

Laboratory **Physi-Chem Material Testing Laboratory, Gala No. G 15, Plot No. A17, Udyogswamini Prerna Sankul, MIDC Ambad, Nashik, Maharashtra**

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

Certificate Number **TC-7772 (in lieu of T-0943, T-1459)**

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Validity **06.09.2018 to 05.09.2020**

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.	Base-Ferrous Carbon Steel & Low Alloy Steels	Carbon	ASTM E415-17	0.0064 % to 1.39 %
		Silicon	JIS G 1253-2013	0.0038 % to 1.11 %
		Manganese		0.0076 % to 2.18 %
		Phosphorus		0.0010 % to 0.082 %
		Sulphur		0.0019 % to 0.32 %
		Chromium		0.0066 % to 3.12 %
		Molybdenum		0.0047 % to 0.49 %
		Nickel		0.018 % to 1.77 %
		Aluminium		0.0019 % to 0.20 %
		Copper		0.0055 % to 0.27 %
		Niobium		0.00095 % to 0.26 %
		Titanium		0.00085 % to 0.082 %
		Vanadium		0.00057 % to 0.46 %
		Lead		0.00009 % to 0.19 %
		Boron		0.0001 % to 0.0061 %
		Nitrogen		0.0047 % to 0.0095 %
		Arsenic		0.0028 % to 0.0058 %
Calcium		0.0002 % to 0.0013 %		
Tin		0.0028 % to 0.018 %		
2.	Base-Ferrous Stainless Steel	Carbon	ASTM E1086-14	0.0028 % to 0.39 %
		Silicon	JIS G 1253-2013	0.0285 % to 1.56 %
		Manganese		0.023 % to 2.00 %
		Phosphorus		0.0066 % to 0.047 %
		Sulphur		0.0044 % to 0.030 %
		Chromium		3.79 % to 26.65 %
		Molybdenum		0.0085 % to 4.33 %
		Nickel		0.18 % to 23.40 %
Aluminium		0.0026 % to 0.075 %		
Cobalt		0.016 % to 0.30 %		

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		Copper		0.086 % to 2.18 %
		Niobium		0.027 % to 0.26 %
		Titanium		0.104 % to 1.22 %
		Vanadium		0.066 % to 0.32 %
		Tungsten		0.008 % to 2.35 %
		Nitrogen		0.0028 % to 0.26 %
3.	Base-Ferrous High speed Tool Steel	Carbon	JIS G 1253-2013	0.28 % to 2.44 %
		Silicon		0.095 % to 0.93 %
		Manganese		0.199 % to 1.00 %
		Phosphorus		0.0036 % to 0.030 %
		Sulphur		0.00066 % to 0.024 %
		Chromium		2.04 % to 12.85 %
		Molybdenum		0.048 % to 5.46 %
		Cobalt		0.0158 % to 8.43 %
		Copper		0.042 % to 0.22 %
		Vanadium		0.006 % to 1.91 %
		Tungsten		0.032 % to 9.73 %
4.	Base-Aluminium & Aluminium Alloys	Silicon	ASTM E1251-17	0.042 % to 16.60 %
		Iron		0.048 % to 1.37 %
		Copper		0.019 % to 6.14 %
		Manganese		0.0095 % to 1.58 %
		Magnesium		0.0047 % to 6.17 %
		Chromium		0.0026 % to 0.42 %
		Nickel		0.0032 % to 2.80 %
		Zinc		0.013 % to 3.15 %
		Titanium		0.01 % to 0.26 %
		Lead		0.0077 % to 0.52 %
		Tin		0.0057 % to 0.56 %
5.	Base-Copper & Copper Alloys	Zinc	BS EN 15079-15	0.006 % to 47.00 %
		Lead		0.004 % to 10.68 %
		Tin		0.003 % to 11.41 %
		Phosphorous		0.003 % to 0.99 %
		Manganese		0.007 % to 1.64 %
		Iron		0.0005 % to 5.82 %

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		Nickel		0.004 % to 7.0 %
		Silicon		0.007 % to 0.63 %
		Magnesium		0.002 % to 0.20 %
		Chromium		0.03 % to 0.38 %
		Arsenic		0.007 % to 0.49 %
		Cadmium		0.001 % to 1.20 %
		Bismuth		0.01 % to 0.47 %
		Silver		0.003 % to 0.45 %
		Aluminum		0.002 % to 11.34 %
II.	CORROSION TESTS			
1.	Paint, Powder Coated, Plating Parts, Yellow, Blue Galvanised	Salt Spray Test	ASTM B:117-16	Qualitative

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MECHANICAL TESTING

I.	METALS & ALLOYS			
1.	Ferrous & Non-ferrous and Weld in Metals	Tensile Testing: Tensile Strength Yield Stress, 0.2 % Proof Stress	IS 1608-2005, ASTM A370-17a, ASME SEC IX-2017	Load Range- 0.2 kN to 20 kN (Load cell) 10 kN to 1000 kN (Digital) 20 kN to 1000 kN (Analog)
		% Elongation		%E: 0.6 % to 80 %
		% Reduction Area		%RA: 2 % to 80 %
		Bend Test (90,180 degree)	IS 1599-2012, ASTM A370-17a, ASME SEC IX-2017	Mandrel Dia: (2,4,6,8,10,12,14,16,20, 24,28,32,36,40,50, 78 mm)
2.	Pipes & Tubes	Crushing Test	IS 3074-2005, ASTM A370-17a	10 mm to 110 mm Outer Dia
		Flattening Test	IS 2328-2005, ASTM A 370-17a	10mm to 600 mm Outer Dia
		Drift Expansion Test, Flairing Test	IS 2335-2005, ASTM A370-17a	10mm to 60 mm Outer Dia
3.	Ferrous & Non Ferrous	Rockwell Hardness Test	IS 1586 (Part-1):2012	20 HRA to 100 HRA 20 HRB to 100 HRB 20 HRC to 70 HRC
		Vickers Hardness Test	IS 1501(Part-1,4):2013	40 HV1 to 1000 HV1 40 HV0.1 to 1000 HV0.1 40 to 1000 HV0.5
		Brinell Hardness Test	IS 1500(Part-1, 4):2013	(95.5 to 650) HBW 10/3000 (15.9 to 109) HBW 10/500

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II.	METALLOGRAPHY			
1.	Carbon & Alloy Steels	Microstructure	ASM Handbook (Volume-9)	Magnification- 40X, 100X, 200X, 450X, 500X, 650X, 1000X
		Average Grain Size of Metals	IS 4748, 2009 Comparison Method A, Untwined grains	Magnification- 100X 1 to 10
		Decarburized Depth in Steel	IS 6396, 2000 Microscopic Method	0.01 to 2.00 mm at 50X, 0.01 to 1.00mm at 100X
		Inclusion Content in Steel (Worst Inclusion Method)	IS 4163, 2004 Method A, DIN EN 10247:2017 Method P	Magnification 100X (Qualitative)
		Case Depth of Steel	IS 6416, 1988 Microscopic Method Hardness Method	0.01mm to 2 mm 50X, 0.01mm to 1mm 100X 0.03 mm to 10 mm HV0.1, HV0.5, HV1
2.	Cast Iron	Microstructure of Graphite in Cast Iron	IS 7754, 1975	Magnification 100X(Qualitative)
3.	Ferrous Metal, Alloys & Weld in Metal	Macro Etch Test of Wrought Steel Products, Weld	IS 11371, 1985 ASME SEC IX-2017	Magnification 1X to 10X(Qualitative)