

**Laboratory**

**Chemical and Metallurgical Laboratories, #57, 1st Floor, 8th Main, Petechannappa Industrial Estate, Kamakshipalya, Magadi Road, Bangalore, Karnataka**

**Location 1: # 57, 1st Floor, 8th Main, Petechannappa Industrial Estate, Kamakshipalya, Magadi Road, Bangalore, Karnataka**

**Location 2: # 36/1, 12th Main, 17th Ward, Puttaiah Road, Vrushbhavathi Nagar, Bangalore, Karnataka**

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

**Certificate Number**

**TC-7510 (in lieu of T-0778, T-1757)**

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**Validity**

**13.07.2018 to 12.07.2020**

**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
<b><u>CHEMICAL TESTING</u></b>				
<b>I.</b>	<b>METALS AND ALLOYS</b>			
<b>1.</b>	<b>Ferrous Base</b>			
<b>a.</b>	<b>Plain Carbon/ Low alloy Steel &amp; Free Cutting Steel</b>	C	ASTM E 415- 15,	0.041% to 1.1%
		Si	IS 8811: 1998	0.04 % to 1.2%
		Mn		0.05% to 1.8%
		P		0.003% to 0.10%
		S		0.001 % to 0.35%
		Cr		0.05 % to 3.2%
		Mo		0.01 % to 0.87%
		Ni		0.01 % to 3.3%
		Al		0.01 % to 1.05%
		Co		0.003 % to 0.018%
		Cu		0.01 % to 0.45%
	V		0.004 % to 0.55%	
	Pb		0.001 % to 0.35%	
	B		0.0005 % to 0.001	
<b>b.</b>	<b>Stainless Steel</b>	C	ASTM E1086- 14	0.013 % to 0.16%
		Si	IS 9879: 1998	0.16 % to 1.2%
		Mn		0.36 % to 1.85%
		P		0.008 % to 0.022%
		S		0.005 % to 0.39%
		Cr		12 % to 27%
	Mo		0.05 % to 3.75%	

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		Ni		0.30 % to 25.00%
		Co		0.017 % to 0.20%
		Cu		0.026 % to 0.37%
		Nb		0.005% to 1.11%
		Ti		0.001% to 0.35%
<b>c.</b>	<b>High Mn Steel</b>	C	ASTM E 2209: 13	0.02 % to 1.20%
		Si		0.10 % to 0.50%
		Mn		4.00 % to 13.12%
		P		0.012 % to 0.05%
		S		0.001 % to 0.02%
		Cr		0.15 % to 20.00%
		Ni		0.27 % to 7.08%
<b>d.</b>	<b>Tool Steel/Die steel</b>	C	CML/MSP/Fe 003	0.36 % to 2.22%
		Si	Issue Date: April 2010	0.15 % to 2.00%
		Mn		0.20 % to 1.10%
		P		0.01 % to 0.04%
		S		0.001 % to 0.04%
		Cr		3.50 % to 15.00%
		Mo		0.04 % to 5.50%
		Co		0.10 % to 10.00%
		V		0.40 % to 2.00%
		W		0.009 % to 21.00%
<b>e.</b>	<b>Cast Iron</b>	C	IS 15338-2013	1.85 % to 3.8%
		Si		0.72 % to 2.87%
		Mn		0.15 % to 1.26%
		P		0.03 % to 0.31%
		S		0.01 % to 0.10%

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		Cr		0.077 % to 0.90%
		Mo		0.009 % to 0.30%
		Ni		0.06 % to 1.80%
		Cu		0.10 % to 0.60%
		V		0.02 % to 0.35%
2.	Aluminium Base	Bi	ASTM E 1251:2011	0.005 % to 0.40%
		Cr		0.01 % to 0.36%
		Cu		0.01 % to 4.80%
		Fe		0.19 % to 1.64%
		Mg		0.11 % to 1.35%
		Mn		0.03 % to 1.00%
		Ni		0.05 % to 0.60%
		Pb		0.03 % to 0.60%
		Si		0.05 % to 18.00%
		Sn		0.02 % to 0.40%
		Ti		0.01 % to 0.30%
		Zn		0.03 % to 1.30%
		Zr		0.06 % to 0.20%
3.	Copper Base	Al	BS EN 15079: 2015	0.005 % to 11.00%
		Bi	CML/QAP/Cu 001	0.025 % to 0.14%
		Fe	Issue Date: April 2010	0.001 % to 4.25%
		Mn		0.01 % to 0.55%
		Ni		0.01 % to 4.75%
		P		0.004 % to 0.25%
		Pb		0.01 % to 22.50%
		Si		0.01 % to 0.30%
		Sn		0.03 % to 11.0%
		Zn		0.005 % to 45.0%





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				165 HV to 976 HV 160 BHN to 651 BHN)
<b>II.</b>	<b>METALLOGRAPHY</b>			
<b>1.</b>	<b>Steel and Electroplated Anodized aluminium</b>	Salt Spray fog test Neutral Salt Spray	ASTM B117-2016 IS 9844-1981 (RA 2016)	Qualitative
<b>2.</b>	<b>Steel products</b>	Effective Case depth	IS6416-1988 RA2018) ASTM B934-2015 (Vickers Hardness HV1)	0.05 to 5.0 mm
		Total case Depth	IS6416-1988 RA2018) ASTM B934-2015 (Microscopic method)	Qualitative (5 µ to 1000 µ)
		Measuring Decarburized depth	IS 6396-2000 (Microscopic method)	Qualitative (0 to 0.05 mm)
<b>3.</b>	<b>Metallic Products</b>	Estimation average Grain Size	IS4748-2009(RA2017) ASTM E112-2013 (Microscopic Method)	ASTM Grain size No 1 to10
<b>4.</b>	<b>Ferrous &amp; Non-ferrous materials</b>	Cladding Thickness/ Weld, Brazing Joint Thickness	IS3203-1982(RA2016) IS 7562-1974 (Microscopic Method)	Qualitative (5µ to 100 µ)
		Micro structural	ASM Handbook Volume -7 & 9 -2004	Qualitative (Magnification 100x, 200x,500x,1000x,2000x)
		Macro Examination	IS 11371-1985(RA 2018) IS 12573-2010(RA 2012) ASTM E381-2017 ASM Handbook Vol. 9-2004	Qualitative (Magnification 10x to 50x)

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5.	Steel products	Macroscopic Examination	IS 13015-1991 (RA-2018)	Qualitative (Magnification 10x to 50x)
6.	Iron Castings	Microstructure of graphite Microscopic Method	ASTM A247-2017 ASM Handbook Vol .9-2004 IS 7754:1975(RA2018) (MicroscopicMethod)	Qualitative (Magnification 100x to 500x)
III.	<b>PLASTICS AND PLASTIC PRODUCTS</b>			
1.	Plastic products	Shore D Hardness	ASTM D2240-2015	10 to 100 6 mm Thick(mm)
IV.	<b>RUBBER AND RUBBER PRODUCTS</b>			
1.	Rubber Products	Shore A Hardness	ASTM D2240-2015	10 to 100 6 mm Thick(mm)

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<b>LOCATION-2</b>				
<b>I.</b>	<b>MECHANICAL PROPERTIES OF METALS</b>			
1.		Tensile Test: Ultimate Tensile Strength Yield Strength 0.2% proof stress % Elongation %Reduction in area	IS 1786-2008 (RA-2013) IS 1608-2005(RA2011) ASTM A370-2017 ASTM E8- 2015 ISO 6892-1998	50N to 360kN  0.5% to 80% 10% to 80%
		Compression Test	IS 13780-1988	50N to 360kN
		Bend Test	IS 1599-2012 ISO 7438-2005	Qualitative (Mandrel Size-16mm, 24mm,32mm,48mm and 60mm)
2.	<b>Metallic Materials-Tube</b>	Drift Expansion Test or Flaring Test	IS 2335-2005 ASTM A370-2017 ISO 8493-1998	Qualitative (Dia 10 mm to 50 mm Cone angle 30°,45°,60°)
		Flattening Test	IS 2328-2005 ISO 8492-1998	Qualitative (Dia 50mm to 300mm)
3.	<b>Metallic Materials</b>	Charpy Impact Test 'V' Notch	IS 1757(P-1):2014 ASTM E 23:2017 ISO: 148-1:2009	5 to 240 Joules (-80 °C to +200°C)
		Charpy Impact Test 'U' Notch	IS 1499:1997 ASTM E 23:2017 ISO: 148-1:2009	
		Izod Impact Test	IS 1598 :1997 ASTM E 23:2017	5 J to 140 J At room Temperature

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4.	<b>Fusion Welded Joints Materials</b>	Transverse Root bend, Face bend on Butt Weld	IS 3600 (Part 5):1983 ISO 5173:1981	Qualitative (Mandrel Size 16mm,24mm, 32mm, 48mm & 60 mm)
		Transverse tensile Test	IS 3600 (Part 3):2009 ISO 4136:2001	5 N to 390 kN