

Laboratory **Delta Metallurgical Laboratory & Services, Sumeru Plaza, Neminath Nagar, Dhamani Road, Sangli, Maharashtra**

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

Certificate Number **TC-5525** Page 1 of 6

Validity **03.12.2017 to 02.12.2019** Last Amended on 18.12.2017

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.	Plain carbon steel & low alloy steel	C	ASTM-E 415 IS-8811	0.02 % to 1.20 %
		Si		0.03 % to 2.00 %
		Mn		0.05 % to 2.0 %
		P		0.003 % to 0.05 %
		S		0.003 % to 0.05 %
		Cr		0.05 % to 3.50 %
		Mo		0.05 % to 1.00 %
		Ni		0.05 % to 3.50 %
		Al		0.005 % to 0.06 %
		Co		0.05 % to 0.50 %
		Cu		0.05 % to 0.50 %
		Nb		0.001 % to 0.01 %
		Ti		0.05 % to 0.25 %
		V		0.05 % to 0.50 %
B	0.0003 % to 0.0015 %			
2.	Stainless Steel	C	ASTM E-1086 IS 9879	0.01 % to 0.4 %
		Si		0.10 % to 2.00 %
		Mn		0.10 % to 5.00 %
		P		0.003 % to 0.05 %
		S		0.003 % to 0.05 %
		Cr		0.10 % to 25.0 %
		Mo		0.05 % to 5.00 %
		Ni		0.10 % to 25.00 %
		Cu		0.05 % to 0.50 %
		N		DMLS/SOP/29, Issue Date.(10-2017)
V		0.01 % to 0.40 %		
3.	Aluminium and Aluminium Alloy	Si	IS 11035	0.05 % to 15.00 %
		Fe	ASTM E1251	0.05 % to 1.50 %

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		Cu	IS 11035	0.05 % to 6.00 %
		Mn	ASTM E1251	0.05 % to 0.25 %
		Mg		0.05 % to 2.00 %
		Cr		0.05 % to 0.50 %
		Ni		0.01 % to 0.25 %
		Zn		0.05 % to 0.50 %
		Ti		0.05 % to 0.25 %
		Pb		0.05 % to 0.25 %
4.	Copper and Copper Alloys	Zn	BS EN 15079	0.05 % to 40.00 %
		Pb		0.05 % to 10.00 %
		Sn		0.05 % to 10.00 %
		Bi		0.005 % to 0.50 %
		Al		0.05 % to 10.00 %
		Mn		0.05% to 2.00%
		Fe		0.05% to 5.00%
		Ni		0.05% to 5.00%
		Sb		0.05% to 0.50%
		As		0.010% to 0.15%
		Ag		0.005% to 0.15%
		S		0.0001% to 0.60%
		P		0.0001% to 0.50%
		Si		0.0002% to 5.00%
5.	Cast Iron	C	IS 15338	2.00% to 4.50%
		Si	ASTM E1999	1.50% to 4.00%
		S		0.05% to 0.40%
		P		0.005% to 0.50%
		Mn		0.10% to 1.00%
		Cr		0.50% to 2.00%
		Mo		0.05% to 5.00%
		Ni		0.10% to 2.00%
		Mg		0.005% to 0.075%
		V		0.05% to 0.30%
Al		0.010% to 0.075%		

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<u>MECHANICAL TESTING</u>				
I. METALLOGRAPHY TEST				
1.	Austenitic Stainless Steel	IGCT Practice A	ASTM A262	250X / 500X
		IGCT Practice B	ASTM A262	0.18 to 500 mils per year
		IGCT Practice C	ASTM A262	0.1 to 100 mils per year
		IGCT Practice E	ASTM A262	1T/2T 180° bend
		IGCT Practice F	ASTM A262	0.18 to 500 mils per year
		Intergranular corrosion test	IS 10461(Part1) IS 10461(Part2)	0.1 to 500 mils per year 1T/2T 180° bend
2.	Multiphase Ferrous and non ferrous alloys	Determination of volume fraction of phases	ASTM E562	2 % to 95 %
3.	Wrought Nickel rich Chromium bearing alloys	Intergranular corrosion test	ASTM G28 Method A	Quantitative
4.	Steel & its products	Grain size measurement by comparison method.	ASTM E112 IS 4748	ASTM G.S. No. 1 to 10
5.	Stainless steel / Duplex stainless steels	Detecting presence of detrimental Intermetallic phases	ASTM A923 Method A	400X / 500X
			ASTM A923 Method B	2 to 280J 24°C to -196°C
			ASTM A923 Method C	0.1 to 500 Mdd
6.	Ferrous and non ferrous Metals and alloys	Micro structural analysis	ASM Handbook Vol9, ASTM E407	Qualitative (50X, 100X, 200X, 400X, 500X, 1000X)

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7.	Duplex stainless steels, stainless steel and related alloys	Pitting corrosion test Crevice corrosion test	ASTM G48 Pitting Corrosion Method A,C,E Crevice corrosion Method B	(Qualitative) 20X 0.1 g/m ² to 10 g/m ²
8.	Cast iron (grey iron), Ductile iron	Graphite type, distribution and size	IS 7754 ASTM A247	Qualitative 100X
9.	Ferrous metals	Inclusion rating by comparison method	ASTM E45 Method A and D, IS 4163 Method A	Type A Type B Type C Type D Severity level 0.5- 3 Qualitative 100X
		Depth of decarburization by Microscopic method	IS 6396	0.01 to 1.0mm (100X)
10.	Ferrous metals and non ferrous metals	Case depth by Microscopic method	IS 6416	0.01 to 1.0mm (100X)
		Coating thickness by Microscopic method	IS 3203	0.01 to 1.0mm (100X)
II.	MECHANICAL PROPERTIES OF METALS			
1.	Ferrous and non ferrous alloys	Charpy Impact test	ASTM E23	2 to 280J 24°C to (-)196°C

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2.	Ferrous & Non Ferrous Metals	Tensile Test Ultimate Tensile Strength 0.2% Proof Stress / Yield stress Elongation Reduction area	ASTM A 370 ASTM E 8/ E8M IS 1608 BS EN ISO 6892-1	600 kN to 0.04 kN up to 3500 N/mm ² up to 2500 N/mm ² up to 2500 N/mm ² up to 80% up to 90%
		Bend Test	IS 1599 ASTM E 290 ASTM A370	Qualitative (mandrel dia.: 12mm,16mm,20mm, 24mm,30mm,32mm, 40mm,50mm,60mm, 80mm,140mm,175mm, 224mm,280mm)
3.	Ferrous & Non Ferrous Metals Including Weld Metals	Tensile Test Ultimate Tensile Strength Proof Stress / Yield stress Elongation Reduction area	ASME SEC.IX BS EN ISO 15614-1 BS EN ISO 4136 IS 7307-1 IS 3600(Part3) IS 3600(Part 4)	600 kN to 0.04 kN up to 3500 N/mm ² up to 2500 N/mm ² up to 2500 N/mm ² :up to 80% up to 90%
		Bend Test/Re-bend test Face/Root/Side Bend	ASME SEC. IX ASTM E 190 EN ISO 15614-1 BS EN ISO 5173 IS 3600(Part5) IS 3600(Part6) IS 3600(Part7)	Qualitative (mandrel dia.: 12mm,16mm,20mm, 24mm,30mm,32mm, 40mm,50mm,60mm, 80mm,140mm,175mm, 224mm,280mm)
		Rockwell Hardness	ASTM A370 IS 1586 (Part 1) ASTM E18 BS EN ISO 6508-1	10 HRB to 100 HRB 20 HRC to 70 HRC

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		Superficial Rockwell Hardness	IS 1586 (Part 1) ASTM E18 ISO 6508-1	70 HR to 94 HR 15N 42 HR to 86 HR 30N 20 HR to 77 HR45N
		Brinell Hardness	IS 1500 (Part 1) ASTM E10 BS EN ISO 6506-1	90 HBW to 550 HBW (750 kg / 3000 kg) (5.0 mm, 10.0 mm diameter ball)
4.	Ferrous & Non Ferrous Weld metals	Macro examination/	IS 11371: 1985 ASM Metal Hand Book Vol. 9 ASME (Sec IX) IS 7307 (Part 1) IS3600(Part 9)	(Qualitative) 1 x,10 x,20 x
5.	Ferrous and Non-ferrous plates/ Rods and Torr steel	Re-bend test	IS 1786	Qualitative (mandrel dia.: 12mm,16mm,20mm, 24mm,30mm,32mm,40mm 50mm,60mm,80mm, 140mm, 175mm,224mm, 280mm)
6.	Rods and Torr steel	Weight/meter	IS 1786	Upto 10 kg/m