

Laboratory **Commando Lab, No. 3A, 5th South Street, Avarampalayam, Coimbatore, Tamil Nadu**

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

Certificate Number **TC-5123 (in lieu of T-3276)**

Page 1 of 7

Validity **03.02.2017 to 02.02.2019**

Last Amended on **06.10.2017**

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.	Ferrous Materials			
a.	Low Alloy Steel	Carbon Silicon Manganese Sulphur Phosphorus Chromium Nickel Molybdenum Aluminium Vanadium Copper Boron Titanium Niobium Cobalt	ASTM E 415: 2017 IS 8811: 1998	0.10% to 1.20% 0.20% to 1.00% 0.40% to 8.50 % 0.005% to 0.055% 0.020% to 0.080% 0.10% to 4.20% 0.07% to 4.20% 0.05% to 0.90% 0.01% to 0.20% 0.10% to 0.30% 0.10% to 0.50% 0.004% to 0.010% 0.002% to 0.05% 0.01% to 0.06% 0.01% to 0.05%
b.	Stainless Steel	Carbon Silicon Manganese Sulphur Phosphorus Chromium Nickel Molybdenum Copper Niobium Titanium Nitrogen Vanadium	ASTM E 1086: 2014 IS 9879: 1998	0.020% to 0.10 % 0.30% to 0.70% 0.60% to 1.50 % 0.005% to 0.040% 0.010% to 0.050% 15.00% to 28.00% 4.00% to 20.00% 0.30% to 2.80% 0.10% to 3.30% 0.01% to 0.70% 0.01% to 0.50% 0.02% to 0.07% 0.03% to 0.06%

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Page 2 of 7

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c.	Cast Iron	Carbon	ASTM E 1999: 2011	2.30% to 4.00
		Silicon		1.50% to 2.60%
		Manganese		0.10% to 1.20%
		Sulphur		0.01% to 0.15%
		Phosphorus		0.01% to 0.08%
		Chromium		0.02% to 0.90%
		Nickel		0.01% to 1.80%
		Molybdenum		0.05% to 0.50%
		Titanium		0.01% to 0.15%
		Magnesium		0.002% to 0.20%
2.	Non Ferrous Materials			
a.	Aluminium & its Alloys	Silicon	ASTM E 1251: 2011	5.00% to 13.00%
		Copper	IS 7658: 1975	0.40% to 3.00%
		Iron	(RA 2005)	0.30% to 1.00 %
		Manganese	IS 11035:1984	0.05% to 0.60%
		Magnesium	(RA 2000)	0.30% to 0.50%
		Zink		0.10% to 0.80%
		Titanium		0.01% to 0.06%
		Niobium		0.01% to 0.50%
		Lead		0.01% to 0.10%
		Tin		0.01% to 0.18%
b.	Copper & its Alloys	Chromium	BS EN 15079: 2015	0.01% to 0.40%
		Tin		0.027% to 13.00%
		Lead		0.010% to 3.00%
		Zinc		0.20% to 40.00%
		Iron		0.004% to 0.030%
		Phosphorous		0.003% to 0.070%
		Nickel		0.01% to 0.02%
		Aluminium		0.002% to 11.00%
		Antimony		0.010% to 0.03%
		Manganese		0.010% to 0.20%
Silicon	0.010% to 0.05%			
Sulphur	0.010% to 0.02%			

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Page 3 of 7

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MECHANICAL TESTING

I. MECHANICAL PROPERTIES OF METALS				
1.	Ferrous & Non Ferrous alloys Products Steel Stainless Steel Cast Iron SG Iron	Tensile Test at Elevated temperature (50°C to 950°C)	ISO 6892-2: 2011 ASTM E 21: 2009	
		Yield Stress		80N to 380 kN
		Tensile Stress		80N to 380 kN
		% Elongation		5% to 80 %
		% Reduction Area		2 % to 90 %
2.	Ferrous & Non Ferrous alloys Products Steel, Stainless Steel, Cast Iron, SG Iron, Copper, Aluminium	Proof Stress	IS 1608: 2005 (RA 2011) ASTM A 370: 2016 ASTM E8/E8M : 2016 ISO 6892 - 1: 2016 IBR 1950	10N to 380 kN
		Yield Stress		10N to 380 kN
		Tensile Stress		10N to 380 kN
		% Elongation		5% to 80 %
		% Reduction Area		2 % to 90 %
3.	Ferrous & Non Ferrous alloys Products Steel, Stainless Steel, Copper, Aluminium Welded Metal and Alloys	Tensile Stress	IS 2825: 1969 (RA 2012) ASME SEC IX: 2015 BS EN ISO 15614-1:2004 IS 7307-1:1974 (RA 2003) IBR 1950	80N to 380 kN
4.	Ferrous & Non Ferrous Alloys Products Steel, Stainless Steel	All Weld Tensile Test	IS 7307-1:1974 (RA 2003) IBR 1950	
		Proof Stress		10N to 380 kN
		Yield Stress		10N to 380 kN
		Tensile Stress		10N to 380 kN
		% Elongation		5% to 80 %
	% Reduction Area	2 % to 90 %		

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Page 4 of 7

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Last Amended on 06.10.2017

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5.	Ferrous & Non Ferrous Alloys Products Steel, Stainless Steel, Copper, Aluminium Weld Specimen	Fillet-Weld	ASME SEC IX – 2015 IS 7307-1:1974 (RA 2008) BS EN ISO 15614-1:2004 IBR 1950	Qualitative (Applied load up to 380kN)
6.	Ferrous & Non Ferrous Steel, Stainless Steel, Copper Aluminium Welded Metal and Alloys	Transverse Root and Face Bend	IS : 3600 (Pt. 5): 1983 (RA 2010) ASME SEC IX: 2015 BS EN ISO 15614-1:2004 IBR- 1950	Qualitative Mandrel Dia: (12, 16, 20, 24, 32, 40, 48, & 64) mm 90 ⁰ , 180 ⁰ bend Applied load up to 380kN)
		Transverse Side Bend	ASME SEC IX - 2015 IS : 3600 (Pt. 6): 1983 (RA 2008) IS 7307-1:1974(RA 2003) IS 2825: 1969 (RA 2012) BS EN ISO 15614-1:2004	Qualitative Mandrel Dia: (12, 16, 20, 24, 32, 40, 48, & 64) mm 90 ⁰ , 180 ⁰ bend Applied load up to 380kN)
7.	Ferrous & Non Ferrous Steel, Stainless Steel, Copper Aluminium	Longitudinal Root and Face Bend	IS : 3600 (Pt. 7) : 1985 (RA 2008) ASTM A 370 : 2016 BS EN ISO 15614-1:2004 ASME SEC IX: 2015 IBR 1950	Qualitative Mandrel dia: (12, 16, 20, 24, 32, 40, 48, & 64) mm 90 ⁰ , 180 ⁰ bend Applied load up to 380kN)
8.	Ferrous & Non Ferrous Alloys Products Steel, Stainless Steel, Copper, Aluminium Welded Metal and Alloys	Fracture	ASME SEC IX: 2015 BS EN ISO 15614-1:2004 IS 7307-1: 1974 (RA 2008)	Qualitative (Applied load up to 380kN)

Mallika Gope
Convenor

N. Venkateswaran
Program Director

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Page 5 of 7

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9.	Ferrous & Non Ferrous Alloys Products Steel, Stainless Steel, Copper, Aluminium	Shear	IS 5242 : 1979 (RA 2010)	80N to 380kN (Bush Dia: 5, 8, 12, 16, 20 mm)
10.	Helical Spring	Static Load on Helical Compression Springs (Characteristic Curve) Compression load up to 380kN Deflection: 250mm	IS : 7906 (Pt. 2) : 1975 (RA 2009) CI : 7	10N to 380 kN
11.	Ferrous & Non Ferrous Steel, Stainless Steel, Copper Tube and Pipe	Flattening Test	ASTM A 370 : 2016 IS 2328-2005 (RA 2011)	Qualitative (Pipe OD : 10mm to 80.0 mm Pipe Thickness : 2mm to 10 mm Applied load up to 380kN)
12.	Ferrous & Non Ferrous Alloys Products Steel, Stainless Steel, Copper, Aluminium	Rockwell Hardness	IS 1586 (Pt-1) : 2012 ASTM E18 : 2016 ASTM A 370 : 2016	20 HRA to 90 HRA 30 HRBW to 100 HRBW 20 HRC to 70 HRC
13.	Ferrous & Non Ferrous Steel Stainless Steel Copper Aluminium	Vickers Hardness	IS 1501(Pt-1) : 2013 ASTM E 384: 2016	100 HV10 to 500 HV10

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Page 6 of 7

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14.	Ferrous & Non Ferrous Alloys Products Steel, Stainless Steel, Copper, Aluminium	Brinell Hardness	ASTM E 10: 2015 IS 1500(Pt-1): 2013	100 HBW to 450 HBW (5mm/750kgf) 100 HBW to 450 HBW (10mm/3000kgf)
15.	Ferrous & Non Ferrous Steel Stainless Steel Copper Aluminium	Charpy Impact (25°C to (-)196 °C)	IS 1757: 2014 IS 1499: 1977 (RA 2015) BS EN ISO 15614-1:2004 ISO 148-1:2009 ASME SEC IX : 2015	2J to 280 J
			ASTM A 370: 2016 ASME SEC IX : 2015 ASTM E23: 2016	1J to 280 J
II.	METALLOGRAPHY TEST			
1.	Ferrous & Non Ferrous Steel Stainless Steel Copper Aluminium	Macro Examination	ASTM E340: 2015 ASTM E 381: 01 (2012) ASME SEC IX: 2015 IS 7739 : 1975 (RA 2010) IS 13015: 1991 (RA 2012) IS 11371: 1985 (RA 2007) IS 12573: 1988 (RA 2010) IS 3600 (Part 9): 1985 (RA 2008)	Qualitative (Magnification 5 x to 55x)
		Microstructural Analysis	IS 7739: 1975 (RA 2010) IS 7754 : 1975 (RA 2012) IS 11959: 1987 (RA 2009) IS 3600 (Part 9): 1985 (RA 2008) ASM Metals Hand Book Vol-9 ASTM E3: 11	Qualitative, (Magnification 40x, 100x, 200x, 400x, 1000 x)

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Page 7 of 7

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2.	Steel	Apparent Grain Size Comparison Method	IS 4748: 2009 ASTM E112-13	Qualitative (ASTM No 1 to 10 100X)
		Non Metallic Inclusion by method A	ASTM E45:2013 IS 4163: 2004	Qualitative (Thin, Heavy (or) Thick Type A, B, C, D) Sensitivity Range 0.5 to 5
3.	Ferrous Materials, Stainless Steel	Depth of Decarburization (by microscopic method)	ASTM E 1077: 2014, IS 6396-2000 (RA 2012)	0.001mm to 1 mm
4.	Grey Cast Iron and S.G. Iron	Micro Examination Graphite Flakes / Nodules type and size, distribution Characteristics	IS 7754-1975 (Ra 2012) ASM Metals Hand Book Vol-9 2000 ASTM A247: 2016 ISO 945-1:2008 ISO 1083-2004	Qualitative (Magnification 50x, 100x, 200x, 250x, 400x)
5.	Stainless Steel	Volume Fraction of Phase	ASTM E 562: 2011	5 % to 95 %
6.	Austenitic Stainless Steel Wrought/Cast Products	Intergranular - corrosion	ASTM A 262 : 2015	
			Practice E	Qualitative (1t/180°, 20X)
			Practice F	Qualitative (1t/180°, 20X)