

Laboratory Metal Analysis & Services Pvt. Ltd., 219/233/201, Bussa Udyog Bhavan, T. J. Road, Sewree (West), Mumbai, Maharashtra

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6680 (in lieu of T-0776, T-0777)

Page 1 of 7

Validity 27.12.2017 to 26.12.2019

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
-----	----------------------------	-------------------------	---	--

CHEMICAL TESTING

I.	METALS & ALLOYS			
		By OES		
1.	Low Alloy Steel	C	ASTM E415 - 2017	0.040%to 1.44%
		Si	/ IS 8811: 1998	0.10%to 1.23%
		Mn	1 st Rev RA 2012	0.21%to 1.84%
		S		0.007%to 0.064%
		P		0.006%to 0.061%
		Ni		0.07 %to 4.35%
		Cr		0.12%to 5.47%
		Mo		0.02%to 1.25%
		V		0.01%to 0.55%
		Cu		0.02%to 0.47%
		Al		0.02%to 0.36%
		C	IS 228 (Part 1) - 1987 3 rd Rev, (RA 2012)	0.05%to 1.2%
		Si	IS 228 (Part 8) - 1989 3 rd Rev, (RA 2014)	0.05%to 3.0%
		Mn	IS 228 (Part 2) – 1987 3 rd Rev, (RA 2012)	0.1%to 1.5%
		S	IS 228 (Part 9) – 1989 3 rd Rev, (RA 2014)	0.01%to 0.25%
		P	IS 228 (Part 3) -1987 3 rd Rev, (RA 2012)	0.01%to 0.12%
		Ni	IS 228 (Part 5) - 1987 3 rd Rev, (RA 2014)	0.2%to 5.0%
		Cr	IS 228 (Part 6)-1987, 3 rd Rev, (RA 2014)	0.2%to 5.0%

Sachin Tomar
Convenor

N. Venkateswaran
Program Director

Laboratory **Metal Analysis & Services Pvt. Ltd., 219/233/201, Bussa Udyog Bhavan, T. J. Road, Sewree (West), Mumbai, Maharashtra**

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

Certificate Number **TC-6680 (in lieu of T-0776, T-0777)**

Page 2 of 7

Validity **27.12.2017 to 26.12.2019**

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
2.	Stainless Steel	Mo	IS 228 Part 7- 1990 3 rd Rev, (RA 2012)	0.1%to 2.0%
		C	ASTM E1086 – 2014 / IS 9879: 1998	0.018%to 0.31%
		Si		0.24%to 1.16%
		Mn		0.54%to 1.92%
		S		0.004%to 0.032%
		P		0.005%to 0.028%
		Ni		1.75 %to 14.14 %
		Cr		10.69 %to 20.31 %
		Mo		0.03%to 2.32%
		C	IS 228 (Part 1) - 1987 3 rd Rev, (RA 2012)	0.05%to 0.5%
Si	IS 228 (Part 8) - 1989 3 rd Rev, (RA 2014)	0.05%to 3.0%		
Mn	ASTM E 350-2012	0.5%to 2.0%		
P	IS 228 (Part 3) -1987 3 rd Rev, (RA 2012)	0.01%to 0.05%		
Ni	IS 228 (Part 5) - 1987 3 rd Rev, (RA 2014)	0.2%to 15.0%		
Cr	IS 228 (Part 6)-1987, 3 rd Rev, (RA 2014)	10%to 30.0%		
Mo	IS 228 (Part 7)- 1990 3 rd Rev, (RA 2012)	1.0%to 3.0%		
3.	Aluminium & Its Alloys	Cu		0.01 %to 0.30%
		Cu	ASTM E 1251-2011	0.015%to 5.84%
		Mg		0.015%to 4.90%
		Si		0.035%to 12.15%
		Fe		0.080%to 1.09%
		Ni		0.004%to 0.17%
		Mn		0.015%to 1.13%
Zn		0.009%to 4.66%		

Sachin Tomar
Convenor

N. Venkateswaran
Program Director

Laboratory **Metal Analysis & Services Pvt. Ltd., 219/233/201, Bussa Udyog Bhavan, T. J. Road, Sewree (West), Mumbai, Maharashtra**

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

Certificate Number **TC-6680 (in lieu of T-0776, T-0777)** **Page 3 of 7**

Validity **27.12.2017 to 26.12.2019** **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
		Pb		0.006%to 0.47%
		Sn		0.009%to 0.21%
		Ti		0.0018%to 0.18%
		Cr		0.004%to 0.15%
4.	Positive Material Identification	(PMI) with elements	API Practice 578 / X-ray Fluorescence (Sect. 5.2.1)	Nominal Alloy Verification/ Qualitative
	Iron & its alloys	Cr, Ni, Mo, Mn, V, Ti, Cu,W,Co,Nb,Fe		
5.	Tool Steel	C	MAS/QS/15	0.54%to 1.12%
		Si	Issue No: 01 Rev 01	0.14%to 0.64%
		Mn	Issue Date: 17.10.2015	0.19%to 0.59%
		S	Optical Emission Spectrometer	0.019%to 0.046%
		P		0.020%to 0.047%
		Cr		0.97%to 4.99%
		Mo		0.063%to 10.35%
		W		1.62%to 19.58%
		V		0.169%to 2.00%
		Co		0.072%to 8.74%

Laboratory Metal Analysis & Services Pvt. Ltd., 219/233/201, Bussa Udyog Bhavan, T. J. Road, Sewree (West), Mumbai, Maharashtra

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6680 (in lieu of T-0776, T-0777) **Page 4 of 7**

Validity 27.12.2017 to 26.12.2019 **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
<u>MECHANICAL TESTING</u>				
I.	MECHANICAL PROPERTIES OF METALS			
1.	Ferrous , Non Ferrous Metals & Alloys	Tensile Test Ultimate Tensile Strength Yield Strength 0.2% Proof Stress % Elongation % Reduction Area	IS 1608 – 2005 (RA 2017), ASTM E8/E8M-2016a	10 to 400 kN (load) 2 % to 90 % 5 % to 90%
		Bend Test	IS 1599 – 2012 (RA 2017), ASTM A370-2017	Qualitative Mandrel Dia (mm) 2, 4, 6, 8, 10, 12, 16, 18, 20, 24, 32, 40, 36, 48, 50, 56, 63, 75, 84, 132, 155, 180, 230, 313, 500.
		Flaring Test	IS: 2335 – 2005 (RA 2017), ASTM A370-2017	Qualitative (5mm up to 75mm OD) Conical Mandrel 30°, 45°, 60°
		Flattening Test	IS 2328 – 2005 (RA 2017), ASTM A370-2017	5mm to 600mm OD Load 2 to 400 kN
		Impact Test – Charpy V notch	IS 1757 Part -1 – 2014, ISO 148 PART – 1 :2016	2 to 300 J Temp from -75°C to 28 °C
		Impact Test – Izod	IS 1598 - 1977 (RA 2015)	2 J to 168 J
		Rockwell Hardness	IS 1586 Part -1:2012 (RA 2017), ASTM E18-2017	60 to 100 HRBW 20 to 70 HRC

Laboratory **Metal Analysis & Services Pvt. Ltd., 219/233/201, Bussa Udyog Bhavan, T. J. Road, Sewree (West), Mumbai, Maharashtra**

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

Certificate Number **TC-6680 (in lieu of T-0776, T-0777)**

Page 5 of 7

Validity **27.12.2017 to 26.12.2019**

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
		Brinell Hardness	IS 1500 (Part -1) : 2013 (RA 2017), ASTM E10 -2017	95.5 to 616 HBW 10mm / 3000 kgf
		Vickers Hardness	IS 1501 (Part -1):2013 (RA 2017), ASTM E92 -2017	18.9 to 985 HV 5 37.8 to 1971 HV 10
2.	Weld in Metals	Tensile Test (Transverse & Longitudinal) Ultimate Tensile Strength	ASME SEC IX-2017 Section QW 150, IACS UR W 28:2012 (Section- 4.2.2.2 &- 4.2.2.3)	10 kN to 400 kN (load)
		Bend Test (Face Bend, Root Bend, Side Bend)	ASME SEC IX-2017 Section QW 160, IACS W UR 28:2012 4.2.2.4	Qualitative Plate / Pipe Upto 25mm Mandrel Dia (mm) 2, 4, 6, 8, 10, 12, 16, 18, 20, 24, 32, 40, 36, 48, 50, 56, 63, 75, 84, 132, 155, 180, 230, 313, 500
		Impact Test – Charpy V notch	IS 1757 Part -1 – 2014 ISO 148 PART – 1 :2016	2 to 300 J Temp from -75°C to 28 °C
		Hardness Test - Vickers	IACS W UR 28:2012 (Section 4.2.2.7)	18.9 to 985 HV 5 37.8 to 1971 HV 10
		Macro structural Analysis	ASME SEC IX-2017 QW-183 & QW- 184 IACS W UR 28:2012 (Section 4.2.2.7)	1X, 2X, 10 X Qualitative Analysis
II.	METALLOGRAPHY TEST			
1.	Iron & Steel, Copper & its Alloy, Nickel & its Alloy, Cast Iron	Microstructure Analysis	ASM Handbook Vol 7 & 9 IS 7739 – (Part 1)-1975 RA 2017, IS 7739 – (Part 5)-1976 RA 2012,	100X, 200X, 500X, 1000X, 2000X. Qualitative

Sachin Tomar
Convenor

N. Venkateswaran
Program Director

Laboratory **Metal Analysis & Services Pvt. Ltd., 219/233/201, Bussa Udyog Bhavan, T. J. Road, Sewree (West), Mumbai, Maharashtra**

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

Certificate Number **TC-6680 (in lieu of T-0776, T-0777)**

Page 6 of 7

Validity **27.12.2017 to 26.12.2019**

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
			IS 7739 – (Part 4):1975 RA 2012, IS 7739 – (Part 8)1975 RA 2012, ASTM E 407-07e1 RA 2015	
2.	Steel	Macro structural Analysis	E340- 2015, E381- 2017, IS 7739 – (Part 5)-1976 RA 2015	1 to 10 X Qualitative
3.	Stainless Steel (Austenitic Steel)	Estimation of grain size by comparison method	IS 4748 – 2009 RA 2017, ASTM E-112- 2013	ASTM Grain Size No 1 to 8 At 100 X
4.	Low Carbon Steel		IS 4748 – 2009 RA 2017	Grain Size No. 1 to 10 at 100 X
5.	Copper and Copper Base Alloy		ASTM E-112- 2013	Average diameter (0.200, 0.150, 0.120, 0.090, 0.070, 0.060, 0.050, 0.045, 0.035, 0.025, 0.020, 0.015, 0.010, 0.005)mm At 75X
6.	Ferrous Metals and Their Alloys	Determination of Case Depth by Microscopic Method	IS-6416: 1988 1 st Rev, RA 2012	0.01mm to 2.0 mm at Magnification 50, 100 X, 200X
		Determination of inclusion rating in steel By Method A	IS-4163: 2004 3rd Rev, RA Jan 2017	A, B, C, D, & DS Thin & Heavy Thin & Heavy 0.5 to 3.0 at 100 X Qualitative Analysis
		Determination of depth of decarburized layer in steel. (By Microscopic Method)	IS-6396: 2000 2 nd Rev (RA 2012)	0.01mm to 2.0 mm at Magnification 50, 100 X, 200X

Sachin Tomar
Convenor

N. Venkateswaran
Program Director

Laboratory Metal Analysis & Services Pvt. Ltd., 219/233/201, Bussa Udyog Bhavan, T. J. Road, Sewree (West), Mumbai, Maharashtra

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6680 (in lieu of T-0776, T-0777)

Page 7 of 7

Validity 27.12.2017 to 26.12.2019

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
7.	Cast Iron (SG & Grey Cast Iron)	Designation of the Microstructure of graphite (form ,distribution ,&sizes) in cast iron (By Comparison Method)	IS-7754: 1975 (RA 2012 ASTM A247 2017	at 100 X Qualitative Analysis
8.	Austenitic Stainless Steel	IGC Practice A	ASTM A262-2015	Qualitative Analysis (250 X to 500X)
		IGC Practice B	ASTM A262-2015	1 to 500 Mils per Year
		IGC Practice C	ASTM A262-2015	1 to 500 Mils per Year
		IGC Practice E	ASTM A262-2015	Qualitative Analysis (5X, 10X /15X)
		Determination Of resistance to Intergranular Corrosion of Stainless Steel	EN ISO 3651-2 : 1998 Method A	Qualitative Analysis (5X, 10X /15X)
9.	Duplex Austenitic/ Ferritic Stainless Steel	Detecting Detrimental Intermetallic Phase	ASTM A923-2014 Method A	Qualitative Analysis (400X, 500X)
10.	Austenitic and Duplex Stainless Steel	Determining Volume fraction by Systematic Manual Point Count Method	ASTM E562 :2011	20 % to 70%