Laboratory	**Chemical & Metallurgical Services, T.S. No. 63, Sidco Indl. Estate, Ekkaduthangal, Chennai, Tamil Nadu**	
Accreditation Standard	**ISO/IEC 17025: 2005**	
Certificate Number	**TC-5039**	**Page 1 of 10**
Validity	**13.12.2018 to 12.12.2020**	**Last Amended on 12.04.2019**

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

A.	**CHEMICAL TESTING (BY OES METHOD)**			
I.	**METALS & ALLOYS**			
1.	**Carbon Steel**	C	IS 8811:1998 (RA 2018)	0.005 % to 2.00 %
		Si	ASTM E 415-2017	0.005 % to 3.50 %
		Mn		0.005 % to 3.00 %
		P		0.001 % to 0.90 %
		S		0.001 % to 0.60 %
		Cu		0.005 % to 2.00 %
		Pb		0.005 % to 2.50 %
2.	**Alloy Steel**	C	IS 8811:1998 (RA 2018)	0.005 % to 1.00 %
		Si	ASTM E 415-2017	0.005 % to 3.50%
		Mn		0.005 % to 1.00 %
		P		0.001 % to 0.09 %
		S		0.001 % to 0.06 %
		Cr		0.005 % to 4.00 %
		Ni		0.005 % to 5.00 %
		Mo		0.005 % to 1.00 %
		Cu		0.005 % to 1.00 %
		Al		0.005 % to 0.20 %
		V		0.005 % to 0.50 %
		N		0.005 % to 0.02 %
		As		0.005 % to 0.02 %
3.	**Stainless Steel**	C	IS 9879:1998 (RA 2015)	0.005 % to 0.2 %
		Si	ASTM E 1086-2014	0.005 % to 1.0 %
		Mn		0.005 % to 2.00 %
		P		0.001 % to 0.10 %
		S		0.001 % to 0.10 %
		Cr		5.00 % to 26.00 %

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		Ni		5.00 % to 22.00 %
		Mo		0.005 % to 4.00 %
		Cu		0.005 % to 2.00 %
		Al		0.005 % to 0.20 %
		V		0.005 % to 0.40 %
		Nb		0.006 % to 0.30 %
4.	**Tool Steel**	C	IS 8811:1989 (RA 2018)	0.005 % to 1.00 %
		Si	ASTM E 352-2013	0.005 % to 0.50 %
		Mn		0.005 % to 0.50 %
		P		0.001 % to 0.05 %
		S		0.001 % to 0.05 %
		Cr		0.005 % to 5.00 %
		Mo		0.005 % to 6.00 %
		V		0.005 % to 2.00 %
		Co		0.005 % to 5.00 %
		W		0.005 % to 18.00 %
5.	**Cast Iron**	C	IS 15338:2003 (RA 2018)	0.005 % to 3.50 %
		Si	ASTM E1999-2018	0.005 % to 3.00 %
		Mn		0.005 % to 0.70 %
		P		0.001 % to 0.10 %
		S		0.001 % to 0.05 %
		Cr		0.005 % to 0.05 %
		Ni		0.005 % to 0.50 %
		Mo		0.005 % to 0.20 %
		Cu		0.005 % to 0.40 %
		Pb		0.005 % to 0.05 %
		Ti		0.002 % to 0.05%
6.	**Aluminium & its Alloys**	Cu	ASTM E 1251-2017	0.010 % to 5.0 %
		Si		0.015 % to 0.3 %
		Mg		0.015 % to 3.0 %
		Zn		0.015 % to 6.0 %
		Ni		0.010 % to 1.00 %

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		Mn		0.015 % to 1.00 %
		Fe		0.010 % to 0.50 %
		Ti		0.005 % to 0.10 %
		Cr		0.008 % to 0.20 %
		Zr		0.0015 % to 0.050 %
		Be		0.0001 % to 0.050 %
7.	**Copper & its Alloys**	Sn	BS EN 15079-2015	0.05 % to 12.00 %
		Pb		0.05 % to 9.00 %
		Zn		0.05 % to 40.00 %
		Si		0.04 % to 0.20 %
		Al		0.020 % to 7.50 %
		Ni		0.005 % to 4.00 %
		Mn		0.020 % to 1.00 %
		S		0.008 % to 0.07 %
		Fe		0.020 % to 2.00 %
		P		0.005 % to 1.00 %
		Sb		0.020 % to 0.20 %
		As		0.010 % to 0.30 %
8.	**Nickel & its Alloys**	C	CMS/SOP/OES/NI-2016	0.008 % to 0.15 %
		Mn	Issue No. 03	0.020 % to 1.50 %
		Si	Issue Date-14/11/2016	0.010 % to 0.05 %
		Fe		0.050 % to 2.00 %
		Cu		0.020 % to 35.00 %
		Al		0.010% to 0.05 %
		Co		0.030% to 0.05 %
B.	**CHEMICAL TESTING (BY WET METHOD)**			
I.	**METALS & ALLOYS**			
A.	**Fe Base Alloys**			
1.	**Carbon Steel**	C	IS 228 (Part 1): 1987 (RA 2007)	0.005 % to 0.50 %

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		Si	IS 228 (Part 8): 1989	0.010 % to 3.00 %
		Mn	IS 228 (Part 2): 1987	0.010 % to 3.00 %
		P	IS 228 (Part 3): 1987	0.005 % to 0.090 %
		S	ASTM E 350/2001 & IS 228 (Part 9): 1989 (RA 2004)	0.005 % to 0.090 %
2.	**Alloy Steel/SS**	C	IS 228 (Part 1): 1987 (RA 2007)	0.010 % to 2.70 %
		Si	IS 228 (Part 8): 1989	0.010 % to 2.50 %
		Mn	IS 228 (Part 2): 1987	0.010 % to 2.00 %
		P	IS 228 (Part 3): 1987	0.005 % to 0.50 %
		S	ASTM E 350/2001 & IS 228 (Part 9): 1989 (RA 2004)	0.005 % to 0.50 %
		Cr	IS 228 (Part 6): 1987 (RA 2002)	0.10 % to 20.00 %
		Ni	IS 228 (Part 5): 1987 (RA 2002)	0.10 % to 10.00 %
		Mo	IS 228 (Part 7): 1990 RA2001	0.10 % to 3.00 %
3.	**Cast Iron**	C	IS 12308 (Part 11): 1991	1.00 % to 3.50 %
		Si	IS 12308(Part 6): 1991	0.010 % to 3.80 %
		Mn	IS 12308 (Part 10): 1991	0.010 % to 2.50 %
		P	IS 12308(Part 5): 1991	0.015 % to 0.50 %
		S	IS 12308 (Part 2): 1987	0.015 % to 0.50 %
		Cr	IS 12308 (Part 8): 1991	0.010 % to 4.00%
		Ni	IS 12308(Part 7): 1991	0.010 % to 4.50%
4.	**Copper & its Alloys**	Cu	IS 4027 (Part 1): 1987 (RA 2006) IS 3685:1966	0.010 % to 99.90 %
		Pb	IS 4027 (Part 1): 1987 (RA 2006) IS 3685:1966	0.010 % to 10.00 %

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Sn	IS 4027 (Part 5): 1987 (RA 2006) IS 3685:1966	0.010 % to 10.00 %
		Zn	IS 4027 (Part 6): 1987 (RA 2006) IS 3685:1966	0.010 % to 50.00 %
		Fe	IS 4027 (Part 8): 1991 (RA 2003) IS 3685:1966	0.010 % to 1.00 %
		Al	IS 3685:1966 ASTM E54/2001	0.010 % to 15.00 %
		Mn	IS 4027 (Part 2): 1987 (RA 2006) IS 3685:1966	0.010 % to 6.00 %
		P	IS 4027 (Part 3): 1987 (RA 2006)	0.005 % to 1.00 %
		Ni	IS 4027 (Part 1): 1987 (RA 2006) IS 3685:1966	0.010 % to 2.00 %
5.	**Aluminium Base Alloy**	Si	IS 504 (Part 1): 2002	0.010 % to 20.00 %
		Cu	IS 504 (Part 3): 2002 & ASTM E34/2001	0.010 % to 6.00 %
		Mn	IS 504 (Part 5): 2002	0.010 % to 1.00 %
		Mg	IS 504 (Part 6): 2002 & ASTM E34/2001	0.010 % to 6.00 %
		Fe	IS 504 (Part 2): 2002	0.010 % to 1.00 %
		Ni	IS 504 (Part 7): 2002	0.010 % to 1.00 %
		Zn	IS 504 (Part 4): 2002	0.010 % to 0.50 %
II.	**PAINT & SURFACE COATING**			
1.	**Paint & Enamel**	Consistency	IS 101 (Part 1/Sec. 5): 1989 (RA 2004)	Qualitative
		Viscosity (Flow cup)	IS 3944:1982	0 to 500 s

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Mass per ten liters	IS 101 (Part 1/Sec. 7): 1987 (RA 2004)	8.00 kg/10L to 25.0 kg/10L
		Drying time		
		(a)Surface dry	IS 101 (Part 3/Sec. 1): 1986 (RA 2017)	Upto 24 hours
		(b)Hard dry	IS 101 (Part 3/Sec. 1): 1986 (RA 2017)	Upto 50 hours
		(c)Tack free dry	IS 101 (Part 3/Sec. 1): 1986 (RA 2017)	---
		Finish	IS 101 (Part 3/Sec. 4): 1987 (RA 2004)	Qualitative
		Gloss at 60˚	IS 101 (Part 4/Sec. 4): 1988 (RA 2001)	10 to 100
		Fineness of Grind	IS 101 (Part 3/Sec. 5): 1987 (RA 2004)	0 to 100 microns
		Colour	IS 5-2007 IS 101 (Part 4/Sec. 2)	Qualitative
		Scratch hardness	IS 101 (Part 5/Sec. 2): 1988 (RA 1999)	Pass/Fail
		Flexibility & adhesion	IS 101 (Part 5/Sec. 2): 1988 (RA 1999)	Pass/Fail
		Flash point	IS 101 (Part 1/Sec. 6): 1987 (RA 2004)	Ambient to 60 °C
		Volume solids	IS 101 (Part 8/Sec. 6): 1993 (RA 2004)	10 % to 75 %
		Accelerated storage stability at 60˚ C, 96 hours	IS 2923:2003 Annex F	Pass/Fail
		Coating Thickness	ASTM D 7091-2013	1 microns to 500 microns
		Dry film thickness	IS 101 (Part 3/Sec. 2): 1989 (RA 2004)	5 µm to 2000 µm
		Volatile matter	IS 101 (Part 2/Sec. 2)	1 % to 80 %

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Neutral salt spray test	IS 101 (Part 6/Sec. 1): 1988 (RA 2010)	Qualitative
		Resistance to water	IS 101 (Part 7/Sec. 1): 1988 (RA 2009)	Qualitative
		Resistance to heat	IS 101 (Part 7/Sec. 3): 1990 (RA 2015)	Qualitative
		Resistance to Acid	IS 9862:1981 (RA 2009)	Qualitative
		Resistance to Alkali	IS 9862:1981 (RA 2009)	Qualitative

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MECHANICAL TESTING

I.	**MECHANICAL PROPERTIES OF METALS**			
1.	**Ferrous &Non Ferrous Metals/Alloys/ Alloys of tube / Bar/ Flat / Plate/Angle**	0.2 % Proof stress Yield Strength Tensile Strength %Elongation %Reduction Area	IS 1608 (Part 1): 2018 ASTM A370-2017a ASTM E8/E8M -2016a IS 1786:2008 (RA 2013) BS EN 10025 (Part 1): 2004	100 MPa to 1200 MPa 100 MPa to 1200 MPa 100 MPa to 1500 MPa 1 % to 80 % 1 % to 80 %
2.	**Weld metals (Plate, Pipe& Diameter)**	Transverse Tensile Strength	ASME SEC IX-2017 AWS D1.1-2015	100 MPa to 1500 MPa
3.	**Ferrous &Non Ferrous Metals/Bars/Flat/ Plate/Angle/Weld/ metals (Plate, Pipe& Round)**	Bend	IS 1599:1985 (RA 2012) ASTM E 290-2014 ASTM SEC-IX-2017 AWS D1.1-2015	Qualitative Mandrel Size- 12 mm, 16 mm, 20 mm, 25 mm
4.	**Weld Metals**	Filet Weld Fracture Test	ASME Sec.IX -2017	Qualitative
5.	**Ferrous Material**	Impact Charpy “V” Notch(From ambient temperature to -50°C)	IS 1757 (Part 1): 2014	2 J to 300 J
		Impact Charpy “U” Notch(From ambient temperature to -50°C)	IS 1499:1977 (RA 2015)	2J to 300 J
		Impact Izod “V” Notch Test	IS 1598:1977 (RA 2015)	2 J to 168 J

Mamta Bharti
Convenor

Sunita Rawat
Program Manager

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
6.	**Ferrous & Non Ferrous Material**	Brinell hardness Test	IS 1500 (Part 1): 2013	150 HBW to 580 HBW, (10/3000, 10/1000)
		Rockwell Hardness Test - "C" Scale	IS 1586 (Part 1): 2012	20 HRC to70 HRC
		Rockwell Hardness Test - "B" Scale	IS 1586 (Part 1): 2012	20 HRBW to 100 HRBW
		Vickers Hardness Test	IS 1501 (Part 1): 2013	HV5 Upto 450 HV HV10 Upto 650 HV HV30 Upto 950 HV
7.	**Spring**	Compression Test	IS 7906 (Part 1): 1997 (RA 2009) IS 7906 (Part 2): 1975 (RA 2009)	0.1 kN to 390 kN
8.	**Steel**	Mass per Meter	IS 1786:2008 (RA 2013)	1 kg to 30 kg
II.	**METALLOGRAPHY TEST**			
1.	**Ferrous & Non Ferrous Metals& Alloys**	Microstructure Analysis by Optical Microscope	As per ASME Metal Handbook Volume 7&9 2004	50X to 400X
2.	**Cast Irons**	Type, Size, Distribution of graphite	IS 7754:75 (RA 2007)	100X
3.	**Steel**	Non Metallic Inclusion Rating by Microscopy Method-B	IS 4163:2004 (RA 2010)	100 X Max. Thick & Thin (A,B,C,D, 0 to3)
4.	**Ferrous Metals**	Estimation of Grain Size by Microscopy Method	IS 4748:2009 ASTM E112-2013 (Comparison Method)	(Grain Size 1 to 8) 100 X Max
5.	**Steel**	Determination of Case Depth by Microscopy Method	IS 6416:1988 (RA 2007)	100 X Max (0.01 mm to 2.0 mm)
		Depth of Decarburization by Microscopy Method	IS 6396:2000 (RA 2007)	100 X Max (0.01 mm to 2.0 mm)

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6.	**Ferrous &Non Ferrous Metals**	Coating Thickness by Microscopy Method	IS 3203:1982 (RA 2010)	100 X Max (0.01 mm to 2.0 mm)
7.	**Weld Metals**	Macro Etch Test	ASME IX-2017	10 X
8.	**Ferrous & Non Ferrous Metals, Forging & Billets, Blooms & Low Casting Alloys**	Macro Etch Test	IS 11371:1985 (RA 2012) ASTM E 381-1996 (RA 2017) IS 13015:1991 (RA 2007) ASTM E 340-2015 IS 12573:2010	10 X
9.	**Austenitic Stainless Steel**	Intergranular Corrosion Test (IGC)	ASTM A262-2015 Practice A Practice B Practice C Practice E	 1 to 100 Max 1 to 100 Max 1 to 100 Max 1 T to 4 T
III.	**RUBBER & PLASTIC**			
1.	**Rubber& Plastic Material**	Tensile Strength % Elongation	ASTM D412-2015a ASTM D638-2014 IS 3400 (Part 1): 2012	0.2 kgf to 500 kgf 10 % to 600 %
		Shore Hardness “A” Shore hardness “D”	ASTM D 2240 (RA 2015) ASTM D 2240 (RA 2015)	Shore- A 5 to 95 Shore-D 0 to 100
IV.	**BUILDING MATERIAL**			
1.	**Burnt Clay Bricks**	Compressive strength	IS 3495 (Part 1): 1992 (RA 2011)	5 kN to 1000 kN
2.	**Cement Concrete Cubes**	Compressive strength	IS 516:1959 (RA 2008)	5 kN to 1000 kN