

Laboratory

Metallurgical Services Private Limited, Mehta House, Ashok Silk Mills Lane, Off. L.B.S. Marg, Ghatkopar (W), Mumbai, Maharashtra

Location 1: Mehta House, Ashok Silk Mills Lane, Off. L.B.S. Marg, Ghatkopar (W), Mumbai, Maharashtra

Location 2: 17, A-1, Shiv Shakti Industrial Estate, Off. L.B.S. Marg, Ghatkopar (W), Mumbai, Maharashtra

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-7586 (in lieu of T-0135, T-0136 & T-4085) Page 1 of 51

Validity 15.07.2018 to 14.07.2020 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
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**CHEMICAL TESTING**

I.	METAL & METAL ALLOYS			
A.	Optical Emission Spectrometer (Oes)			
1.	Plain Carbon steel and Low Alloy steel	Aluminum	ASTM E 415-2017 IS 8811:2012	0.001 % to 0.075 % 0.005 % to 0.15 %
		Arsenic	ASTM E 415-2017 IS 8811:2012	0.05 % to 0.1 % 0.005 % to 0.05 %
		Boron	ASTM E 415-2017 IS 8811:2012	0.002 % to 0.007 % 0.005 % to 0.010 %
		Carbon	ASTM E 415-2017 IS 8811:2012	0.08 % to 1.1 % 0.01 % to 1.5 %
		Chromium	ASTM E 415-2017 IS 8811:2012	0.01 % to 2.25 % 0.05 % to 5.0 %
		Cobalt	ASTM E 415-2017 IS 8811:2012	0.008 % to 0.18 % 0.01 % to 0.20 %
		Copper	ASTM E 415:2017 IS 8811:2012	0.01 % to 0.5 % 0.01 % to 0.5 %
		Manganese	ASTM E 415-2017 IS 8811:2012	0.01 % to 2.0 % 0.01 % to 2.0 %
		Molybdenum	ASTM E 415:2017 IS 8811:2012	0.03 % to 0.6 % 0.01 % to 1.5 %
		Nickel	ASTM E 415-2017 IS 8811:2012	0.01 % to 5.0 % 0.05 % to 5.0 %
		Niobium	ASTM E 415-2017 IS 8811:2012	0.01 % to 0.085 % 0.008 to 0.076

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		Nitrogen	ASTM E 415-2017 IS 228 pt. 23:2003 (RA 2008)	0.001 % to 0.015 % 0.002 % to 1.0 %
		Phosphorous	ASTM E 415-2017 IS 8811:2012	0.02 % to 0.085 % 0.005 to 0.1
		Silicon	ASTM E 415-2017 IS 8811:2012	0.07 % to 1.15 % 0.05 % to 2.0 %
		Sulphur	ASTM E 415-2017 IS 8811:2012	0.001 % to 0.055 % 0.005 % to 0.1 %
		Tin	ASTM E 415-2017 IS 8811:2012	0.01 % to 0.045 % 0.003 % to 0.1 %
		Titanium	ASTM E 415-2017 IS 8811:2012	0.001 % to 0.2 % 0.01 to 0.25
		Vanadium	ASTM E 415-2017 IS 8811:2012	0.001 % to 0.3 % 0.001 % to 1.0 %
		Zirconium	ASTM E 415-2017 IS 8811:2012	0.02 to 0.05 0.001 % to 0.05 %
<b>2.</b>	<b>Stainless Steel</b>	Carbon	ASTM E 1086-2014	0.005 % to 0.25 %
		Chromium	ASTM E 1086:2014 IS 9879:1998 (RA 2015)	17.0 % to 23.0 % 5.0 % to 20.0 %
		Copper	ASTM E:1086:2014	0.01 % to 0.4 %
		Manganese	ASTM E:1086-2014 IS 9879:1998 (RA 2015)	0.01 % to 2.0 % 0.10 % to 5.0 %
		Molybdenum	ASTM E:1086:2014 IS 9879:1998 (RA 2015)	0.1 % to 3.0 % 0.01 % to 3.0 %
		Nickel	ASTM E 1086-2014 IS 9879:1998 (RA 2015)	7.5 % to 13.0 % 2.0 % to 15.0 %
		Phosphorous	ASTM E:1086-2014	0.003 % to 0.15 %

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			IS 9879:1998 (RA 2015)	0.002 % to 0.10 %
		Silicon	ASTM E:1086-2014 IS 9879:1998 (RA 2015)	0.01 % to 0.9 % 0.01 % to 2.0 %
		Sulphur	ASTM E:1086-2014 IS 9879:1998 (RA 2015)	0.003 % to 0.065 % 0.002 % to 0.10 %
		Nitrogen	IS 228 pt. 23:2003 (RA 2008)	0.001 % to 0.015 % 0.002 % to 1.0 %
3.	Plain Carbon steel and Low Alloy steel	Aluminum	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.01 % to 1.22 %
		Arsenic	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.01 % to 0.05 %
		Silicon	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.010 % to 0.070 %
		Carbon	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.010 % to 0.080 %
		Antimony	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.003 % to 0.07 %
		Boron	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.005 % to 0.010 %
		Boron	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.0002 % to 0.005 %
		Chromium	SOP No:MSPL/SOP/26A Issue:02/27.02.18	2.25 % to 5.5 %
		Copper	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.5 % to 5.0 %
		Lead	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.01 % to 0.25 %
		Nickel	SOP No:MSPL/SOP/26A	0.5 % to 5.0 %

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			Issue:02/27.02.18	
		Niobium	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.01 % to 0.10 %
		Nitrogen	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.005 % to 0.08 %
		Phosphorous	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.003 % to 0.1 %
		Tungsten	SOP No:MSPL/SOP/26A Issue:02/27.02.18	0.01 % to 1.0 %
4.	Tool Steel	Carbon	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.35 % to 2.5 %
		Chromium	SOP No:MSPL/SOP/26B Issue:02/27.02.18	3.0 % to 15.0 %
		Cobalt	SOP No:MSPL/SOP/26B Issue:02/27.02.18	4.0 % to 11 %
		Manganese	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.10 % to 1.0 %
		Molybdenum	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.01 % to 10.0 %
		Phosphorous	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.003 % to 0.03 %
		Silicon	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.10 % to 1.0 %
		Sulphur	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.005 % to 0.030 %
		Tungsten	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.50 % to 18.0 %
		Vanadium	SOP No:MSPL/SOP/26B	0.30 % to 3.0 %

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			Issue:02/27.02.18	
		Copper	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.01 % to 0.20 %
		Nickel	SOP No:MSPL/SOP/26B Issue:02/27.02.18	0.01 % to 0.75 %
5.	<b>Stainless Steel</b>	Aluminum	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.01 % to 1.22 %
		Boron	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.005 % to 0.010 %
		Carbon	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.25 % to 1.25 %
		Chromium	SOP No:MSPL/SOP/26C Issue:02/27.02.18	8.0 % to 17.0 % 23.0 % to 25.75 %
		Copper	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.3 % to 5.0 %
		Manganese	SOP No:MSPL/SOP/26C Issue:02/27.02.18	2.0 % to 2.50 %
		Nickel	SOP No:MSPL/SOP/26C Issue:02/27.02.18	13.0 % to 35.0 %
		Niobium	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.01 % to 2.5 %
		Nitrogen	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.005 % to 0.38 %
		Phosphorous	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.01 % to 0.1 %
		Silicon	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.01 % to 2.5 %
		Sulphur	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.065 % to 0.10 %

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		Titanium	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.01 % to 1.0 % 0.01 % to 2.0 %
		Tungsten	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.01 % to 1.0 %
		Vanadium	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.01 % to 0.30 %
		Cobalt	SOP No:MSPL/SOP/26C Issue:02/27.02.18	0.02 % to 1.0 %
		Molybdenum	SOP No:MSPL/SOP/26C Issue:02/27.02.18	3.0 % to 4.0 % 3.0 % to 6.20 %
<b>6.</b>	<b>Manganese Steel</b>	Carbon	SOP No:MSPL/SOP/26D Issue:02/27.02.18	0.7 % to 1.5 %
		Chromium	SOP No:MSPL/SOP/26D Issue:02/27.02.18	1.0 % to 3.0 % 16.0 % to 24.0 %
		Manganese	SOP No:MSPL/SOP/26D Issue:02/27.02.18	5.5 to 15.50
		Molybdenum	SOP No:MSPL/SOP/26D Issue:02/27.02.18	0.10 % to 2.0 %
		Nickel	SOP No:MSPL/SOP/26D Issue:02/27.02.18	3.0 % to 9.0 %
		Phosphorous	SOP No:MSPL/SOP/26D Issue:02/27.02.18	0.01 % to 0.1 %
		Silicon	SOP No:MSPL/SOP/26D Issue:02/27.02.18	0.01 % to 2.0 %
		Sulphur	SOP No:MSPL/SOP/26D Issue:02/27.02.18	0.01 % to 0.030 %
		Manganese	SOP No:MSPL/SOP/26D Issue:02/27.02.18	5.5 % to 15.50 % 5.5 % to 20.0 %
<b>7.</b>	<b>Aluminium Alloy</b>	Chromium	ASTM E 1251:2017a	0.01 % to 0.23 %

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		Copper	ASTM E 1251:2017a	0.01 % to 3.0 %
		Iron	ASTM E 1251:2017a	0.01 % to 0.5 %
		Lead	ASTM E 1251:2017a	0.01 % to 0.6 %
		Magnesium	ASTM E 1251:2017a	0.01 % to 4.0 %
		Manganese	ASTM E 1251:2017a	0.01 % to 1.2 %
		Nickel	ASTM E 1251:2017a	0.01 % to 2.6 %
		Silicon	ASTM E 1251:2017a	0.01 % to 11.0 %
		Silicon	ASTM E 1251:2017a	0.01 % to 12.5 %
		Tin	ASTM E 1251:2017a	0.01 % to 0.5 %
		Titanium	ASTM E 1251:2017a	0.01 % to 0.12 %
		Vanadium	ASTM E 1251:2017a	0.01 % to 0.022 %
		Copper	ASTM E 1251:2017a	0.01 % to 3.0 % 3.0 % to 5.5 %
		Iron	ASTM E 1251:2017a	0.01 % to 0.5 % 0.01 % to 1.25 %
		Zinc	ASTM E 1251:2017a	0.01 % to 1.5 % 0.01 % to 5.7 %
8.	Metal & Alloys (Copper Base Alloy) Brass, bronze, Al. Bronze, Gun metal, Phosphor, bronze	Aluminum	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 11.50 %
		Arsenic	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 0.25 %
		Bismuth	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.001 % to 0.15 %
		Chromium	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 0.10 %
		Iron	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 5.0 %

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		Lead	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.001 % to 12.5 %
		Manganese	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 1.8 %
		Nickel	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 33.0 %
		Phosphorus	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 0.40 %
		Silicon	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 0.50 %
		Sulphur	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.001 % to 0.10 %
		Tin	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.01 % to 9.0 %
		Zinc	SOP No:MSPL/SOP/33 Issue:02/27.02.18	0.001 % to 40.0 %
		Copper	SOP No:MSPL/SOP/33 Issue:02/27.02.18	55.0 % to 95.00 %
9.	Metal & alloys Nickel base Inconel Incoloy Hastelloy Monel	Aluminum	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 4.0 %
		Boron	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.003 % to 0.005 %
		Chromium	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 21.50 %
		Cobalt	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 2.5 %
		Copper	SOP No:MSPL/SOP/34	0.01 % to 26.0 %

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			Issue:02/27.02.18	0.01 % to 35.0 %
		Iron	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 10.0 % 0.01 % to 30.0 %
		Lead	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 0.050 %
		Magnesium	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 0.030 %
		Manganese	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 2.0 %
		Molybdenum	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 26.0 %
		Nickel	SOP No:MSPL/SOP/34 Issue:02/27.02.18	50.0 % to 75.0 %
		Niobium	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.1 % to 5.70 %
		Phosphorus	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 0.055 %
		Silicon	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 4.1 %
		Sulphur	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 0.075 %
		Titanium	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 3.0 %
		Tungsten	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 3.25 %
		Vanadium	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 0.2 %
		Carbon	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.003 % to 0.010 % 0.01 % to 0.15 %

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		Chromium	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 21.50 % 0.01 % to 30.00 %
		Nickel	SOP No:MSPL/SOP/34 Issue:02/27.02.18	30 % % to 50 % 50.0 % to 75.0 %
		Phosphorus	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.005 % to 0.010 % 0.01 % to 0.055 %
		Sulphur	SOP No:MSPL/SOP/34 Issue:02/27.02.18	0.01 % to 0.075 % 0.001 % to 0.010 %
<b>B.</b>	<b>Wet Analysis</b>			
1.	Iron Alloys (Carbon Steel And Low Alloy Steel).	Chromium	ASTM E 350-2012. IS 228 PT (6):1987 (RA 2014) SOP No:MSPL/SOP/30 Issue:06/27.02.18	0.01 % to 3.99 % 0.1 % to 5.0 %
		Manganese	ASTM E 350-2012 IS -228 PART (2):1987 (RA 2014)	0.10 % to 2.50 % 0.1 % to 2.0 %
		Molybdenum	SOP No:MSPL/SOP/07 Issue:01/14.04.16 IS 228 Part-7:90 (RA 2014)	1.0 % to 3.0 % 1.0 % to 3.0 %
		Nickel	ASTM E 350-2012 IS 228 Part (5):87 (RA 2014)	0.1 % % to 5.0 % 0.1 % % to 5.0 %
		Niobium+ Tantalum (As Niobium)	SOP No:MSPL/SOP/28 Issue:06/27.02.18	0.01 % to 1.45 %
		Phosphorus	ASTM E 350-2012 IS 228 Part (3):87 (RA 2014)	0.020 % to 0.25 % 0.01 % to 0.50 %
		Silicon	ASTM E 350-2012	0.05 % to 3.50 %

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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
			IS 228 Part (8):89 (RA 2014)	0.05 % to 3.50 %
		Tungsten	SOP No:MSPL/SOP/13 Issue:06/27.02.18	0.50 % to 2.0 %
		Vanadium	SOP No:MSPL/SOP/14 Issue:06/27.02.18	0.01 % to 2.0 %
2.	<b>Iron Alloys (Stainless Steel)</b>	Chromium	ASTM E 353-2014 IS 228 part-6:90(RA 2014) SOP No:MSPL/SOP/30 Issue:06/27.02.18	0.1 % to 35.0 % 0.10 % to 30.0 %
		Molybdenum	SOP No:MSPL/SOP/07 Issue:06/27.02.18 IS 228 Part-7:90 (RA 2018)	1.0 % to 3.0 % 0.1 % to 4.0 %
		Nickel	ASTM E 353-2014 IS 228 Part (5):87 (RA 2014)	0.1 % to 48.0 % 0.5 % to 36.0 %
		Niobium+ Tantalum (as Niobium)	SOP No:MSPL/SOP/28 Issue:02/27.02.18	0.01 % to 1.45 %
		Phosphorus	ASTM E 353-2014 IS 228 Part (3):87 (RA 2018)	0.020 % to 0.35 % 0.005 % to 0.50 %
		Silicon	ASTM E 353-2014 IS 228 Part (8):89 (RA 2014)	0.050 % to 4.0 % 0.05 % to 4.0 %
		Tungsten	SOP No:MSPL/SOP/13 Issue:06/27.02.18	0.50 % to 10.0 %

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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
		Vanadium	SOP No:MSPL/SOP/14 Issue:06/27.02.18	0.01 % to 2.0 %
3.	Iron Alloy (Tool Steel & high alloy steel)	Chromium	ASTM E 352-2013  SOP No:MSPL/SOP/30 Issue:06/27.02.18	0.1 % to 14.0 %  0.10 % to 17.00 %
		Molybdenum	SOP No:MSPL/SOP/07 Issue:06/27.02.18	0.1 % to 6.0 %
		Nickel	ASTM E 352-2013	0.1 % % to 4.30 %
		Phosphorus	ASTM E 352-2013	0.005 % to 0.050 %
		Silicon	ASTM E 352-2013 IS 228 part-8:90(RA 2014)	0.1 % to 2.50 % 0.050 % to 5.0 %
		Tungsten	SOP No:MSPL/SOP/13 Issue:06/27.02.18	0.50 % to 21.0 %
		Vanadium	SOP No:MSPL/SOP/14 Issue:06/27.02.18	0.01 % to 2.0 %
4.	Iron Alloys (Cast Iron)	Chromium	ASTM E 351:2013  IS 12308 Pt (8):1997 (RA 2018)	0.05 % to 30.0 %  0.10 % to 28.0 %
		Manganese	ASTM E 351:2013 12308 (Pt.10):91 (RA 2018)	0.1 % to 2.50 % 0.01 % to 1.8 %
		Molybdenum	SOP NO:MSPL/SOP/07 Issue:06/27.02.18 IS 12308 (Pt.9):93 (RA 2018)	0.1 % to 3.0 %  0 % to 1.0 %

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		Nickel	ASTM E 351:2013 IS 12308 (Pt.7):1991 (RA 2018)	0.1 % to 36 % 0.55 % to 36 %
		Phosphorus	ASTM E 351:2013 IS 12308 (Pt.5):91 (RA 2018)	0.01 % to 0.90 % 0.01 % to 0.50 %
		Silicon	ASTM E 351:2013 IS 12308 (Pt.6):91 (RA 2018)	0.1 % to 6.0 % 0.1 % to 6.0 %
5.	Aluminium Alloys	Silicon	ASTM E 34-2011 IS 504 (Part 1):2002	0.05 % to 20 % 0.05 % to 20 %
6.	Copper Alloys	Beryllium	ASTM E 2824-2011	0.1 % to 3.0 %
		Copper (All By Electrolysis)	IS 3685:66 (RA 2018) IS 4027 (Pt.1):87 (RA 2018) ASTM E 53(2013) SOP No:MSPL/SOP/29 Issue:Issue:06/27.02.18	0.1 % to 85 % 0.1 % to 85 % 99.75 % to 99.95 % 55.00 % to 99.99 %
		Lead (Electrolysis)	IS 3685:1966 (RA 00) IS 4027 (Pt.1):1987 (RA 2018) SOP No:MSPL/SOP/29	0.01 % to 15.0 % 0.01 % to 15.0 % 0.01 % to 15.0 %

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			Issue:06/27.02.18	
		Nickel	ASTM E 478:(2017)	4.0 % to 50 %
		Phosphorus	IS 3685:1966 (RA 2018)	0.01 % to 0.5 %
		Silicon	ASTM E 54-80:1990	0.01 % to 5 %
		Tin	ASTM E 478 (2017)	0.5 % to 20 %
7.	<b>Metals &amp; Alloys (Lead Base)</b>	Antimony	IS 403:1964 (RA 2000)	0.1 % to 15 %
		Tin	SOP No:MSPL/SOP/22 Issue:06/27.02.18	1 % to 82.2 %
8.	<b>Metals &amp; Alloys (Tin Base)</b>	Antimony	IS 403:1964 (RA 2016)	0.1 % to 15 %
		Antimony	IS 1409:1949 (RA 2000)	0.1 % to 15 %
		Tin	SOP No:MSPL/SOP/22 Issue:06/27.02.18	1 % to 82.2 %
9.	<b>Nickel base Hastelloy Metals &amp; alloys (MONEL)</b>	Carbon	ASTM E 1019:2011	0.005 % to 1.0 %
		Sulphur	ASTM E 1019: 2011	0.002 % to 0.1 %
		Silicon	ASTM E 354:2014	0.05 % to 5.0 %
		Chromium	ASTM E 354:2014	0.10 % to 33.00 %
		Nickel	ASTM E 354:2014	30.0 % to 84.0 %
		Molybdenum	ASTM E 354:2014	1.5 % to 30.0 %
		Copper	SOP No:MSPL/SOP/29 Issue:06/27.02.18	28.0 % to 35.0 %
		Lead	SOP No:MSPL/SOP/29 Issue:06/27.02.18	0.01 % to 15.0 %

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		Tungsten	SOP No:MSPL/SOP/13 Issue:Issue:06/27.02.18	0.01 % to 7.00 %
10.	Copper Base Alloy	Mercurous Nitrate Test For Crack Detection	ASTM B 154:2016 IS 2305:1988 (RA 2015)	Qualitative
			BS 2874	Qualitative
11.	Copper	Carbon Film Test	BS-EN-1057:2010	Qualitative
12.	Metals & Alloys (Zinc Coated Iron And Steel Product)	Mass of Zinc Coating	IS 6745:1972 (RA 2016) (Loss In Weight)  ASTM A-90: 2018 AS 2331:2.1-2001	1.0 g to 500 g/M <sup>2</sup> 501 g to 1500 g/M <sup>2</sup>  1.0 g to 500 g/M <sup>2</sup> 501 g to 1500 g/M <sup>2</sup>
13.	Metals & Alloys (Zinc Coated Iron And Steel Product)	Uniformity Of Zinc Coating	IS 2633:1986 (RA 2016)  ASTM A-239:2014	Qualitative  Qualitative
14.	Metals & Alloys (Zinc Coated Iron And Steel Product)	Adhesion Test	IS 2629:1985(RA 2016)	Qualitative
C.	ICP-AES Technique			
1.	Iron/Nickel Alloys	Aluminum	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.01 % to 1.5 %
		Chromium	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.015 % to 27.0 %
		Cobalt	SOP No:MSPL/SOP/25A/B	0.01 % to 5.0 %

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			Issue:02/27.02.18	
		Copper	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.01 % to 4.00 %
		Iron	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.01 % to 11.0 %
		Manganese	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.01 % to 20 %
		Molybdenum	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.01 % to 35 %
		Nickel	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.01 % to 35.5 % (SS)
		Phosphorus	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.01 % to 0.25 %
		Titanium	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.01 % to 2.0 %
		Vanadium	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.010 % to 2.0 %
<b>2.</b>	<b>Iron/Nickel Alloys</b>	Calcium	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.0001 % to 0.005 %
		Magnesium	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.0001 % to 0.005 %
		Antimony	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.001 % to 0.10 %
		Tin	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.001 % to 0.050 %
		Arsenic	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.001 % to 0.010 %
		Boron	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.0001 to 0.020

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		Zirconium	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.001 to 0.10
		Lead	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.001 to 0.35
		Niobium	SOP No:MSPL/SOP/25A/B Issue:02/27.02.18	0.001 % to 5.35 %
3.	Aluminium Alloys	Chromium	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 0.25 %
		Copper	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 2.50 %
		Iron	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 0.75 %
		Lead	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 0.10 %
		Magnesium	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 2.70 %
		Manganese	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 1.10 %
		Nickel	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 2.0 %
		Tin	SOP No:MSPL/SOP/25F Issue:02/27.02.18	Up % to 0.05 %
		Titanium	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 0.25 %
		Zinc	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 6.0 %
		Beryllium	SOP No:MSPL/SOP/25F	0.0001 % to 0.001 %

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			Issue:02/27.02.18	
		Zirconium	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.001 % to 0.20 %
		Vanadium	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.01 % to 0.25 %
		Gallium	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.0001 % to 0.025 %
		Cadmium	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.0001 % to 0.025 %
		Bismuth	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.0001 % to 0.025 %
		Strontium	SOP No:MSPL/SOP/25F Issue:02/27.02.18	0.0001 % to 0.001 %
4.	<b>Copper Alloys</b>	Bismuth	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 % to 0.10 %
		Antimony	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 % to 0.50 %
		Aluminum	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.01 % to 11.0 %
		Arsenic	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.01 % to 0.15 %
		Iron	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.01 % to 5.00 %
		Lead	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 % to 10.0 %
		Manganese	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.01 % to 1.50 %
		Nickel	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.01 % to 35.0 %

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		Phosphorus	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 % to 1.0 %
		Tin	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 % to 15.0 %
		Zinc	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.01 % to 6.0 %
		Cadmium	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 to 0.035
		Magnesium	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 to 0.1
		Selenium	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 to 0.05
		Tellurium	SOP No:MSPL/SOP/25C Issue:02/27.02.18	0.001 to 0.05
<b>5.</b>	<b>Metals &amp; Alloys (Zinc Base)</b>	Aluminum	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 4.5 %
		Copper	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 2.50 %
		Magnesium	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.060 %
		Indium	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.005 %
		Lead	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.020 %
		Manganese	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.010 %
		Nickel	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.020 %
		Tin	SOP No:MSPL/SOP/25D	0.001 % to 0.010 %

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		Antimony	Issue:02/27.02.18 SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.005 %
		Iron	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 1.00 %
		Cadmium	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.010 %
		Thallium	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.005 %
		Bismuth	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.20 %
		Chromium	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.0001 % to 0.1 %
		Lead	SOP No:MSPL/SOP/25D Issue:02/27.02.18	0.001 % to 0.020 % 0.020 % to 1.50 %
6.	<b>Metals &amp; Alloys (Lead Base)</b>	Bismuth	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.01 % to 0.2 %
		Copper	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.1 %
		Silver	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.03 %
		Zinc	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.01 %
		Cadmium	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.01 %
		Cadmium	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.1 %
		Arsenic	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.1 %

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		Antimony	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.1 %
		Tin	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.1 %
		Tellurium	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.005 %
		Selenium	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.005 %
		Aluminum	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.0001 % to 0.10 %
		Nickel	SOP No:MSPL/SOP/25E Issue:02/27.02.18	0.001 % to 0.10 %
7.	<b>Metals &amp; Alloys (Tin Base)</b>	Bismuth	SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.01 % to 0.20 %
		Copper	SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.001 % to 5 %
		Silver	SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.001 % to 0.03 %
		Zinc	SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.001 % to 0.05 %
		Cadmium	SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.001 % to 0.20 %
		Nickel	SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.001 % to 0.20 %
		Iron	SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.001 % to 0.5 %
		Antimony	SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.001 % to 10 %
		Lead	SOP No:MSPL/SOP/25G	0.001 % to 3.5 %

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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
		Arsenic	Issue:02/27.02.18 SOP No:MSPL/SOP/25G Issue:02/27.02.18	0.001 % to 0.20 %
8.	Metals & Alloys (Titanium Base)	Aluminum	ASTM E 2371:2013	0.001 % to 8.00 %
		Cobalt	ASTM E 2371:2013	0.001 % to 0.1 %
		Chromium	ASTM E 2371:2013	0.001 % to 0.5 %
		Copper	ASTM E 2371:2013	0.001 % to 0.5 %
		Iron	ASTM E 2371:2013	0.001 % to 0.5 %
		Manganese	ASTM E 2371:2013	0.001 % to 0.1 %
		Molybdenum	ASTM E 2371:2013	0.001 % to 6.0 %
		Nickel	ASTM E 2371:2013	0.001 % to 0.5 %
		Niobium	ASTM E 2371:2013	0.001 % to 6.0 %
		Palladium	ASTM E 2371:2013	0.001 % to 0.20 %
		Ruthenium	ASTM E 2371:2013	0.001 % to 0.5 %
		Silicon	ASTM E 2371:2013	0.001 % to 0.5 %
		Tin	ASTM E 2371:2013	0.01 % to 3.0 %
		Vanadium	ASTM E 2371:2013	0.001 % to 6.0 %
		Yttrium	ASTM E 2371:2013	0.001 to 0.01
		Zirconium	ASTM E 2371:2013	0.001 % to 5.0 %
		Boron	ASTM E 2371:2013	0.0008 % to 0.01 %
		Tungsten	ASTM E 2371:2013	0.001 % to 0.10 %
D.	Gaselement In Metal & Metal Alloys			
1.	Steel, Iron, Nickel & Cobalt Alloys	Carbon	ASTM E 1019-2011 IS 228 pt. 20:2003 (RA 2014)	0.001 % to 4.50 % 0.005 % to 2.00 %
		Sulphur	ASTM E 1019-2011 IS 228 pt. 20:2003	0.002 % to 0.24 % 0.001 % to 0.35 %

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SI.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
			(RA 2014)	
		Oxygen	ASTM E 1019-2011 IS 228 pt. 18:2003 (RA 2018)	0.001 % to 0.03 %
		Hydrogen	IS 228:2003 (Part 22)	0.50 ppm to 6.0 ppm
		Nitrogen	ASTM E 1019-2011 IS 228 pt. 17:1998 (RA 2016) IS 228 pt. 24:2003 (RA 2008)	0.01 % to 0.2 % 0.001 % to 0.4 %
2.	<b>Copper Alloys</b>	Oxygen	ASTM E 2575-2008	0.0001 to 0.001 0.001 % to 0.055 %
		Sulphur	ASTM E 1019-2011	0.0025 % to 0.11 %
3.	<b>Titanium Alloys</b>	Oxygen	ASTM E 1409-2016	0.01 % to 0.40 %
		Nitrogen	ASTM E 1409-2016	0.003 % to 0.11 %
		Hydrogen	ASTM E 1447-2016	0.0006 % to 0.0260 %
		Carbon	SOP No:MSPL/SOP/35 Issue:02/27.02.18	0.001 % to 0.10 %
II.	<b>WATER</b>			
1.	<b>Packaged Drinking Water/Packaged Natural Mineral</b>	Colour, Hazenunits	IS3025 (Part 4) 1983 (RA 2012)	0.5 Hazenunits to 500 Hazenunits
		Odour	IS3025 (Part 5) 1983 (RA 2012)	Disaggreable to Aggreable

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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
	<b>Water/Potable Drinking Water/Water for Processed Food Industry</b>	Turbidity, NTU	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		Total Dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	10 mg/L to 1000 mg/L
		pH Value	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
		Total Solids	IS 3025 (Part 15) 1984 (RA 2014)	1 mg/L to 1000 mg/L
		Barium (as Ba)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Copper (as Cu)	IS 30 IS 25 (Part 2) 2004 (RA 2014)	0.01 mg/L to 1000 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Manganese (as Mn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Nitrate (as NO <sub>3</sub> )	IS 3025 (Part 34) 1988 (RA 2014)/EPA 353.2(1993)	0.25 mg/L to 45 mg/L
		Zinc (as Zn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Silver (as Ag)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Aluminium (as Al)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Chloride (as Cl)	IS 3025 (Part 32)1988 (RA 2014)	0.1 mg/L to 5000 mg/L
		Selenium (as Se)	IS 3025 (Part 2) 2004	0.01 mg/L to 300 mg/L

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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
			(RA 2014)/ICP-OES	
		Sulphate (as SO <sub>4</sub> )	IS 3025(Part 24) 1986 (RA 2014)	4 mg/L to 1000 mg/L
		Alkalinity (as HCO <sub>3</sub> )	IS 3025(Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
		Calcium(as Ca)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Magnesium (as Mg)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Sodium (as Na)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Residual free chlorine (as Cl)	IS 3025(Part 26) 1986 (RA 2014)/EPA 330.5 (1978)	0.01 mg/L to 100 mg/L
		Oil and Grease	IS 3025 (Part 39) 1991 (RA 2014)	0.1 mg/L to 2000 mg/L
		Antimony (as Sb)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.001 mg/L to 100 mg/L
		Borates (as B)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES/EPA 212.3 (1974)	0.01 mg/L to 100 mg/L
		Total hardness (as CaCO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Chromium (as Cr <sup>6+</sup> )	IS 3025(Part 52) 2003 (RA 2014)	0.1 mg/L to 1000 mg/L
		Mercury (as Hg)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.001 mg/L to 100 mg/L
		Cadmium (as Cd)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.005 mg/L to 100 mg/L

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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
		Arsenic (as As)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L
		Lead (as Pb)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.005 mg/L to 100 mg/L
		Chromium (as Cr)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L
		Nickel (as Ni)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L
2.	<b>Reagent Grade Water (GRADE 1, 2, &amp; 3)</b>	Specific conductivity, $\mu\text{S/cm}$ at 25°C,	IS 3025 (Part 14) 1984 (RA 2013)	0.5 $\mu\text{S/cm}$ to 4000 $\mu\text{S/cm}$ at 25°C
		pH at 25 °C	IS 3025 (Part 11):1983 (RA 2012)	2 to 12 pH
		Total solids or non volatile residue at 105°C	IS 3025 (Part 15) 1984 (RA 2014)	1 mg/L to 1000 mg/L
		Silica (as SiO <sub>2</sub> )	IS 3025 (Part 35) 1988 (RA 2014)	0.01 mg/L to 1000 mg/L
		Colour retention of KMnO <sub>4</sub> at 27 x 2 °C, Minutes	IS 1070 (Annex A) 1992 (RA 2013)	Qualitative
3.	<b>Water for Construction</b>	Organic Solids	IS 3025 (Part 18) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Inorganics Solid	IS 3025 (Part 18) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Sulphates (as SO <sub>4</sub> )	IS 3025 (Part 24) 1986 (RA 2014)	1 mg/L to 1000 mg/L
		Chlorides (as Cl)	IS3025 (Part 32) 1988 (RA 2014)	1 mg/L to 5000 mg/L
		Suspended matter	IS3025 (Part 17) 1984 (RA 2012)	1 mg/L to 1000 mg/L

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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
		Acidity (ml of 0.02 N NaOH) (as mg/L Ca CO <sub>3</sub> )	IS3025 (Part 22) 1986 (RA 2014)	0.1 ml to 50/100 ml 0.5 mg/L to 500 mg/L
		Alkalinity (mL of 0.02 N H <sub>2</sub> SO <sub>4</sub> ) (as mg/L Ca CO <sub>3</sub> )	IS3025 (Part 23) 1986 (RA 2014)	0.1 ml to 50 ml/100ml 0.5 mg/L to 500 mg/L
		pH Value	IS 3025 (Part 11) 1983 (RA 2012)	2 to 12
4.	<b>Water for Storage Batteries</b>	Colour	IS 3025 (Part 4) 1983 (RA 2012)	1 to 500 True Colour Units
		Odour	IS 3025 (Part 5) 1983 (RA 2012)	Qualitative
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		Non-Volatile Solids	IS 1069 (A-2) 1993 (RA 2013)	1 mg/L to 1000 mg/L
		Chloride (as Cl)	IS 3025 (Part 32) 1988 (RA 2014)	1 mg/L to 5000 mg/L
		pH Value	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
		Heavy metal (as Pb)	IS 7017:1973 (RA 2015)	0.05 mg/L to 100 mg/L
		Hardness (as CaCo <sub>3</sub> )	IS 3025 (Part 21) 1983 (RA 2014)	1 mg/L to 5000 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.02 mg/L to 100 mg/L
		Manganese(as Mn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.02 mg/L to 100 mg/L
		Oxidizable matter	IS 1069 (A-3) 1993	Qualitative

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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
			(RA 2013)	
		Specific electrical conductivity at 25 °C µS/cm	IS 3025 (Part 14) 1984 (RA 2013)	0.5 to 4000 µS/cm at 25°C
		Total dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
5.	Water for swimming pools	pH	IS 3025 (Part 11)1983 (RA 2012)	2 pH to 12 pH
		Total alkalinity (as CaCO <sub>3</sub> )	IS 3025 (Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
		Aluminium (as Al)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Total Residual Chlorine(CI)	IS 3025(Part 26) 1986 (RA 2014)/EPA 330.5	0.01 mg/L to 100 mg/L
		Oxygen (as O <sub>2</sub> )absorbed in 4 hrs. at 27 °C	IS 3025(Part-63):2007 (RA 2013)	0.5 mg/L to 50 mg/L
		Total dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Chloride (as Cl)	IS 3025 (Part 32) 1988 (RA 2014)	0.01 mg/L to 5000 mg/L
		Iron(as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Heavy metal (as Pb)	IS 7017:1973 (RA 2015)	0.05 mg/L to 100 mg/L
		Colour	IS 3025 (Part 4) 1983 (RA 2012)	1 Hazen to 500 Hazen Units
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		Odour	IS 3025 (Part 5) 1983 (RA 2012)	Qualitative

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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
6.	CPCB class a- drinking water source without conventional treatment but after disinfection, cpcb class b-outdoor bathing (organised), Cpcb Class c-drinking water source after conventional treatment and disinfection, cpcb Class d-water for propagation of wild life and fisheries	pH	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
		Dissolved oxygen (DO)	IS 3025 (Part 38) 1989 (RA 2014)	0.5 mg/L to 10 mg/L
		Biochemical Oxygen Demand (BOD), 3 days 27 °C	IS 3025 (Part 44) 1993 (RA 2014)	0.5 mg/L to 500 mg/L
		Free Ammonia(as NH3)	IS 3025 (part 34) 1988 (RA 2014)	0.5 mg/L to 500 mg/L
7.	Cpcb Class E- Water For Irrigation, Industrial Cooling, Controlled Waste Disposal	pH	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
		Electrical Conductivity at 25°C	IS 3025 (Part 14) 1984 (RA 2013)	0.5 µS/cm to 4000 µS/cm at 25°C
		Sodium Adsorption Ratio(SAR)	Clause 4.1.2 of IS 11624:1986 (RA 2009)	0.5 to 30 me/L
		Boron (as B)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES EPA 212.3(1974)	0.01 mg/L to 100 mg/L
8.	Feed Water At	Total Hardness	IS 3025 (Part 21)1983	1 mg/L to 5000 mg/L

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	<b>Economizer Inlet</b>	(as CaCO <sub>3</sub> )	(RA 2014)	
		pH value	IS 3025 (Part 11):1983 (RA 2012)	2 to 12
		Oxygen (as O <sub>2</sub> )	25 of IS 3550:1965	0.5 mg/L to 50 mg/L
		Iron (as Fe)	A-1 & A-2 of IS 10496:1983 (RA 2012)	0.01 mg/L to 1000 mg/L
		Copper(as Cu)	A-1 & A-2 of IS 10496:1983 (RA 2012)	0.01 mg/L to 1000 mg/L
		Silica (as SiO <sub>2</sub> )	A-3 of IS 10496:1983 (RA 2012)	0.01 mg/L to 10000 mg/L
		Residual hydrazine (as N <sub>2</sub> H <sub>4</sub> )	26 of IS 3550:1965 (RA 2014)	0.02 mg/L to 500 mg/L
		Conductivity after passing through cation exchanger column at 25 °C	7 of IS 3550:1965 (RA 2014)	0.5 µS/cm to 4000 µS/cm at 25 °C
		Oxygen (as O <sub>2</sub> )consumed in 4 hour	IS 3025(Part-63):2007 (RA 2013)	0.5 mg/L to 50 mg/L
<b>9.</b>	<b>Feed Water At Boiler</b>	Phosphate (as PO <sub>4</sub> )	IS 3025 (Part 31) 1988 (RA 2014)	0.05 mg/L to 1000 mg/L
		Caustic, alkalinity (as CaCO <sub>3</sub> )	IS 3025 (Part 23):1964 (RA 2014)	0.5 mg/L to 500 mg/L
		Total alkalinity (as CaCO <sub>3</sub> )	13 of IS 3025:1964 (RA 2014)	0.5 mg/L to 500 mg/L
		Silica (as SiO <sub>2</sub> )	A-3 of IS 10496:1983 (RA 2014)	0.01 mg/L to 10000 mg/L
		Total Hardness (as CaCO <sub>3</sub> )	IS 3025 (Part 21):1983 (RA 2014)	1 mg/L to 5000 mg/L

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		Hydrazine (as N <sub>2</sub> H <sub>4</sub> )	26 of IS 3550:1965	0.02 mg/L to 500 mg/L
		Total dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Chloride (as NaCl)	A-5 of IS 10496:1983 (RA 2012)	1 mg/L to 5000 mg/L
		pH value	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
10.	Feed Water At Economizer Inlet	pH value	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
		Total Hardness (as CaCo <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Silica (as SiO <sub>2</sub> )	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Manganese(as Mn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Ammonia (as NH <sub>3</sub> )	IS 3025 (Part 34) 1988 (RA 2014)	0.5 mg/L to 500 mg/L
		Sodium (as Na) mg/L	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Dissolved oxygen(DO) (as O <sub>2</sub> )	IS 3025 (Part 38) 1989 (RA 2014)	0.5 mg/L to 10 mg/L
11.	Water for fermentation Industry	Colour	IS 3025 (Part 4) 1983 (RA 2012)	1 Hazen to 500 Hazen units
		Odour	IS 3025 (Part 5) 1983 (RA 2012)	Qualitative

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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
		Turbidity, NTU, Max	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		Total Dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		pH Value	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
		Total Hardness (as Ca CO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Copper (as Cu)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Manganese (as Mn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Nitrate (as NO <sub>3</sub> )	IS 3025 (Part 34) 1988 (RA 2014)	0.25 mg/L to 45 mg/L
		Chloride (as Cl)	IS 3025 (Part 32) 1988 (RA 2014)	1 mg/L to 500 mg/L
		Selenium (as Se)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 300 mg/L
		Sulphates (as SO <sub>4</sub> )	IS 3025 (Part 24) 1986 (RA 2014)	0.1 mg/L to 1000 mg/L
		Magnesium (as Mg)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Zinc (as Zn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Arsenic (as As)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L

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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
		Lead (as Pb)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.005 mg/L to 100 mg/L
		Chromium (as Cr)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L
12.	Water for Brewing And Water For Distillery Industry	Total Dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Carbonate hardness (as CaCO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Alkalinity (asCaCO <sub>3</sub> )	IS 3025 (Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
		Calcium (as Ca)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Chloride (as NaCl)	Clause 24 of IS 3025:1964	1 mg/L to 5000 mg/L
		pH Value	IS 3025 (Part 11)1983 (RA 2012)	1 pH to 13 pH
		Manganese (as Mn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
13.	Water for Tanning Industry	Colour, (Hazenunits)	IS 3025 (Part 4) 1983 (RA 2012)	1 Hazen to 500 Hazen unit
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		pH	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
		Alkalinity (as CaCO <sub>3</sub> )	IS 3025 (Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
		Total hardness (asCaCO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Iron(as Fe)	IS 3025 (Part-2)	0.01 mg/L to 1000 mg/L
		Manganese(as Mn)	IS 3025 (Part-2)	0.01 mg/L to 1000 mg/L

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		Chlorides(as Cl)	IS 3025 (Part 23) 1986 (RA 2014)	1 mg/L to 5000 mg/L
14.	<b>Water for Paper And Pulp Industry</b>	Colour, (Hazenunits)	IS 3025 (Part 4) 1983 (RA 2012)	1 to 500
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		Total Dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Total hardness (asCaCO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Manganese (as Mn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Total Residual Chlorine (as Cl)	IS 3025 (Part 26) 1986 (RA 2014)/EPA 330.5	0.01 mg/L to 100 mg/L
15.	<b>Water for Rayon Manufacturing Industry</b>	Colour, (Hazenunits)	IS 3025 (Part 4) 1983 (RA 2012)	1 to 500
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 mg/L to 1000 mg/L
		Total Dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Total Alkalinity (asCaCO <sub>3</sub> )	IS 3025 (Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
		Total hardness (asCaCO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Silica (as SiO <sub>2</sub> )	IS 3025 (Part 35):1988 (RA 2014)	0.01 mg/L to 10000 mg/L

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		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Manganese (as Mn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Heavy metal (as Pb)	IS 7017:1973 (RA 2015)	0.05 mg/L to 100 mg/L
16.	Water for Ice Manufacturing Industry	Colour	IS 3025 (Part 4) 1983 (RA 2012)	1 Hazen to 500 Hazen units
		Odour	IS3025 (Part 5) 1983 (RA 2012)	Qualitative
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		Total solids	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		pH	IS 3025 (Part 11)1983 (RA 2012)	2 pH to 12 pH
		Alkalinity ((asCaCO <sub>3</sub> ))	IS 3025 (Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
		Total hardness (asCaCO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Copper (as Cu)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Manganese (as Mn)	IS 3025(Part 2) 2004 (RA 2014)	0.01 mg/L to 1000 mg/L
		Chloride (as Cl)	IS 3025 (Part 32)1988 (RA 2014)	1 mg/L to 500 mg/L

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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
		Selenium (as Se)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 300 mg/L
		Sulphates (as SO <sub>4</sub> )	IS 3025(Part 24) 1986 (RA 2014)	0.1 mg/L to 1000 mg/L
		Magnesium (as Mg)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Zinc (as Zn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Lead (as Pb)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.005 mg/L to 100 mg/L
		Arsenic (as As)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.001 mg/L to 100 mg/L
		Chromium (as Cr)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L
17.	<b>Ground Water/ Borewell Water</b>	pH	IS 3025 (Part 11)1983 (RA 2012)	2 pH to 12 pH
		Temperature	IS 3025 (Part 9) 1984 (RA 2012)	10 degC to 100 degC
		Specific electrical conductivity at 25°C (µS/cm)	IS 3025 (Part14) 1984 (RA 2013)	0.5 µS/cm to 4000 µS/cm
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		Total Suspended Solids(TSS)	IS 3025 (Part 17) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Total Dissolved solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L

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		Alkalinity (as HCO <sub>3</sub> )	IS 3025(Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
		Nitrate (as NO <sub>3</sub> )	IS 3025 (Part 34) 1988 (RA 2014) EPA 353.2 (1992)	0.25 mg/L to 45 mg/L
		Ammonical nitrogen (as NH <sub>3</sub> )	IS 3025 (Part 34) 1988 (RA 2014)	0.5 mg/L to 500 mg/L
		Total nitrogen (as N)	IS 3025 (Part 34) 1988 (RA 2014)	0.5 mg/L to 500 mg/L
		Hardness (as CaCo <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Chloride (as Cl)	IS 3025 (Part 32)1988 (RA 2014)	1 mg/L to 500 mg/L
		Sulphate (as SO <sub>4</sub> )	IS 3025 (Part 24) 1986 (RA 2014)	0.1 mg/L to 1000 mg/L
		Phosphate (as PO <sub>4</sub> )	IS 3025 (Part 31) 1988 (RA 2014)	0.05 mg/L to 1000 mg/L
		Sodium (as Na)	IS 3025(Part 2) 2004 (RA 2014)	0.01 mg/L to 1000 mg/L
		Potassium (as K)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Calcium (as Ca)	IS 3025(Part 2) 2004 (RA 2014)	0.01 mg/L to 1000 mg/L
		Magnesium (as Mg)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Borates (as B)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES /EPA 212.3	0.01 mg/L to 100 mg/L
		Biochemical oxygen	IS 3025 (Part 44) 1993	1 mg/L to 500 mg/L

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		demand (BOD) (3 days at 27°C)	(RA 2014)	
		Chemical oxygen demand (COD)	IS 3025 (Part 58) 2006 (RA 2012)	0.5 mg/L to 1000 mg/L
<b>18.</b>	<b>Water for Textile Industry</b>	Colour	IS 3025 (Part 4) 1983 (RA 2012)	1 Hazen to 500 Hazen units
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		pH Value	IS 3025 (Part 11)1983 (RA 2012)	2 to 12
		Total Hardness (as CaCO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1 mg/L to 5000 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Manganese (as Mn)	IS 3025(Part 2) 2004 (RA 2014)	0.01 mg/L to 1000 mg/L
		Aluminium (as Al)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Sulphate (as SO <sub>4</sub> )	IS 3025 (Part 24) 1986 (RA 2014)	0.1 mg/L to 1000 mg/L
		Chloride (as Cl)	IS 3025 (Part 32)1988 (RA 2014)	1 mg/L to 5000 mg/L
		Total alkalinity (as CaCO <sub>3</sub> )	IS 3025 (Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
<b>19.</b>	<b>Water for Fish Processing Industry</b>	Colour	IS 3025 (Part 4) 1983 (RA 2012)	1 Hazen to 500 Hazen units

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		Odour	IS 3025 (Part 5) 1983 (RA 2012)	Qualitative
		Turbidity	IS 3025 (Part 10)1984 (RA 2012)	0.02 NTU to 1000 NTU
		pH	IS 3025 (Part 11)1983 (RA 2012)	2 pH to 12pH
		Total Dissolved Solids(TDS)	IS 3025 (Part 16) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		Alkalinity (as CaCO <sub>3</sub> ) mg/L	IS 3025 (Part 23) 1986 (RA 2014)	0.5 mg/L to 500 mg/L
		Chloride (as NaCl)	IS 3025 (Part 32)1988 (RA 2014)	1 mg/L to 5000 mg/L
		Sulphates (as SO <sub>4</sub> )	IS 3025 (Part 24) 1986 (RA 2014)	0.1 mg/L to 1000 mg/L
		Total Hardness (as CaCO <sub>3</sub> )	IS 3025 (Part 21)1983 (RA 2014)	1.0 mg/L to 5000 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Copper (as Cu)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 1000 mg/L
		Lead (as Pb))	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.005 mg/L to 100 mg/L
		Mercury (as Hg)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.001 mg/L to 100 mg/L
		Cadmium (as Cd)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.005 mg/L to 100 mg/L
		Arsenic (as As)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L

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		Chromium (as Cr)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L
		Selenium (as Se)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 300 mg/L
		Free chlorine(as Cl)	IS 3025(Part 26) 1986 (RA 2014)/EPA 330.5 (1978)	0.01 mg/L to 100 mg/L
<b>III.</b>	<b>POLLUTION &amp; EFFLUENTS(ENVIRONMENT)</b>			
<b>1.</b>	<b>Industrial Effluents</b>	Colour	IS 3025 (Part 4) 1983 (RA 2012)	1 to 500 true colour units
		Odour	IS 3025 (Part 5) 1983 (RA 2012)	(Qualitative) Disagreeable to Agreeable
		Total Suspended solids	IS 3025 (Part 17) 1984 (RA 2012)	1 mg/L to 1000 mg/L
		pH Value	IS 3025 (Part 11)1983 (RA 2012)	1 to 13
		Temperature °C	IS 3025 (Part 9) 1984 (RA 2012)	10 degC to 60 degC
		Nitrate (as NO <sub>3</sub> )	IS 3025 (Part 34) 1988 (RA 2014)EPA 353.2 (1993)	0.25 mg/L to 45 mg/L
		Total residual chlorine (as Cl)	IS 3025(Part 26) 1986 (RA 2014) EPA330.5(1978)	0.01 mg/L to 100 mg/L
		Manganese (as Mn)	IS 3025 (Part 2) 2004 (RA 2014) ICP-OES	0.1 mg/L to 20 mg/L
		Copper (as Cu)	IS 3025 (Part 2) 2004	1 mg/L to 200 mg/L

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			(RA 2014)/ICP-OES	
		Zinc (as Zn)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.1 mg/L to 25 mg/L
		Iron (as Fe)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.1 mg/L to 20 mg/L
		Vanadium (as V)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.1 mg/L to 20 mg/L
		Amonical nitrogen (as NH <sub>3</sub> )	IS 3025 (Part 34) 1988 (RA 2014)	3 mg/L to 100 mg/L
		Biochemical oxygen demand (BOD) (3 days at 27°C)	IS 3025 (Part 44) 1993 (RA 2014)	5 mg/L to 500 mg/L
		Chemical oxygen demand (COD)	IS 3025 (Part 58) 2006 (RA 2012)	5 mg/L to 1000 mg/L
		Selenium (as Se)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 300 mg/L
		Oil & Grease	IS 3025(Part 39) 1991 (RA 2014)	4 mg/L to 100 mg/L
		Arsenic (as As)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.01 mg/L to 100 mg/L
		Cadmium (as Cd)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.1 mg/L to 10 mg/L
		Chromium (as Cr)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.1 mg/L to 20 mg/L
		Hexavalent chromium (as Cr+6)	IS 3025 (Part 52) 2003 (RA 2014)	0.2 mg/L to 100 mg/L
		Mercury (as Hg)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.5 mg/L to 10 mg/L

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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
		Lead (as Pb)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.005 mg/L to 100 mg/L
		Nickel (as Ni)	IS 3025 (Part 2) 2004 (RA 2014)/ICP-OES	0.1 mg/L to 20 mg/L
		Dissolved phosphates (as P)	IS 3025(Part 31) 1988 (RA 2014)	0.1 mg/L to 50 mg/L

### MECHANICAL TESTING

I.	METALLOGRAPHY TEST			
1.	Metals, Alloys	Tensile Test (ys, uts, %e, % ra, 0.2 % ps & 1 % ps)	IS 1608:2005 (RA 2017) ASTM A 370:2017 ASTM E-8/E8M-2016a IBR (2017) BS EN ISO:6892-2016 BS EN ISO 4136:2012 ASTM B 557:2015	UTS:50 to 2500 MPa 0.2 %PS:50 to 1500 MPa Y.S:50 to 1500 MPa 1 %PS:100 to 1500 MPa %El:0.5 to 80 % %RA:2 to 90 %
		Tensile Test (n,k & r value)	ASTM E 517-2018 ASTM E 646-2016	6 to 300 kN
		Elevated Temperature Tensile Test (uts, % e, % ra, 0.2 % ps)	ASTM E-21:2017 BS EN ISO:6892-2:2011	40°C to 950°C UTS:50 to 1200 MPa 0.2 % PS:50 to 800 MPa 1 %PS:100 to 1000 MPa %E:0.2 to 100 % %RA:2 to 90 %

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**Laboratory**

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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
		Hardness Test (Brinell)	IS 1500 PT. 1:2013 (1996) ASTM A 370:2017A ASTM E 10:2017 BS EN ISO 6506-1:2014	100 to 350 HBW 2.5/187.5 100 to 500 HBW 10/3000
		hardness test (Vickers)	ASTM E92:2017 IS 1501 PT. 1:2013 ASTM A 370:2017 BS EN ISO 6507-1:2018 BS EN ISO 9015-1:2011	50 to 600 HV5 100 to 600 HV10 200 to 700 HV30
		Hardness Test (Microvickers)	ASTM E 384:2017 IS 1501 PT. 1:2013 ASTM A 370:2017 BS EN ISO 6507-1:2018 BS EN ISO 9015-1:2011	50-300 HV0.01 100 to 1100 HV0.1 ** 100 to 500 HV0.3 ** 100 to 500 HV0.5 200 to 1000 HV1
		Hardness Test (Rockwell) (Superficial)	IS 1586 PT. 1:2012 ASTM A 370:2017 ASTM E 18-2017 e1 BS EN ISO 6508-1:2016	20 to 70 HRC 50 to 100 HRBW 40 to 75 15TW 70 to 90 30TW
2.	Grey Iron Casting	Transverse Tensile Test	IS 210:2009 (RA 2014)	4 to 400 kN
3.	Metals & Alloys (Plate, Rod, & Sheet)	Bend Test	IS 1599:2012 (RA 2015) ASTM A 370: :2017 ASTM E 290:2014 IBR:(2011 07) BS EN ISO 5173:2010 + A(2011)	MANDREL DIA 2-125 mm
4.	Metals & Alloys (Sheet & Strip)	Modified erichson Cupping test	IS 10175 (Part 1):1993 (RA 2012)	0.2 to 2.0 mm THICK & WIDTH 90 mm OR MORE

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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
5.	Steel Plates	Through Thickness Tension Test ( %RA)	ASTM A 770 M-03 (RA 2012) BS EN 10164:2004	PLATE THICKNESS FROM 15 to 350 mm %RA 2 to 90 %
6.	High Strength Deformed Steel Bars	Tensile Test (0.2 %PS, UTS, %E)	IS 1786:2008 (RA 2013) IS 1608:2005 (RA 2011)	0.2 %PS:250-800 MPa UTS:300-1000 MPa %E:2-30 %
		Bend Test	IS 1786:2008 (RA 2013) IS 1599:2012 (RA 2015)	MANDREL DIA 6 to 220 mm
		Rebend Test	IS 1786:2008 (RA 2013)	Mandrel Dia 16 to 224mm
		Mass/Unit Length	IS 1786:2008 (RA 2013)	0 to 30 Kg
		Fracture Toughness (K1C, J1C, CTOD)	ASTM E 399-2017 ASTM E 1820-2017 BS 7448 Pt.1:1991 Pt 3:2005 ISO 12135:2016	0.25 to 100 kN
		Fatigue Test	ASTM E 466-2015 ASTM E 606-2012 ASTM E 647-2015 e1	0.25 to 100 kN Freq:0.5 Hz-100 Hz
		Creep/Stress Rupture Test	ASTM E 139:2011 ASTM E 292:2009 e1	0.04 to 53.3 kN Temp:Ambient-1000°C
7.	Covered Electrodes in Welding Mild & Low Alloy Steel	Diffusible Hydrogen Test (HG)	IS 11802:1986 (RA 2013)	15 ml/100 gms of WELD METAL
			ISO 3690-2012	10 ml/100 g of WELD METAL
8.	Manual Metal Arc	Metal Recovery	IS 13043:1991 (RA 2008)	1.2 to 6.3 mm Size

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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
9.	Welding Electrodes Welded Metals and Alloys	Tensile Test (YS, UTS,) AWS D	ASME SEC IX 2017 BS EN ISO 15614:2017 API-1104:2013 AWS D1.1:2015 AWS D1.2:2014 AWS D1.6 2017	Y.S:50 to 1500 MPa UTS:50 to 2500 MPa
10.	Metals & Alloys (Welded Test Piece)	Nick Break Test	API:1104-21 st ED IBR (RA 2017) IS 2825:1969 (RA 2017)	VISUAL OBSERVATION MAG 1X.
11.	Metals & alloys, Covered electrode s for mmaw of carbon & C-mn steel Welding rods electrodes & filler metals	Bend Test (Butt Weld)	IS 814:2005 (RA 2011) ASME SEC IX (2017) API 5L 46 th ED	180 ° BENT OVER MANDREL DIA 2-200 mm
12.	Metals & Alloys (Wires, Welded Pipes And	Reverse Bend Test	ASTM A 370:2017 IS 1716:1985 (RA 2011)	3/8"-4" O.D AND WALL THICKNESS 0.1 to 3.4 mm

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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
	<b>Tubes)</b>			
13.	<b>Metals &amp; Alloys</b>	Salt Spray Test	ASTM B 117-2016 ISO 9227 Method A:2017	Qualitative Temp:25 to 40°C Time:1 h to 1000h
14.	<b>Metals &amp; alloys, Covered electrode s for mmaw of carbon &amp; C-mn steel Welding rods electrodes &amp; filler metals</b>	Tensile Test (YS, UTS, % E, %RA,0.2 %PS)	IS 814:2004 (RA 2010) IS 1608:2005 (RA 2011) ASME SEC II PT. C (2017)	Y.S:50-600MPa UTS:50-1200 MPa 0.2 %PS:50-800 MPa %E:0.2-100 % %RA:2-90 %
		Charpy Impact Test	IS 1757 Part 1 2014 ASTM A 370:2017 ASTM E 23:2016b ISO 148-1:2016-10 IBR (RA 2017) ASME SEC VIII Div .1 2017	2 to 406J TEMP. RANGE: +50°C to -196 °C
		Izod Impact Test	IS 1598:1977(RA 2015) IBR (RA 2017)	2 to 160 J
15.	<b>Metals &amp; Alloys (Tubes/Pipes)</b>	Flattening Test	IS 2328:2005 (RA 2011) ASTM A 370:2017 ASTM B 111/B111M-2016 IBR (RA 2017), API-5L-2015 ASTM A 999/999M:17 ASTM A 1016/1016M:2017a	3.2 to 700 mm O.D. FERROUS TUBES  3.2 to 300 mm O.D. NON FERROUS TUBES
16.	<b>Metals &amp; Alloys (Welded Tubes And Pipes)</b>	Reverse Flattening Test	ASTM A 370:2017	1/2" to 6" O.D & 0.1 to 15 mm

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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
17.	Metals & Alloys (Tubes/Pipes)	Flanging Test	IS 2330:2011 ASTM A 370:2017, IBR:(RA 2017)	10 to 80 mm O.D. & 0.1 to 10 mm THICKNESS
18.	Metals & Alloys (Tubes/Pipes)	Flaring/Drift Expansion Test	IS 2335:2005 (RA 2011) ASTM A 370:2017 ASTM B 153:2017 IBR (RA 2017) API 5L 46 th ED	2 to 150 mm O.D. & 0.1 to 15 mm THICKNESS
19.	Metals & Alloys (Boiler/Pressure Tubes)	Crushing Strength	IS 3601:2006 (RA 2012) ASTM A 370-2017	10 to 400 kN
20.	Metals & Alloys (Tubes To Tube Sheets Mock-Up)	Pull Out Test	ASME SEC VIII DIV 1 (2017)	10 to 1000 kN
21.	Metals & Alloys Fasteners (NUTS)	Proof Load	IS 1367 (Part 6:1994 (RA 2015) ASTM A 370-2017	10 to 1000 kN M3 to M39
22.	Metals & Alloys	Hydrogen Induced Cracking	NACE TM 0284:2016	QUALITATIVE Crack:10 microns & above H2S Conc:2000 to 4000 ppm
		Sulfide Stress Cracking	NACE TM 0177:2016 (METHOD A & B) NACE 7M 0316:2016	1.5 to 16 kN FPB:5mm max thickness
23.	Metals, Alloys & Welds	Macro Etch Test	IS 11371:1985 (RA 2007) ASTM E 340:2015	QUALITATIVE MAG 10X, 20X

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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 381:2017 BS EN 17639:2013 ASME SEC IX (2017) IS 13015:1991 (RA 2012)	
		Case Depth	IS 6416:1988 (RA 2012) By MICROSCOPIC METHOD	10 to 2000 Microns
			IS 6416:1988 (RA 2012) BY HARDNESS TRAVERSE METHOD	400 to 1000 HV 0.1
		Microstructure of Cast Iron	ASTM A 247:2017 IS 7754:1975 (RA 2012)	QUALITATIVE MAG. 100X
24.	Metals, Alloys & Welds	Microstructure	ASTM E 3:2017 ASTM E407-07 (RA 2015) e1 ASM METAL HAND BOOK VOL. IX IS 7739 (Part 1):1975 (RA 2010) BS EN 17639:2013	0.5 to 10 GRAIN SIZE/100X
		Average Grain Size Measurement	ASTM E112:2013 IS 4748:2009 BY MICROSCOPIC METHOD	100X MAG. ASTM NO.-1 to 10
25.	Ferritic, Austenitic, Duplex (F/A) Stainless Steels	IGC TEST	ISO 3651-2:1998 (METHOD A, B & C)	FORMER DIA 2XT ANGLE 90° MAG 10 X
		IGC Test (HUEY TEST)	ISO 3651-1:1998	1 to 2500 MPY



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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
26.	<b>Austenitic Stainless Steels</b>	IGC Practice-A	ASTM A262:2015	250X 500X
		IGC Practice-B	ASTM A 262:2015	1 to 2500 MPY
		IGC Practice-C	ASTM A 262:2015 IS 10461 PT. 1:94 (RA 2016) IS 10461 PT. 2 94: (RA 2007)	1 to 2500 MPY
		IGC Practice-E	ASTM A 262:2015 IS 10461 PT 2:94 (RA 2007)	FORMER Dia 1XT, 4XT ANGLE 180° MAG 5X TO 20 X
27.	<b>Stainless steels and nickel base, chromium bearing alloys.</b>	Pitting Corrosion	ASTM G-48-2011 RA 2015 (METHOD-A)	QUALITATIVE MAG. 20X
		Crevice Corrosion	ASTM G-48-2011- (RA 2015) (METHOD-B)	QUALITATIVE MAG. 20X
28.	<b>Wrought, Cast, Welded Nickel Rich Chromium Bearing Alloys</b>	Ferric sulphate-Sulphuric acid test	ASTM G-28-2002 (RA 2015) METHOD-A	1 to 2500 MPY
		Mixed Acid-Oxidizing Salt Test	ASTM G-28-2002 (RA 2015) METHOD-B	1 to 3000 MPY
29.	<b>Austenitic/Ferritic (Duplex Stainless Steel)</b>	Chloride Stress Corrosion Test	ASTM G-36-94 (RA 2013)	10X MAGNIFICATION
		Sodium Hydroxide Etch	ASTM A 923-2014	400 X

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		Test	(METHOD-A)	
		Ferric Chloride Corrosion Test	ASTM A 923-2014 (METHOD-C)	1 to 2500 MDD
30.	Metals & Alloys	Inclusion Rating In Steel	ASTM E 45:2018 IS 4163:2004 (RA 2010)	0.5 to 3
		Ferrite Measurement	ASTM E-1245-2016 ASTM E 562-2011	3 to 70 %
		Ferrite Measurement	ASTM A 800/800M-2014 BY FERRIT SCOPE	0.10 to 83.60 %
		Coating Thickness Measurement	IS 3203:1982 (RA 2016) BY MICROSCOPIC METHOD	10 microns to 2 mm
		Decarb Measurement	IS 6396-2000 (RA 2012) ASTM E-1077-2014 BY MICROSCOPIC METHOD	10 microns to 2 mm

**RADIOLOGICAL TESTING**

I.	PARAMETERS CONCERNING RADIOACTIVE RESIDUES			
1.	WATER	Alpha emitters	IS 14194 (Part 2)-2013	0.05 to 100 Bq/L

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	Package drinking water/Packaged natural mineral water/Potable drinking water/water for processed food industry/Industrial effluents as per CPCB/Water for fermentation industry/Water for ice manufacturing industry/Water for fish processing industry	Beta emitters	IS 14194 (Part 1)-2013	0.05 to 100 Bq/L

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