

Laboratory **IRC Industrial Research & Consultancy Pvt. Ltd., Howrah Amta Road, Baltikuri Bazar, Howrah, West Bengal**

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

Certificate Number **TC-5231**

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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.	Cast Iron, Pig Iron & S.G. Iron	Carbon	IS 12308 (Part 11)	1.5 % to 4.5 %
		Manganese	IS 12308 (Part 10)	0.05 % to 7.0 %
		Silicon	IS 12308 (Part 6)	0.10 % to 6.0 %
		Phosphorus	IS 12308 (Part 5)	0.01 % to 0.50%
		Nickel	IS 12308 (Part 7)	0.50 % to 4.0%
		Sulphur	IS 12308 (Part 2)	0.05 % to 0.25 %
		Chromium	IS 12308 (Part 8)	0.10 % to 2. 50 %
2.	Plain Carbon, Low Alloy Steel	Carbon	IS 228 (Part 1)	0.05 % to 2.50 %
		Manganese for Carbon Steel and High Mn Steel	IS 228 (Part 2)	0.10 % to 1.5 %
		Silicon	IS 228 (Part 8)	0.05 % to 0.50%
		Sulphur for Carbon Steel and Low Alloy Steel	IS 228 (Part 9)	0.01 % to 0.25 %
		Phosphorus	IS 228 (Part 3)	0.01 % 0.10%
		Nickel	IS 228 (Part 5)	0.10 % to 40 %
		Chromium	IS 228 (Part 6)	0.10 % to 40.0 %
		Copper	IS 228 (Part 15)	0.05 % to 5.0 %
	Molybdenum	IS 228 (Part 7)	0.01 % 10%	

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3.	Copper And Copper- Base Alloys	Copper	IS 440 IS 3685 IS 4027,(Part I) IS 3187	0.1 % to 99.98 %
		Lead	IS 440 IS 3685 IS 4027 (Part 1) IS 3187	0.05 % to 20.0 %
		Silicon	IS 3685 IS 4027(Part 10))	0.01 % to 1.0 %
		Zinc	IS 3685 IS 4027 (Part 6) IS 3187	0.05 % to 45.0 %
		Phosphorus	IS 440 IS 4027 (Part 3)	0.01 % to 5.0 %
		Nickel	IS 440 IS 3685 IS 4027 (Part 4) IS 3187	0.05 % to 8.0 %
		Iron	IS 440 IS 3685 IS 4027 (Part 8) IS 3187	0.020 % to 5.5 %
		Tin	IS 3685 IS 4027 (Part 15)	0.01 % to 12.0 %
		Manganese	IS 3187 IS 3685 IS 4027	0.05 % to 4.0 %
		4.	Aluminium & Aluminium-Base Alloys	Aluminium
Silicon	IS 504 (Part I)			0.3 % to 15.0 %
Copper	IS 504 (Part 3)			0.01 % to 0.30 %

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Program Manager

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		Zinc	IS 504 (Part 4)	0.10 % to 0.30 %
		Manganese	IS 504 (Part 5)	0.10 % to 1.0 %
		Magnesium	SO IRC/TM/AL/01 2013 Issue No: 03 Issue Date: 04.02.2013	0.05 % to 0.50 %
		Chromium	IS 504(Part 8)	0.01% to 0.05%
5.	White Metal Lead Base & Tin Base	Tin	IS 1409	1.0 % to 90.0 %
		Antimony	IS 1409	0.7 % to 15.0 %
		Lead	IS 1409	0.10 % to 80.0 %
		Copper	IS 1409	0.10 % to 6.0 %
		Arsenic	IS 1409	0.01 % to 5.0 %
6.	Steels (Plain Carbon & Low Alloy)	Carbon	IS 8811 ASTM E 415	0.01 % to 1.50 %
		Manganese	IS 8811 ASTM E 415	0.01 % to 2.0 %
		Silicon	IS 8811 ASTM E 415	0.05 % to 2.0%
		Sulphur	IS 8811 ASTM E 415	0.005 % to 0.10%
		Phosphorus	IS 8811 ASTM E 415	0.005 % to 0.10 %
		Nickel	IS 8811 ASTM E 415	0.10 % to 5.0 %
		Chromium	IS 8811 ASTM E 415	0.05 % to 5.0 %
		Copper	IS 8811 ASTM E 415	0.010 % to 0.50 %
		Molybdenum	IS 8811 ASTM E 415	0.01 % to 1.5 %
		Niobium	IS 8811	0.008 % to 0.076 %

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
			ASTM E 415	
		Aluminium	IS 8811 ASTM E 415	0.005 % to 0.15 %
		Cobalt	IS 8811 ASTM E 415	0.01 % to 0.2 %
7.	Cr – CrNi Steels (Stainless Steel)	Carbon	IS 9879 ASTM E 1086	0.005 % to 0.30 %
		Manganese	IS 9879 ASTM E 1086	0.1 % to 5.0 %
		Silicon	IS 9879 ASTM E 1086	0.1% to 2.0%
		Sulphur	IS 9879 ASTM E 1086	0.002 % to 0.10%
		Phosphorus	IS 9879 ASTM E 1086	0.002 % to 0.10 %
		Nickel	IS 9879 ASTM E 1086	2.0 % to 25.0 %
		Chromium	IS 9879 ASTM E 1086	5.0 % to 20.0 %
		Copper	IS 9879 ASTM E 1086	0.001 % to 0.50 %
		Molybdenum	IS 9879 ASTM E 1086	0.010 % to 3.0 %
8.	Tool Steel	Tungsten	IRC/TM/SS/01 2013 Issue No: 03 Issue Date: 04.02.2013	5 % to 20 %
		Cobalt	IRC/TM/SS/02 2013 Issue No: 03 Issue Date: 04.02.2013	0.05 % to 5.5%
9.	Copper And Copper–Base Alloys	Copper	IRC/TM/CU/01 2013 Issue No: 03 Issue Date: 04.02.2013	50 % to 99.98 %
		Zinc	IRC/TM/CU/02 2013 Issue No: 03 Issue Date:	0.05 % to 40.0 %

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			04.02.2013	
		Tin	IRC/TM/CU/03 2013 Issue No: 03 Issue Date: 04.02.2013	0.05 % to 15.0 %
		Lead	IRC/TM/CU/04 2013 Issue No: 03 Issue Date: 04.02.2013	0.01 % to 7.0 %
		Manganese	IRC/TM/CU/05 2013 Issue No: 03 Issue Date: 04.02.2013	0.01 % to 1.5 %
		Silicon	IRC/TM/CU/08 2013 Issue No: 03 Issue Date: 04.02.2013	0.005 % to 1.0 %
		Antimony	IRC/TM/CU/10 2013 Issue No: 03 Issue Date: 04.02.2013	0.01 % to 0.5 %
		Magnesium	IRC/TM/CU/11 2013 Issue No: 03 Issue Date: 04.02.2013	0.01 % to 0.50 %
		Chromium	IRC/TM/CU/12 2013 Issue No: 03 Issue Date: 04.02.2013	0.01 % to 0.1 %
		Phosphorus	IRC/TM/CU/13 2013 Issue No: 03 Issue Date: 04.02.2013	0.01 % to 1.0 %
		Arsenic	IRC/TM/CU/14 2013 Issue No: 03 Issue Date: 04.02.2013	0.05 % to 0.5 %
		Bismuth	IRC/TM/CU/15 2013 Issue No: 03 Issue Date: 04.02.2013	0.02 % to 0.5 %
		Silver	IRC/TM/CU/16 2013 Issue No: 03 Issue Date:	0.001 % to 0.5 %

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10.	Aluminium & Aluminium-Base Alloys	Silicon	04.02.2013 IS 11035	0.30 % to 15%
		Copper	ASTM E 1251	0.01 % to 0.30 %
		Zinc		0.10 % to 0.30 %
		Manganese		0.10 % to 1.00 %
		Magnesium		0.05 % to 0.50 %
		Iron		0.10 % to 0.50 %
		Chromium		0.01 % to 0.05 %
Nickel		0.004 % to 0.15 %		

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MECHANICAL TESTING				
I.	MECHANICAL PROPERTIES OF METALS			
1.	Ferrous & Non – Ferrous Materials	Tensile Test Y.S. -0.2 & 0.5 % P.S	IS 1608 ASTM A 370	10 kN to 400 kN load. (L.C. to100N).
		U.T.S.,	BS EN ISO 6892 -1 ASTM: E 8/E8M	25 kN to 1000 kN load. (L.C.–200N).
		% Elongation		1 % to 90%
		% R.A		1 % to 90%
		Breaking Load Test	IS 1608 ASTM A 370 BS EN ISO 6892-1 ASTM: E 8/E8M	10 kN to 400 kN load. (L.C.–100N). 25 kN to 1000 kN load. (L.C.–200N). Qualitative
		Compression Test Permanent Set Test Twist Test	IS 3063	Upto 750 kN
		Bend Test (Plate & Bar)	IS 1599 ASTM A 370 ASTM E 190	Max. Load–400 kN Mandrel Diameter – (3,10,12,16,20,25,30,38, 40,50,62,75,80,135,175, 177 & 205) mm. Qualitative
		Brinell Hardness Test	IS 1500 (Part – 1) ISO: 6506 -1 ASTM A 370 ASTM E 10	100 HBW to 450 HBW
		Rockwell Hardness Test	IS: 1586 (Part – 1) ASTM A 370 ASTM E 18	HRA : 40 to 88 HRB/W : 25 to 100 HRC : 20 to 70
2.		Ferrous Welded test	Tensile Test	IS 2825 IS 7307 (Part 1)

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	coupon		ASME Sec. IX AWS: D 1.1	
		Bend Test	IS 2825 IS 7307 (Part 1) IS 7310 (Part 1) ASME Sec. IX AWS: D 1.1	Qualitative
		Macro Examination	IS 2825 IS 7307 (Part 1) IS 7310 (Part 1) ASME Sec. IX AWS: D 1.1	Qualitative
		Fracture Test	IS 2825 IS 7307 (Part 1) IS 7310 (Part 1) ASME Sec. IX AWS: D 1.1	Qualitative
		Nick Break Test	IS 2825	Qualitative
3.	Deformed Steel Bars	Tensile Test	IS 1786	Max. Load-1000 kN
		Yield Stress	IS 1786	Max. Load-1000 kN
		% of Elongation	IS 1786	Max. Load-1000 kN
		Bend Test	IS 1786	Qualitative
		Rib-area	IS 1786	0.01 to 2.2 mm ²
		Mass Per Meter Run	IS 1786	Upto 30 kg
4.	Steel Fasteners	Tensile and Proof Load Test	IS 1367 Part - 3/Part - 6 ISO 898 (Part -1)/(Part -2) ASTM A 193/193M ASTM A 194/194M	Mandrel for Bolt- M8,M10,M12,M14, M16,M18,M24,M27,M30, M33,M36,M39 Mandrel for nut- M8,M10,M12,M14, M16,M18,M24,M27,M30, M33,M36,M39
5.		Shear Test	IS 5242	10 kN to400 kN

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	Ferrous Bolts & Rivets	Head Soundness Test	IS 10102 IS 1367(Part – 3)	Dia-8,10,12,14,16,18,20,22,24,27
		Dump Test	IS 1148	Dia-8,10,12,14,16,18,20,22,24,27
6.	Ferrous & Non – Ferrous Tubes	Flattening Test	IS 2328 ISO 8492 ASTM A 370 ASTM A 450 ASTM A 530	Steel up to 400 mm diameter & 60 mm thick. Non – Ferrous Up to 100 mm diameter & 10 mm thick Qualitative
7.	Non – ferrous tubes → Copper	Doubling Over Test	IS 2501	Up to 100 mm diameter & 10 mm thick Qualitative
8.	Ferrous & Non – Ferrous Tube & Tube Fittings	Drift Expansion Test	IS 2335 ISO 8493 IS 1239 (Part 2)	Steel Tubes upto 150 mm diameter. Thickness 10mm (Max)
9.	Metal And Insulator Fittings For Overhead Powerlines Upto And Above 1000v	Visual Examination	IS 2486(Part-1) IS 2486(Part 2) IS 7935 BS 3288 (Part 1) Relevant Drawing	Qualitative
		Verification of Dimensions	IS 2486 (Part-1) IS 2486 (Part-2) IS 7935 BS 3288(Part 1), Relevant Drawing	0 to 200 mm
		Tensile Strength	IS 2486 (Part-1) IS 2486 (Part-2) IS 7935 BS 3288 (Part 1) Relevant Drawing	Max. Load to 1000 kN
		Slip Strength	IS 2486 (Part-1) IS 2486 (Part-2) IS 7935	Qualitative

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			BS 3288 (Part 1) Relevant Drawing	
		Load Test	IS 2486 (Part-1) IS 2486 (Part-2) IS 7935 BS 3288 (Part 1), Relevant Drawing	10 kN to 1000 kN
10.	Iron And Steel Products	Mass of Zinc coating Uniformity of coating Adhesion test Electro-plating Test	IS 6745 IS 2629 Clause 6.2,6.3 & 6.4.2 IS 2633	5 g/m ² to 1000 g/m ²
11.	Rolled Steel Products	Nominal Dimensions Weight /Meter (Mass) Sectional Area	IS 808 IS 1730 IS 1732 IS 1852	Length: Upto 100mm Width: Upto 200mm Thickness: Upto 200mm Weight: Upto 10 kg Qualitative
II.	METALLOGRAPHY TEST			
1.	Ferrous & Non – Ferrous Metals	Microscopic Examination for Microstructure	IS 7739 (Part-1) (Part-2- 4) IS 7754 ASTM Metals Handbook. Volume – 7, 8 TH edition	50X, 75X, 100X, 200X & 500X magnifications only. Qualitative
2.	Steels	Measurement of decarburized depth Measuring case depth	IS 6396 IS 7739 (Part – I) IS 6416 Clause no. 8	10– 1000 Microns L.C- 10 microns 10-3000 microns L.C-10 Microns
		Determination of non – metallic inclusion content by microscopic method	IS 4163 ISO 4967 ASTM E45 Method – A.	Qualitative
3.	Steel Products	Macroscopic study	IS 13015	20X magnification Qualitative
4.	Ferrous & Non –	Estimation of :	IS 4748	75 magnifications for

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	Ferrous Metals	a) Average Grain Size. b) Austenitic grain size for steel.	IS 7739 (Parts- I,III,IV & V) ASTM E 112	Copper & 100 magnification for others. ASTM grain size Nos.1 – 10. Qualitative
5.	Electro plated coatings for ferrous & non – ferrous metals.	Testing of coating thickness by microscopic examination.	IS 3203 Clause no.3	Coating Thickness. 10 to 1000 microns L.C- 10 microns
6.	Austenitic Stainless Steels	Detecting susceptibility to inter granular attack.	ASTM A 262 Practice – A	Qualitative

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NON-DESTRUCTIVE TESTING				
1.	METALS & ALLOYS			
1.	Ferrous and Non ferrous casting, welded joints & various components	Detection of internal defects by gamma rays (Ir- 192)	ASME SEC V, Article 2 & 22 IS 2825 IS 2595 IS 1182	7mm to 65mm thickness of steel or equivalent
2.	Welded Joints, Steel & Aluminium Components.	Detection of internal defects by x-ray	ASME SEC V, Article 2 & 22 IS 2825 IS 2595 IS 1182	6mm to 20mm of Steel thickness or equivalent.
3.	Ferritic Steel Forging	Ultrasonic Testing (UT)	ASTM SA 388/388M ASTM E 114 IS 3664 IS 8791 BHEL: FF: 01.NDT.001 Tisco Std. 03039	From 25 mm to maximum 1000 mm steel thickness
4.	Ferritic Steel Casting	Ultrasonic Testing (UT)	ASTM SA 609 IS 9565 IS 7666	From 10 mm to maximum 600 mm steel thickness
5.	Ferritic Steel Plates	Ultrasonic Testing (UT)	ASTM SA 435/435M ASTM SA 578/578M IS 4225	9 mm to 200 mm steel thickness
6.	Steel Pipe And Tubing	Ultrasonic Testing (UT)	ASTM SE 213 IS 6394	Min 5 mm steel thickness & Min. 2" dia pipe

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7.	Weldmet In Ferritic Steel	Ultrasonic Testing (UT)	IS 4260 ASME-sec-VIII, Appendix-12, Div-1 UW-53 AWS-D1.1/D1.1M ASME SEC V (Article-4)	6 mm to 100 mm steel thickness. 2 mm Ø hole minimum
8.	Ferromagnetic Materials	Magnetic Particle Testing for Surface & Sub Surface defects by fluroscent and visual technique (Yoke Method)	ASTM SE 709 ASME Sec-V,(Article-7), ASTM SE -1444 ASTM SA275 IS 5334-2003 IS 6752 IS 3703 IS 10724	Defects upto 3 mm depth
9.	Ferrous and Non ferrous metals	Liquid Penetrant Testing	ASME Sec V, Article 6 ASTM SE 165 IS 3658	Defects open to surface