

Laboratory MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6815 (in lieu of T-0774, T-0775) Page 1 of 22

Validity 21.12.2017 to 20.12.2019 Last Amended on 18.01.2018

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.	METAL & ALLOYS			
1.	Alloy Steels	Aluminium Arsenic Boron Carbon Chromium Cobalt Copper Lead Manganese Molybdenum Nickel Niobium/Columbium Nitrogen Phosphorus Silicon Sulphur Tin Titanium Tungsten Vanadium Zirconium	IS 8811-1998 (RA 2012)/ ASTME 415 - 2017 ML/VAL/Fe/2013-2014 dt Apr 2013By OES	0.001 % to 0.15% 0.001 % to 0.010% 0.001 % to 0.010% 0.001 % to 2.0% 0.001 % to 8.00% 0.001 % to 0.050% 0.001 % to 0.500% 0.001 % to 0.40% 0.001 % to 2.00% 0.001 % to 1.50% 0.001 % to 5.00% 0.001 % to 0.050% 0.001 % to 0.040% 0.001 % to 0.100% 0.001 % to 2.00% 0.001 % to 0.300% 0.001 % to 0.050% 0.001 % to 0.010% 0.001 % to 1.10% 0.001 % to 1.00% 0.001 % to 0.050%

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)**

Page 2 of 22

Validity **21.12.2017 to 20.12.2019**

Last Amended on **18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
2.	<b>Stainless Steel</b>	Aluminium Boron Carbon Chromium Cobalt Copper Manganese Molybdenum Nickel Niobium Nitrogen Phosphorus Silicon Sulphur Tantalum Titanium Tungsten Vanadium Zirconium	ASTM E1086-2014 IS 9879 – 1998 (RA 2015) ML/VAL/Fe/013-014 dt Apr 2013By OES	0.001 % to 0.150% 0.001 % to 0.010% 0.001 % to 1.5% 8.00 % to 24.0% 0.001 % to 0.5% 0.001 % to 5.00% 0.001 % to 11.00% 0.001 % to 6.00% 0.001% to 25.0% 0.001 % to 0.70% 0.005 % to 0.600% 0.001 % to 0.080% 0.100 % to 4.00 % 0.001 % to 0.35% 0.001 % to 0.06% 0.001 % to 0.7% 0.010 % to 2.5% 0.001 % to 2.50% 0.001 % to 0.050%
3.	<b>Cast Iron / SG Iron</b>	Carbon Chromium Copper Magnesium	ASTM E1999-2011 By OES	1.90 % to 3.80% 0.025 % to 2.00% 0.015 % to 0.750% 0.01 % to 0.09%
		Manganese Molybdenum Nickel Phosphorus Silicon Sulphur Tin Titanium Vanadium		0.001% to 2.00% 0.010 % to 2.00% 0.020 % to 2.00% 0.005 % to 0.400% 0.150 % to 2.50% 0.010 % to 0.080% 0.004 % to 0.140% 0.003 % to 0.120% 0.008 % to 0.220

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)** **Page 3 of 22**

Validity **21.12.2017 to 20.12.2019** **Last Amended on 18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
4.	<b>Tool Steel</b>	Carbon Silicon Manganese Sulphur Phosphorus Chromium Molybdenum Vanadium Tungsten Cobalt	ML/VAL/HSS/2011-2012 dt Apr 2011 By OES	0.5 % to 1.5% 0.2 % to 0.7% 0.4 % to 0.8% 0.01 % to 0.04% 0.01 % to 0.03% 4.0 % to 17.0% 1.0 % to 1.7% 1.0 % to 1.7% 15.0 % to 22.0% 8.0 % to 12.0%
5.	<b>Aluminium &amp; its Alloys</b>	Beryllium Bismuth Chromium Copper Iron Lead Magnesium Manganese Nickel Silicon Tin Titanium Vanadium Zinc Zirconium	ASTM E1251 – 2011	0.001 % to 0.100% 0.001 % to 0.100% 0.010 % to 0.20% 0.020 % to 5.50% 0.100 % to 1.50% 0.005 % to 0.06% 0.010 % to 5.00% 0.010 % to 1.20% 0.010 % to 2.00% 0.100 % to 15.00% 0.010 % to 0.500% 0.010 % to 0.300% 0.001 % to 0.025% 0.07 % to 5.00% 0.001 % to 0.15%
6.	<b>Copper &amp; its Alloys</b>	Tin Lead Zinc Iron Nickel Manganese Sulphur Phosphorus Aluminium	BS EN 15079-2015 ML/VAL/Cu/2011-2012 dt Sep 2011 by OES	0.005 % to 10.00% 0.005 % to 10.00% 0.005 % to 40.00% 0.005 % to 4.50% 0.005 % to 35.00% 0.005 % to 3.00% 0.001 % to 0.050% 0.001 % to 0.200% 0.005 % to 11.00%

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)**

Page 4 of 22

Validity **21.12.2017 to 20.12.2019**

Last Amended on **18.01.2018**

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		Silicon Antimony Arsenic Chromium Cobalt Bismuth		0.002 % to 3.50% 0.002 % to 0.500% 0.005 % to 0.100% 0.002 % to 0.020% 0.005 % to 0.250% 0.001 % to 0.100%
7.	<b>Nickel &amp; its Alloys</b>	Carbon Silicon Manganese Sulphur Phosphorus Iron	ASTM E-3047-2016 ML/VAL/Ni/2011-2012 dt Sep 2011 by OES	0.005 % to 0.300% 0.010 % to 2.00% 0.010 % to 2.00% 0.002 % to 0.040% 0.002 % to 0.040% 0.100 % to 41.00%
		Molybdenum Vanadium Copper Niobium Cobalt Tungsten Titanium Aluminium Chromium Tantalum		0.020 % to 27.00% 0.002 % to 0.600% 0.001 % to 34.00% 0.002 % to 6.00% 0.005% to 17.50% 0.010% to 20.0% 0.005 % to 3.00% 0.050 % to 3.00% 0.005 % to 30.00% 0.010 % to 0.050%
8.	<b>Titanium &amp; Titanium Alloys</b>	Aluminium Iron Molybdenum Vanadium Zirconium Tin Carbon	ASTM E-2994-2016 ML/VAL/Ti/2011-2012 dt Oct 2011 By OES	0.006 % to 9.00% 0.025 % to 0.250% 0.005 % to 2.00% 0.005 % to 3.00% 1.00 % to 4.50% 0.005 % to 2.50% 0.010 % to 0.050%

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)**

Page 5 of 22

Validity **21.12.2017 to 20.12.2019**

Last Amended on **18.01.2018**

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9.	<b>Cobalt &amp; its Alloys</b>	Aluminium Boron Chromium Carbon Copper Iron	ML/VAL/Co/2013 dt Apr 2013 By OES	0.025 % to 0.25% 0.001 % to 0.005% 15.0 % to 28.0% 0.100 % to 0.300% 0.02 % to 0.06% 2.00 % to 3.00%
		Manganese Molybdenum Nickel Silicon Vanadium Sulphur Phosphorus Tungsten Titanium Niobium/Columbium Tantalum		0.20 % to 2.00% 0.50 % to 2.00% 8.0 % to 25.0% 0.10 % to 0.60% 0.005 % to 0.050% 0.0005 % to 0.005% 0.005 % to 0.020% 10.0 % to 16.0% 0.005 % to 0.015% 0.02 % to 0.05% 0.02 % to 0.05%
10.	<b>Cast Iron, SG Iron</b>	Carbon Silicon Sulphur Manganese Phosphorus Copper Chromium Nickel Molybdenum Lead Tin Vanadium Magnesium	IS 12308 Part 11-1991 (RA 2012)  IS 12308 Part 6-1991 (RA 2012)  IS 12308 Part 2-1987 (RA 2012)  ML/Val/ST-Fe-01/13/ICP OES dt 08.10.2013	0.01% to 4.50% 0.10% to 5.00 % 0.005% to 0.25% 0.001% to 3.0 % 0.001% to 0.5% 0.001% to 2.5 % 0.001 % to 6.00% 0.001 % to 5.00% 0.001% to 0.30 % 0.001% to 0.03 % 0.001% to 0.050% 0.001% to 0.050% 0.001% to 0.10 %
11.	<b>Carbon steel</b>	Carbon  Silicon	IS 228 Part 1-1987 (RA 2012)  IS 228 Part 8-1989 (RA 2014)	0.05 % to 2.50 %  0.10 % to 2.50%

**Anand Deep Gupta**  
Convenor

**N. Venkateswaran**  
Program Director

Laboratory MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6815 (in lieu of T-0774, T-0775)

Page 6 of 22

Validity 21.12.2017 to 20.12.2019

Last Amended on 18.01.2018

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Sulphur	IS 12308 Part 2-1987 (RA 2012)	0.002% to 0.25%
		Chromium	IS 228 Part 6-1987 (RA 2014)	3.00% to 25.00 % 0.001 % to 3.00%
		Nickel	ML/Val/ST-Fe-01/13/ICP OES dt 08.10.2013 IS 228 Part 5-1987 (RA 2014)	3.00% to 15.00 % 0.001 % to 3.00 %
		Manganese	ML/Val/ST-Fe-01/13/ICP OES dt 08.10.2013	0.001% to 3.00%
		Phosphorus	ML/Val/ST-Fe-01/13/ICP OES dt 08.10.2013	0.001 % to 2.50%
		Copper		0.001 % to 3.00 %
		Molybdenum		0.001% to 4.00 %
		Aluminium		0.001% to 2.50 %
		Lead		0.001% to 4.00%
		Tin		0.001% to 2.50 %
		Titanium		0.001% to 2.50 %
		Vanadium		0.001% to 2.50 %
		Cobalt		0.001% to 2.50%
12.	Stainless Steel	Carbon	IS 228 Part 1-1987 (RA 2012)	0.01 % to 0.15%
		Silicon		0.01 % to 1.50 %
		Sulphur	IS 228 Part 8-1989	0.001 % to 3.00 %
		Chromium	(RA 2014)	3.00% to 25.00 %
		Nickel	IS 12308 Part 2-1987	3.00% to 15.00%
		Manganese	(RA 2012)	0.10 %to 2.00%
		Phosphorus	IS 228 Part 6-1987	0.001% to 0.10%
		Copper	(RA 2014)	0.002% to 0.10%
		Molybdenum	IS 228 Part 5-1987	0.001% to 4.00 %
		Aluminium	(RA 2014)	0.001% to 2.50 %
		Titanium	ML/Val/ST-Fe-01/13/ICP	0.001% to 2.50 %
		Vanadium	OES dt 08.10.2013	0.001% to 2.50 %
		Cobalt		0.001% to 2.50 %

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)**

**Page 7 of 22**

Validity **21.12.2017 to 20.12.2019**

**Last Amended on 18.01.2018**

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13.	Copper & its Alloys	Copper	IS 4027 Part1-1987 (RA 2012)	30% to 99%
		Lead	ASTM E53:2007(RA2013)	95.0 %to 99.9%
		Carbon	IS 4027 Part1-1987 (RA 2012)	0.50% to 10.00%
			ML/NF-Cu-01/15/ICP OES IS 228 (Part1):1987 (RA 2012)	0.001% to 3.00 %
		Sulphur	IS 12308 (Part2):1987 (RA 2012)	0.10% to 3.00%
		Nickel	ML/NF-Cu-01/15/ICP OES dt 08.10.2015	0.002% to 0.50%
			ML/NF-Cu-01/15/ICP OES dt 08.10.2015	0.001% to 1.50 %
		Tin	IS 4667 Part 2-1969 (RA 2012)	0.001% to 0.500%
		Zinc	ML/NF-Cu-01/15/ICP OES dt 08.10.2015	0.50% to 15.00 %
			IS 4027 Part 6-1987 (RA 2012)	0.001% to 4.00 %
		Iron	IS 4027 (Part8): 1991 (RA 2012)	25.0% to 45.0%
		Aluminium	ML/NF-Cu-01/15/ICP OES dt 08.10.2015	0.001% to 8.00%
			ML/NF-Cu-01/15/ICP OES dt 08.10.2015	
Silver	ML/NF-Cu-01/15/ICP OES dt 08.10.2015	0.001% to 0.02%		
Bismuth	ML/NF-Cu-01/15/ICP OES dt 08.10.2015	0.001% to 1.00%		
Antimony	ML/NF-Cu-01/15/ICP OES dt 08.10.2015	0.001% to 2.50%		

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)**

Page 8 of 22

Validity **21.12.2017 to 20.12.2019**

Last Amended on **18.01.2018**

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14.	<b>Aluminium &amp; its Alloys</b>	Silicon Nickel Copper Zinc Lead Iron Tin Manganese Magnesium Titanium Vanadium Zirconium	IS 504-1963 (RA 2014) ML/NF-AI-01/15/ICP OES dt 08.10.2015	0.10% to 15.00 % 0.001% to 4.00% 0.001% to 8.00 % 0.001% to 4.00 % 0.001% to 4.00 % 0.001% to 4.00 % 0.001% to 2.00 % 0.001% to 4.00v 0.001% to 7.00% 0.001% to 2.00% 0.001% to 2.00 v 0.001% to 2.50 %
15.	<b>Zinc &amp; Zinc Alloys</b>	Zinc Nickel Lead Copper Tin Iron Aluminium Chromium Manganese Magnesium Titanium	IS 4611:1991(RA 2015) Annexure A ML/NF-Zn-01/17/ICP OES dt 23.10.2017	1.00% to 99.00% 0.001% to 3.00% 0.001% to 4.00% 0.001% to 4.00% 0.001% to 4.00% 0.001% to 4.00% 0.001% to 8.00% 0.001% to 4.00% 0.001% to 4.00% 0.001% to 4.00% 0.001% to 4.00%
16.	<b>Heavy Metal on Metals, Alloys &amp; Semi Conductor</b>	Lead Cadmium Mercury Hexavalent Cr6+	BS EN 62321-Part 5-2017 BS EN 62321-Part 5-2017 BS EN 62321-Part 5-2017 IEC-62321-Part 2-2017	1.0 mg/kg to 2500 mg/kg 1.0 mg/kg to 300 mg/kg 1.0 mg/kg to 2500 mg/kg 1.0 mg/kg to 1000 mg/kg
17.	<b>Carbon Steel &amp; Stainless Steel</b>	Oxygen Nitrogen Hydrogen	ASTM E1019-2011 ASTM E1019-2011 ML/VAL/ST-H2-2017-18 dt 29.09.2017	0.0030 % to 0.0150% 0.0050 % to 0.0600% 0.0002 % to 0.0010%
18.	<b>Titanium &amp; Titanium Alloys</b>	Oxygen Nitrogen Hydrogen	ASTM E1409-2013 ASTM E1409-2013 ASTM E1447-2016	0.0040 % to 0.200% 0.001 % to 0.020% 0.0010 % to 0.0200%



Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)**

Page 9 of 22

Validity **21.12.2017 to 20.12.2019**

Last Amended on **18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
II.	<b>PAINT &amp; SURFACE COATING</b>			
1.	<b>Enamel Paints (Finishing/ Under coating)</b>	Flexibility and Adhesion - Scratch Hardness	IS 101 – Part 5-Sec 2-1988 (RA 2014)	Qualitative
		Mass in kg/10 Litres	IS 101 – Part 1-Sec 7-1987 (RA 2014)	(1kg to 20 kg)/10L
		Drying time	IS 101 – Part 3-Sec 1-1986 (RA 2012)	10 minutes Hrs to 72 Hrs (Qualitative)
		Finish	IS 101 – Part 3-Sec 4-1987 (RA 2014)	Qualitative
		Gloss 60°	IS 101 – Part 4-Sec 4-1988 (RA 2012)	5 to 99
		Fineness of Grind	IS 101 – Part 3-Sec 5-1987 (RA 2014)	10 Microns to 100 Microns
		Colour	IS 101 – Part 4-Sec 2-1989 (RA 2014) IS 5-2007-2007 (RA 2012)	Qualitative
		Water Content	IS 101 – Part 2-Sec 1-1988 (RA 2014)	0 to 5 ml
		Consistency-Flow Cup	IS 101 – Part 1-Sec 5-1989 (RA 2014)	10 Sec to 250 Sec
		Flexibility and Adhesion-Bend Test	IS 101 – Part 5-Sec 2-1988 (RA 2014)	Qualitative
		Flash Point	IS 101 – Part 1-Sec 6-1987 (RA 2014)	30°C to 70°C
		Volume Solids	IS 101 – Part 8-Sec 6-1993 (RA 2014)	5.0 % to 80%
		Phthalic Anhydride content	IS 101 – Part 8-Sec 4-2015	8 % to 30%
	Accelerated Storage Stability Test	IS 8662-2004(RA 2014) Annexure F IS 2932-2003(RA 2013) Annexure G	Qualitative	

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)** **Page 10 of 22**

Validity **21.12.2017 to 20.12.2019** **Last Amended on 18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
			IS 133-2004 (RA 2013) Annexure E	
		Resistance to Acid	IS 8662-2004 (RA 2014) Annexure D IS 2932-2003 (RA 2013) Annexure E	Qualitative
		Resistance to Alkali	IS 8662-2004 (RA 2014) Annexure E IS 2932-2003 (RA 2013) Annexure F	Qualitative
		Volatile Matter	IS 101 – Part 2-Sec 2-1986 (RA 2012)	10 % to 95%
		Pressure Test	IS 101 – Part 5-Sec 1-1988 (RA 2014)	Qualitative
		Wet opacity	IS 101 – Part 4-Sec 1-1988 (RA 2014)	80 m <sup>2</sup> /10L to 300 m <sup>2</sup> /10L
		Resistance to Water	IS 133 -2004 (RA 2013) Annexure D	Qualitative
		Film Thickness – Method - 5	IS 101 – Part 3-Sec 2-1989 (RA 2014)	5 Microns to 250 Microns
<b>2.</b>	<b>Ready Mixed Paints (Zinc Chrome Primer)</b>	Accelerated Storage Stability Test	IS 2074-1992 (RA 2014) Annexure E	Qualitative
		pigment content	IS 101 – Part 8-Sec 2-1989 (RA 2014)	10 % to 60%
		Protection Against Corrosion under condition of condensation	IS 101 – Part 6-Sec 1-1988 (RA 2015)	Qualitative
		Resistance to Neutral Salt Spray	IS 101 – Part 6-Sec 1-1988 (RA 2015)	Qualitative
		Resistance to Artificial sea water	IS 2074-1992(RA 2014) Annexure C	Qualitative

Laboratory MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate,  
Chennai, Tamil Nadu

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6815 (in lieu of T-0774, T-0775)

Page 11 of 22

Validity 21.12.2017 to 20.12.2019

Last Amended on 18.01.2018

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		Chromic Anhydride	IS 2074-1992(RA 2014) Annexure B	2 % to 25 %
		Zinc oxide	IS 2074-1992(RA 2014) Annexure B	2 % to 25 %
3.	Varnish	Acid Value	IS 101 – Part 9-Sec 1-1993 (RA 2014)	2 mg of KOH/g to 50 mg of KOH/g
		Resistance to Water	IS 101 – Part 7-Sec 1-1989 (RA 2014)	Qualitative
4.	Ready Mixed Paint Bituminous Brushing, Black japan, Exterior, petrol resisting, stoving	Resistance to Acid & Alkali	IS 158- 2015 IS 9862- 1981-(RA 2014)	Qualitative
		Resistance to Heat	IS 158- 2015	Qualitative
		Resistance to Chlorine	IS 9862- 1981,(RA 2014)	Qualitative
		Protection Against Corrosion under condition of condensation	IS 101 – Part 6-Sec 1-1988 (RA 2015)	Qualitative
		Lead Restriction test- Electrolysis Method	IS 101 – Part 8-Sec 5-1993 (RA 2014)	upto 1.0 %
		Ash content	IS 341-2016	1 % to 10 %
		Residue on sieve	IS 101 – Part 8-Sec 1-1989 (RA 2014)	upto 5.0 %
		Resistance to Petrol & Lubricating oil	IS 142-1980-(RA 2015)	Qualitative

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)** **Page 12 of 22**

Validity **21.12.2017 to 20.12.2019** **Last Amended on 18.01.2018**

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III.	<b>WATER</b>			
1.	<b>Water for Drinking Purpose</b>	Odour	IS 3025 Part 5-1983 (RA2012)	Qualitative
		Taste	IS 3025 Part 7,8-1984 (RA2012)	Qualitative
		pH at 25°C	IS 3025 Part 11-1983 (RA 2012)	1.0 to 14.0
		Total Dissolved Solids at 180°C	IS 3025 Part 16-1984 (RA 2012)	10 mg/l to 5000 mg/l
		Total Hardness as CaCO <sub>3</sub>	IS 3025 Part 21- 2009 (RA 2014)	2.0 mg/l to 2000 mg/l
		Total Alkalinity as CaCO <sub>3</sub>	IS 3025 Part 23-1986 (RA2014)	5 mg/l to 2000 mg/l
		Chlorides as Cl	IS 3025 Part 32-1988 (RA2014)	1.0 mg/l to 2000 mg/l
		Sulphate as SO <sub>4</sub>	IS 3025 Part 24-1986 (RA2014)	10 mg/l to 2000 mg/l
		Calcium as Ca	IS 3025 Part 40-1991 (RA2014)	2.0 mg/l to 1000 mg/l
		Magnesium as Mg	IS 3025 Part 46-1994 (RA2014)	2.0 mg/l to 1000 mg/l
		Silica as SiO <sub>2</sub>	IS 3025 Part 35-1988 (RA2014)	1.0 mg/l to 100 mg/l
		Iron as Fe	IS 3025 Part 2 - 2004 (RA2014)by ICP OES	0.01 mg/l to 40 mg/l

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Chennai, Tamil Nadu

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6815 (in lieu of T-0774, T-0775)

Page 13 of 22

Validity 21.12.2017 to 20.12.2019

Last Amended on 18.01.2018

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Copper as Cu Zinc as Zn Lead as Pb Cadmium as Cd Manganese as Mn Aluminium as Al Barium as Ba Molybdenum as Mo Nickel as Ni Total Chromium as Cr	IS 3025 Part 2 - 2004 (RA 2014) by ICP OES	0.01 mg/l to 40 mg/l 0.01 mg/l to 40 mg/l 0.01 mg/l to 40 mg/l 0.001 mg/l to 10 mg/l 0.01 mg/l to 40 mg/l 0.01 mg/l to 40 mg/l 0.01 mg/l to 40 mg/l 0.01 mg/l to 40 mg/l 0.01 mg/l to 40 mg/l 0.01 mg/l to 40 mg/l
2.	Water for Construction Purpose	To Neutralize 100ml sample of water using phenolphthalein as an indicator  To Neutralize 100ml sample of water using mixed indicator  pH at 25°C	IS 3025 (Part 22): 1986 (RA 2014)  IS 3025 (Part 23): 1986 (RA 2014)  IS 3025 Part 11-1983 (RA 2012)	0.1 ml to 50 ml  0.1 ml to 50 ml  1.0 to 14.0

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Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6815 (in lieu of T-0774, T-0775)

Page 14 of 22

Validity 21.12.2017 to 20.12.2019

Last Amended on 18.01.2018

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Inorganic Solids	IS 3025 Part 18-1984 (RA2012)	10 mg/l to 5000 mg/l
		Organic Solids	IS 3025 Part 18-1984 (RA2012)	10 mg/l to 1000 mg/l
		Suspended Solids	IS 3025 Part 15-1984 (RA2014)	10 mg/l to 3000 mg/l
		Chloride as Cl	IS 3025 Part 32-1988 (RA2014)	1.0 mg/l to 2000 mg/l
		Sulphate as SO <sub>3</sub>	IS 3025 Part 24-1986 (RA2014)	10 mg/l to 2000 mg/l
<b>IV.</b>	<b>ORES &amp; MINERALS</b>			
<b>1.</b>	<b>Lime Stone</b>	Loss on Ignition	IS 1760 Part 1-1991 (RA 2017)	1.0 % to 44 %
		Silica	IS 1760 Part 2-1991 (RA 2017)	0.50% to 10 %
		CaO	IS 1760 Part 3-1991 (RA 2017)	1.0% to 56.0 %
		MgO	IS 1760 Part 3-1991 (RA 2017)	0.10% to 5.00 %

Laboratory MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6815 (in lieu of T-0774, T-0775) Page 15 of 22

Validity 21.12.2017 to 20.12.2019 Last Amended on 18.01.2018

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
<b>MECHANICAL TESTING</b>				
<b>I.</b>	<b>MECHANICAL PROPERTIES OF METALS</b>			
<b>1.</b>	<b>Ferrous &amp; Non Ferrous Metals Including Weld Metals</b>	Tensile Test Tensile Strength	IS 1608 - 2005 (RA 2011) ASTM A370 - 2017 ASTM E8/E8M - 2016a ISO 6892-1 : 2016 ASME SEC IX - 2017 EN ISO 15614-1:2017 EN ISO 4136-2012 EN 13458-2:2002 IS 7307-1:1974 (RA 2013) AWS D 1.1 - 2015 IS 2825 – 1969 (RA2017) AWS D1.6-2007 API 1104-2013	1 to 950 kN
		Elevated Tensile Test	ASTM E21 - 2009 ISO 6892-2 : 2011	100 °C to 900 °C
		Axial Tensile Test Wedge Tensile Test	IS 1367 Part 3 - 2017 EN ISO 898-1 : 2013 ASTM F606/F606M-2016	
		Yield Strength/0.2%, 0.5% & 1% Proof Strength % of Elongation		1 to 950 kN  1% to 75%
		% Reduction in area		5% to 80%

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)**

Page 16 of 22

Validity **21.12.2017 to 20.12.2019**

Last Amended on **18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Bend Test	IS 1599 – 2012(RA2017) ASTM A370 - 2017 ISO 7438-2016	Mandrel Dia 2mm to 200mm Qualitative
		Bend Test Face/Root/Side bend	ASME SEC IX - 2017 EN ISO 15614-1:2017 EN 13458-2:2002 ISO 5173-2009 IS 7307-1:1974 (RA2013) IS 2825 – 1969 (RA2017) AWS D1.6 – 2007 AWS D1.1-2015 API 1104-2013	Qualitative
		Rebend Test	IS 1786-2008 (RA 2013)	Mandrel Dia 2 mm to 200 mm
		Nick Break Test	API 1104-2013 IS 2825 – 1969 (RA2017)	Qualitative
		Compression Test	ASTM A370-2017	Qualitative
		Fracture Test	ASME SEC IX-2017 AWS D1.1-2015 AWS D1.6-2007 IS 7307-1:1974 (RA2013) ISO 9017-2001	Qualitative
		Hardness Test Rockwell Hardness HRA HRB HRC Superficial Rockwell Hardness	ASTM A370-2017 IS 1586 Part- 12012(RA2017) ASTM E18-2017e1 ISO 6508-1:2016	20 to 88 HRA 45 to 100 HRB 20 to 70 HRC



Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)** **Page 17 of 22**

Validity **21.12.2017 to 20.12.2019** **Last Amended on 18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		HR15T HR30T HR45T HR15N HR30N HR45N	IS 1586 Part-1 2012 (RA 2017) ASTM E18-2017e1 ISO 6508-1:2016	67 to 93 HR15T 29 to 82 HR30T 30 to 70 HR45T 70 to 94 HR 15N 42 to 86 HR30N 20 to 77 HR45N
		Vickers Hardness	IS 1501 Part 1-2013 ASTM E384-2016 ISO 6507-1:2005 ASTM E92-2017	100 to 800 HV (1kg to 50kg)
		Micro Vickers Hardness	IS 1501 Part 1-2013 ASTM E384-2016 ASTM E92-2017 ISO 9015-1:2001 ISO 6507-1:2005	100 to 1000 HV (200gf to 1000gf)
		Brinell Hardness	IS 1500 Part1:2013 ASTM E10-2017 ISO 6506-1:2014	100 to 600 BHN (187.5 to 3000kgs) (2.5,5.0,10.0 mm diameter ball)
2.	<b>Ferrous &amp; Non Ferrous Metals (Including weld metals &amp; all weld metals like Plates, rods, pipes etc)</b>	Charpy Impact Test	IS 1757-Part 1-2014 IS 1499-1977 (RA 2015) ASTM A370-2017 ASTM E23 – 2016B ASME Sec IX-2017 EN ISO 15614-1:2017 ISO 9016-2012 ISO 148-1:2016	4-300 Joules (RT to -196 °C)
		Izod Impact Test	IS 1598-1977 (RA 2015)	5 to 164 Joules

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)** **Page 18 of 22**

Validity **21.12.2017 to 20.12.2019** **Last Amended on 18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
3.	<b>Ferrous &amp; Non Ferrous Pipes &amp; Tubes (Including Welded Pipes)</b>	Flattening Test	ASTM A370- 2017 IS 2328-2005 (RA 2017) ASTM A530/A530M-2012	Qualitative
		Flaring (Flange) Test	IS 2330-2011 ASTM A370-2017 ASTM A450/A450M-2015	Qualitative
		Crush Test	ASTM A370-2017	Qualitative
		Drift Expanding Test	IS 2335-2005 (RA 2017)	Qualitative
		Pull out/Push out Test	ASME SEC IX-2017 ASME SEC VIII DIV 1-2015	Qualitative
4.	<b>Fasteners (External &amp; Internal Threaded)</b>	Embrittlement Test	ASTM F606/F606M-2016	Qualitative
		Proof Load for Bolts, Screws & Studs	IS 1367 Part 3-2017, ISO 898-1-2013 ASTM F606/F606M-2016	Qualitative
		Proof Load for Nuts	IS 1367 Part6-1994 (RA 2015) ISO 898-2:2012	Qualitative
5.	<b>Ferrous &amp; Non Ferrous Billets, Blooms, Hotrolled products, Forgings, Extrusion, Sheets, Plates, Weldments, Castings Machined and Ground Parts</b>	Macro Examination/ Visual Examination	ASTM E340-2015 ASTM E381-2017 IS 11371 -1985 (RA 2012) ASM Metal Hand Book vol.9-2004 ASME SEC IX - 2017 ISO 17639-2013 IS 7307 Part1-1974 (RA 2013)	1X,10X,20X (Qualitative)

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)** **Page 19 of 22**

Validity **21.12.2017 to 20.12.2019** **Last Amended on 18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
6.	<b>Metals and Alloys</b>	Micro Structural Characterization	ASTM E3-2011(Reapproved 2017) ASTM E407-07 (Reapproved 2015)E1 ASM Metals Hand Book Vol-9-2004	50X to 1500X (Qualitative)
7.	<b>Steel &amp; Stainless Steels</b>	Inclusion Rating	IS 4163-2004 (RA2010) ASTM E45-2013	100X (Qualitative)
		Grain Size Measurements by comparison method	ASTM E112-2013 IS 4748-2009 EN ISO 643-2012	Grain size No 1 to 10 (Qualitative)
		Decarburization Depth	ASTM E1077-2014 IS 6396-2000 (RA 2012)	20 microns to 1mm
8.	<b>Grey Cast Iron and S.G. Iron Products</b>	Micro Examination Graphite Flakes/ Nodules type and size, distribution characteristics and matrix analysis	IS 7754 - 1975 (RA 2012) ASM metals hand book vol.9 2004 ASTM A247-2017 ISO 945-1:2008 ISO 1083-2004	50X,100X,200X, 250X,400X,500X, 800X, 1000X,1500X (Qualitative)
9.	<b>Duplex Stainless Steel</b>	Determination of Volume fraction of phase	ASTM E562-2011	5% to 95% (Qualitative)
10.	<b>Case Hardened Steels &amp; Nitrided Steels</b>	Case depth by Hardness Traverse method & Metallography	IS 6416-1988 (RA 2012) IS 13691-1993 (RA 2012) ISO 18203-2016 ASTM B487-85 (RA-13)	0.05mm to 10mm (200gf to 1000gf) 20 mm to 0.3mm

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)**

Page 20 of 22

Validity **21.12.2017 to 20.12.2019**

Last Amended on **18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
11.	<b>Metallic and Oxide coating on Metals</b>	Measurement of Metal and oxide coating thickness by Microscopic method Measurement of thickness of Electro plated Coatings	ISO 1463-2003  IS 3203-1982 (Reaffirmed 2016)	0.01 mm to 0.3mm 0.01 mm to 0.3mm  0.01 mm to 0.3mm
12.	<b>Carbon &amp; Carbon Alloy Steels</b>	Jominy End Quench Test	ASTM A255-10 (Reapproved 2014) IS 3848-1981 (RA 2009) ISO 642-1999	30 HRC to 60 HRC
13.	<b>Stainless Steel wrought /cast products</b>	Intergranular-corrosion Test Practice-A Practice-B Practice-C Practice-E Practice-F	ASTM A262 - 2015	Qualitative 0.001 g to 220g 0.001 g to 220g Qualitative 0.001 g to 220g
14.	<b>Austenitic &amp; Duplex Stainless Steel</b>	Intergranular corrosion of stainless steels (Huey Test)	ISO 3651-1:1998	0.001 g to 220g
15.	<b>Ferritic, Austenitic &amp; Duplex Stainless Steel</b>	Intergranular corrosion of stainless steels	ISO 3651-2:1998	Qualitative
16.	<b>Wrought Nickel Rich Chromium Bearing Alloys</b>	Intergranular-corrosion Test Method A	ASTM G28-2002 (RA 2015)	0.001 g to 220g

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)** **Page 21 of 22**

Validity **21.12.2017 to 20.12.2019** **Last Amended on 18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
17.	Duplex Stainless Steel	Intergranular-corrosion Test Method A Method C	ASTM A923-2014	Qualitative 0.001 g to 220g
18.	Stainless steels Duplex Stainless Steel	Pitting Corrosion Test Method A Method B Method C Method D Method E Method F	ASTM G48-2011 (RA 2015)	0.001 g to 220g
19.	Stainless steels Duplex Stainless Steel	Stress Corrosion cracking test in boiling Magnesium/Calcium Chloride Solution (CSCC)	ASTM G36 – 1994 (RA 2013)	Qualitative
20.	Stainless steels Duplex Stainless Steel & Carbon Steels	Test for Resistance to Sulphide Stress Corrosion Cracking (SSCC at RT, 90 & 120 °C)	NACE TM 0177-2016	Qualitative
21.	Steel Pipes & Pressure Vessel Plates	Test for Resistance to Hydrogen Induced Cracking (HIC)	NACE TM 0284 – 2016	Qualitative
22.	Inorganic & Organic Coating (Plated & Painted) Material	Neutral Salt Spray Testing	ASTM B117 2016 ISO 9227 - 2012	Qualitative

Laboratory **MICROLAB, SP. 101, 2<sup>nd</sup> Main Road, Ambattur Industrial Estate, Chennai, Tamil Nadu**

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

Certificate Number **TC-6815 (in lieu of T-0774, T-0775)** **Page 22 of 22**

Validity **21.12.2017 to 20.12.2019** **Last Amended on 18.01.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
23.	<b>Copper / Nickel/Chromium Coatings on steel, zinc Alloys, Aluminum Alloys &amp; Plastics and on Aluminum Anodized Samples</b>	Copper - Accelerated Acetic Acid Salt Spray Test (CASS Test)	ASTM B368-2009 (RA 2014) ISO 9227 - 2012	Qualitative
24.	<b>Ferrous &amp; Non Ferrous Material (Inorganic &amp; Organic Coatings)</b>	Acetic Acid Salt Spray Test (ASS Test)	ASTM G85 - 2011 IS 9227 - 2012	Qualitative
25.	<b>Copper Base Alloys</b>	Mercurous Nitrate Test Procedure A	IS 2305 - 1988 (RA 2005) ASTM B154 - 2016	Qualitative
26.	<b>Zinc Coating on Ferrous Metals</b>	Mass of Zinc Coating	IS 6745-1972 (RA 2016) ASTM A90/A90M-2013 IS 3618-1966	0.001 g to 220g
27.	<b>Ferritic Stainless Steel</b>	Intergranular Attack in Ferritic Steel	ASTM A763-2015	Qualitative