese		0.010 % to 0.50 %
		Silicon		0.010 % to 0.50 %
		Phosphorus		0.005 % to 0.030 %
		Chromium		12.00 % to 24.00 %
		Molybdenum		2.00 % to 10.00 %
		Aluminium		0.10 % to 0.80 %
		Boron		0.002 % to 0.005 %
		Copper		0.020 % to 2.50 %
		Cobalt		0.010 % to 0.30 %
		Titanium		0.15 % to 1.00 %
		Niobium		0.010 % to 4.50 %
		Vanadium		0.010 % to 0.25 %
		Tungsten		0.010 % to 0.10 % 3.00 % to 3.80 %
Iron	1.50 % to 32.00 %			
Nitrogen	0.005 % to 0.010 %			
4.	Aluminium Alloys	Copper	ASTM E 1251 IS 11035 (OES Method)	0.010 % to 6.00 %
		Silicon		0.10 % to 13.00 %
		Magnesium		0.010 % to 3.50 %
		Zinc		0.02 % to 3.50 %
		Nickel		0.01 % to 2.00 %
		Manganese		0.01 % to 1.00 %
		Tin		0.006 % to 0.30 %
		Iron		0.010 % to 1.50 %
		Chromium		0.005 % to 0.50 %
		Lead		0.005 % to 0.35 %
		Titanium		0.005 % to 0.035 %
		Vanadium		0.005 % to 0.050 %
5.	Copper and Copper Alloys	Iron	EN 15079 (OES Method)	0.010 % to 0.60 %
		Silicon		0.005 % to 0.10 %
		Manganese		0.005 % to 0.30 %

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		Phosphorus		0.010 % to 0.10 %
		Nickel		0.010 % to 1.20 %
		Tin		0.20 % to 7.50 %
		Aluminum		0.010 % to 5.00 %
		Zinc		2.00 % to 4.50 % 30.00 % to 42.00 %
		Lead		0.010 % to 7.00 %
6.	Zinc and Zinc Base Alloys	Aluminium	DIRC/VAL-Zn/5.4-01 (OES Method) Issue No.: 01, Issued on: 13-Sep-2017	0.005 % to 4.5 %
		Copper		0.001 % to 4.0 %
		Iron		0.001 % to 0.1 %
		Cadmium		0.001 % to 0.1 %
		Lead		0.001 % to 1.6 %
		Magnesium		0.001 % to 0.1 %
		Nickel		0.001 % to 0.1 %
		Tin		0.001% to 0.1 %
		Inidium		0.0005 % to 0.1%

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MECHANICAL TESTING

I.	MECHNAICAL PROPERTIES OF METALS			
1.	Ferrous and Non-Ferrous Materials (Plain Carbon Steel, Low Alloy Steel, Stainless Steel, Tool Steel, Reinforcing Steel, Cast Iron, Copper Base Alloys, Titanium Base Alloys, Nickel Base Alloys, Aluminum Base Alloys)	Tensile Strength Yield Strength 0.2 % Proof Stress Elongation Reduction in Area	IS 1608, ISO 6892-1 ASTM A 370 ASTM E 8, ASTM E 8 M ASTM B557, ASTM B557M	4 kN to 400 kN 4 kN to 400 kN 4 kN to 400 kN 5 % to 80 % 5 % to 80 %
		Bend	IS 1599 ASTM A 370	Qualitative (Mandrel Diameter 12 mm, 24 mm, 30 mm, 32 mm, 36 mm, 40 mm, 48 mm, 50 mm, 56 mm, 60 mm, 64 mm, 70 mm, 72 mm, 80 mm, 84 mm, 96 mm, 108mm, 112 mm, 120 mm, 125mm, 128 mm, 140 mm, 144mm, 150 mm, 160 mm, 175mm, 180 mm, 192 mm, 224 mm and 225 mm)
		Rockwell Hardness (HRB and HRC)	IS 1586 (Part 1)	45 HRBW to 100 HRBW 20 HRC to 70 HRC
		Micro Vickers HV _{0.5}	IS 1501 (Part 1) ASTM E 384 ISO 6507-1	100 HV _{0.5} to 1000 HV _{0.5}
2.	TMT Bars (Diameter 8 mm to 32 mm)	Tensile Strength Yield Strength 0.2% Proof stress Elongation Weight / meter	IS 1608 IS 1786	4 kN to 400 kN 4 kN to 400 kN 5 % to 80 % 0.1 kg/m to 12.00 kg/m
		Bend	IS 1786	Qualitative Mandrel Diameter 24 mm,

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				30 mm, 32 mm, 36 mm, 40 mm, 48 mm, 50 mm, 60 mm, 64 mm, 80 mm, 100mm, 125 mm, 128 mm, 150mm, 160mm & 192mm
		Re-bend	IS 1786	Qualitative (Mandrel Diameter 32 mm, 40 mm, 48 mm, 50 mm, 56 mm, 60 mm, 70 mm, 72 mm, 84 mm, 96 mm, 108 mm, 112 mm, 120mm, 140 mm, 144 mm, 150mm, 175 mm, 180 mm, 192 mm, 224 mm, 225 mm and 288 mm)
3.	Welded Material (Ferrous and Non-Ferrous)	Tensile Strength	ASME (Section IX)	4 kN to 400 kN
		Bend (Face Bend, Root Bend and Side Bend)	ASME (Section IX)	Qualitative (Mandrel Diameter 12 mm, 24 mm, 30 mm, 32 mm, 36 mm, 40 mm, 48 mm, 50 mm, 56 mm, 60 mm, 64 mm, 70 mm, 72 mm, 80 mm, 84 mm, 96 mm, 108mm, 112 mm, 120 mm, 125mm, 128 mm, 140 mm, 144mm, 150 mm, 160 mm, 175mm, 180 mm, 192 mm, 224 mm and 225 mm)
		Fracture Test	ASME (Section IX)	Qualitative
4.	Ferrous and Non-Ferrous (Tubes and Pipes)	Flattening Test (Tubes and pipes)	IS 2328/ASTM A 370 ASTM A 530 / A530M ISO 8492	Qualitative
		Drift Expansion (Tubes & Pipes)	IS 2335	Qualitative

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		Crushing	ASTM A 370, IS 3601	Qualitative
II.	METALLOGRAPHY TEST			
1.	Metals and Alloys	Micro Structural Characterization	ASTM E3, ASTM E407-07 ASM Metals Hand Book (Volume 9)	Qualitative (Magnification: 50X, 100X, 200X, 500X and 1000X)
		Inclusion Rating	IS 4163, ASTM E 45 BS EN 10247	Qualitative (Magnification: 100X)
		Grain Size by Comparison Method	ASTM E 112 IS 4748 EN ISO 643	Qualitative (Magnification: 100X) Grain Size: 1 to 10
2.	Grey Cast Iron & SG Iron Products	Decarburization Depth Micro Examination Graphite Flakes, Nodules Type & Size, Distribution and Matrix Analysis	ASTM E 1077, IS 6396 IS 7754 ASTM A 247 ISO 945-1, ISO 1083 ASM Metals Hand Book (Volume 9)	10 µm to 300 µm Qualitative (Magnification: 50X, 100X, 200X, 500X and 1000X)
3.	Case Hardened Steels and Nitrided Steels	Case Depth	ISO 18203 IS 6416 IS 13691	0.05 mm to 3 mm
4.	Metallic and Oxide Coating on Metals	Metal and Oxide Coating Thickness of Electroplated coating	ASTM B 487 ISO 1463, IS 3203 (by Microscopic Method)	0.01 to 0.3 mm
5.	Ferrous and Non-Ferrous Billets, Bloom, Hot Rolled Product, Forging, Sheets, Plates, Extrusion, Casting Machined and Ground Parts, Weldments	Macro Examination/ Visual Examination	ASTM E340 ASTM E381 IS 11371 ASM Metals Hand Book (Volume 9) ASME (Sec IX) ISO 17639 IS 7307 (Part 1)	Qualitative (Magnification: 10X)