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;	SI.	Product / Material	Specific Test Performed	Test Method Specification	Range of Testing /
		of Test		against which tests are	Limits of Detection
				performed	

CHEMICAL TESTING

I.	METAL & ALLOYS	3		
1.	Carbon Steel & Alloy Steel	Carbon Manganese Phosphorus Sulphur Silicon Copper Chromium Aluminium Arsenic Boron Nickel Niobium Titanium Vanadium Molybdenum Nitrogen Tin Calcium Lead	ASTM E 415 : 2017 IS 8811 : 1998	0.025% to 1.20 % 0.010% to 2.00% 0.001% to 0.11% 0.001% to 0.35% 0.025% to 2.00% 0.005% to 0.42% 0.010% to 5.00% 0.006% to 1.01% 0.001% to 0.050% 0.0005% to 0.005% 0.010% to 4.00% 0.001% to 0.45% 0.001% to 0.26% 0.001% to 0.55% 0.001% to 1.30% 0.001% to 0.026% 0.001% to 0.026% 0.001% to 0.12% 0.0005% to 0.002% 0.005% to 0.002% 0.005% to 0.33%
2.	Stainless	Cobalt Antimony Carbon	ASTM E 1086 : 2014	0.001% to 0.051% 0.002% to 0.050% 0.010% to 1.50%
۷.	Steel	Manganese Phosphorus Sulphur Silicon Copper Chromium Nickel	IS 9879 : 1998 RA 2015	0.010% to 1.30% 0.010% to 12.00% 0.005% to 0.070% 0.001% to 0.30% 0.010% to 2.00% 0.10% to 5.00% 5.0% to 30.00% 0.50% to 28.00%

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		Niobium Titanium Molybdenum Nitrogen		0.002% to 1.00% 0.010% to 0.48% 0.010% to 4.10% 0.010% to 0.28%
		Tungsten Cobalt		0.010% to 0.12% 0.0460% to 1.00%
3.	Cast Iron	Carbon Manganese Phosphorus Sulphur Silicon Copper Chromium Nickel Molybdenum Magnesium	ASTM E 1999: 2011	2.00% to 4.00% 0.18% to 0.90% 0.030% to 0.10% 0.006 % to 0.044% 1.00 % to 2.40% 0.003% to 0.23% 0.088% to 2.00% 0.035% to 2.00% 0.001% to 0.050% 0.010% to 0.10%
4.	High Speed Tool Steel	Carbon Manganese Phosphorus Sulphur Silicon Chromium Molybdenum Tungsten Cobalt Vanadium	ASTM E 1086:2014	0.10% to 2.50% 0.010% to 1.50% 0.005 % to 0.030% 0.005 % to 0.025% 0.010% to 1.40% 0.010% to 12.00% 0.010% to 6.00% 0.010% to 6.00% 0.010% to 0.30% 0.010 % to 4.50 %
5.	Copper Alloy	Zinc Lead Tin Phosphorus Manganese Iron Nickel Silicon	BS EN 15079 :2015	0.001% to 40.0% 0.010% to 14.00% 0.010% to 14.00% 0.010% to 0.38% 0.001% to 4.06% 0.001% to 4.30% 0.001% to 34.34% 0.001% to 0.83%

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[Silver		0.001% to 0.10%
		Cadmium		0.001% to 0.036%
		Antimony		0.005% to 0.50%
		Sulphur		0.005% to 0.10%
		Aluminium		0.005% to 10.23%
		Arsenic		0.001% to 0.25%
		Bismuth		0.001% to 0.10%
		Carbon		0.002% to 0.030%
ļ		Beryllium	i 	0.005% to 0.010%
6.	Nickel Alloys	Carbon	SAS/QS/02/2012	0.004% to 0.50%
		Manganese		0.1% to 1.35%
		Phosphorus		0.0009% to 0.050%
		Sulphur		0.0003% to 0.050%
		Silicon		0.01% to 0.20%
		Copper		0.005% to 34.00%
		Chromium		0.001% to 21.30%
		Molybdenum		0.001% to 25.00%
		Tungsten		0.001% to 3.56%
		Iron		0.01% to 31.45%
		Aluminium		0.001% to 3.40%
		Cobalt		0.01% to 0.38%
į		Niobium		0.002% to 3.60%
		Titanium		0.005% to 2.60%
		Vanadium		0.001% to 0.23%
		Nickel		63.00% to 99.60%
		Boron		0.003% to 0.021%
		Nitrogen		0.001% to 0.020%
7.	Aluminium Alloy	Chromium	ASTM E 1251 :2017	0.001% to 0.13%
		Cobalt		0.001% to 0.23%
		Copper		0.001% to 4.20%
		Iron		0.001% to 0.73%
		Lead		0.001% to 0.14%
		Magnesium		0.001% to 3.08%
		Manganese		0.001% to 1.50%

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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
		Nickel Silicon Tin Titanium Vanadium Zinc Silver Cadmium Bismuth		0.001% to 0.41% 0.001% to 13.30% 0.001% to 0.22% 0.001% to 0.15% 0.001% to 0.032% 0.001% to 3.50% 0.010% to 0.11% 0.001% to 0.010% 0.001% to 0.13%
8.	Iron & Its Alloy	Titanium Vanadium Chromium Manganese Iron Cobalt Nickel Copper Molybdenum Tungsten Niobium	ASTM E 1916-97:RA 2004	Qualitative
9.	Nickel & Its Alloy	Titanium Vanadium Chromium Manganese Iron Cobalt Nickel Copper Molybdenum Tungsten Niobium Hafnium Tantalum	ASTM E 1916-97:RA 2004	Qualitative

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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
10.	Copper & Its Alloy	Chromium Manganese Iron Nickel Copper Zinc Arsenic Lead Tin Bismuth Zirconium Silver	ASTM E 1916-97:RA 2004	Qualitative
11.	Low Alloy Steel	Carbon	IS 228 (Part 1) – 1987 RA 2008	0.050% to 2.50%
		Silicon	IS 228 (Part 8) -1989 RA 2009	0.05% to 5.0%
		Manganese	IS 228 (Part 2) – 1987 RA 2002	0.1% to 3.0%
		Phosphorus	IS 228 (Part I3) - 1987 RA 2008	0.01% to 0.12%
		Sulphur	IS 228 (Part 9)-1989, RA 1999	0.010% to 0.6%
		Chromium	IS 228 (Part 6)-1987 RA 2002	0.5% to 5.0%
		Nickel	IS 228 (Part 5) - 1987 RA 2002	0.2% to 5.0%
		Molybdenum	IS 228 (Part 7)- 1990 RA 2001	0.15% to 2.0%

Sohm Analytical Services (I) Pvt. Ltd., A-121/101, B-33/35, Amargian Industrial Estate, Pokharan Road No. 1, Khopat, Thane (W), Laboratory

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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
12.	Stainless Steel	Carbon	IS 228 (Part 1) – 1987, RA 2008	0.015% to 0.30%
		Silicon	IS 228 (Part 8) -1989 RA 2009	0.05% to 3.0%
		Phosphorus	IS 228 (Part 3) - 1987 RA 2008	0.01% to 0.12%
		Sulphur	IS 228 (Part 9)-1989, RA1999	0.005% to 0.6%
		Chromium	IS 228 (Part 6)-1987 RA 2002	0.1% to 26.0%
		Nickel	ASTM (E - 353) 2014	0.2% to 25.0%
		Molybdenum	IS 228 (Part 7)- 1990 RA 2001	1.0% to 6.0%
13.	Copper & its Alloys	Copper	IS 440 :1964 RA 2006	99.20 % to 99.99 %
14.	Wire, Sheet, Strip, Plate	Mass of Zinc Coating (By Stripping Method)	IS 6745:1972 (RA 2016)	50 g to 220 g

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MECHANICAL TESTING

I.	MECHANICAL PROPERTIES OF METALS			
1.	Ferrous ,Non Ferrous Metals & Alloys	Tensile Test (Yield Strength, Ultimate Tensile Strength, 1%,0.2% Proof Stress % Elongation, % Reduction in Area) Brinell Hardness Hardness Vickers Hardness Rockwell B & C Scales	IS 1608-2005 ASTM A370- 2017a ASTM E8/E8M-2016a ISO 6892-1:2016 ASTM B 557-15 IBR Rule:2017 IS 1500 (Part 1):2013 ASTM E10-2017 ISO 6506-1:2014 IS 1501 (Part 1):2013 ISO 6507-1:2018 ASTM E92-2017 ASTM A370- 2017a ASTM E18-2017e1	10kN to 400kN 30kN to 1200kN 100 MPa to 2300 MPa 50 MPa to 1500 MPa 2 % to 80 % 2 % to 85 % 50HBW to 500HBW 2.5.mm /187.5 kgf / 62.5 kgf / 31.25 kgf 50 to 750 HV 5 50 to 900 HV 10 50 to 750 HV 30 50 HRBW to 100 HRBW
2.	Metals and alloys (Tube to tube sheet Mock up)	Pull Out Test	IS 1586 (Part 1):2012 ISO 6508-1 :2016 ASME Sec. VIII Div.1:2017	Qualitative (10kN to 400kN 30 kN to 1200 kN)
3.	Weld Metal	Tensile Test (Ultimate Tensile Strength)	IS 2825-1969 (RA 2017) BS EN ISO 15614-1-2017 AWS D1.1-2015 AWS D4.0-2016 ASME SEC.IX -2017 BS EN ISO 4136:2012 IBR Rule:2017 API 1104-2013	10kN to 400kN 30kN to 1200kN UTS: 100 MPa to 2300 MPa

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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
		Face Bend, Root Bend & Side Bend Test	BS EN ISO 5173:2010+A1 :2011 IS 2825:1969(RA 2017) IBR Rules:2017 AWS D1.1-2015, ASME SEC.IX – 2017 API 1104-2013	Qualitative (Mandrel Diameter: 5,6,8,10,12,15,24,30,32, 36,40,45,52,60,75,90 in mm)
4.	Cladded steel Plate	Shear Test	ASTM A 263-2012/ SA 263-2017 ASTM A 264-2012 / SA 264-2017 ASTM A 265-2012/ SA 265-2017	10kN to 400kN 30kN to 1200kN Shear strength: 50 MPa to 800 Mpa
5.	Steel Plates, Bars, Rods	Bend Test	IS 1599-2012 IS 2329:2005 ASTM A370-2017a ASTM E290-2014 IBR Rules:2017	Qualitative (Mandrel Diameter: 5,6,8,10,12,15,24,30,32, 36,40,45,52,60,75,90 in mm)
6	Ferrous ,Non Ferrous Metals & Alloys (Weld)	Nick break Test	API 1104:2013 IS 3600 (Part 8)-1985 IBR Rule:2017 IS 2825-1969(RA 2017)	Qualitative (10kN to 400kN 30kN to 1200kN)
7.	Steel Plates	Through Thickness Tensile (%R.A)	ASTM A770-03(2012) BS EN 10164-2004 API SPEC 2H-2012	10kN to 400kN 30kN to 1200kN 5 % to 85 %
8.	Ferrous, Non Ferrous Metals & Alloys	Charpy 'V' notch Impact Test	ASTM E23-16b ASTM A370-2017a IS 1757-1988 (2003) BS EN ISO 148-1:2016 BS EN ISO 9016:2012 IBR RULE:2017	2J to 300 J (-) 196°C to 50°C
		Izod Impact Test	IS 1598-1988(R 2015)	2J to 168 J Ambient Temperature

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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
9.	High Strength deformed bar for concrete reinforcement	Re-bendTest	IS 1786 – 2008	Qualitative (Mandrel Diameter: 5,6,8,10,12,15,24,30,32, 36,40,45,52,60,75,90 in mm)
10.	Steel Tubes / Pipes	Flattening Reverse Flattening Test	IS 2328 -2005-Ra2017 ASTM A370-2017a ASTM A1016/1016M-2016 ASTM A999-2018	Qualitative (Outer Diameter : 10 mm to 660 mm)
		Bend Test	IS 2329 - 2005 ASTM A370-2017a ASTM A530 - 2012	Qualitative (Mandrel Diameter : 140,160,180,260,300, 340,620,720 in mm)
11	Ferrous ,Non Ferrous Metals & Alloys Tube / Pipe	Flaring Test/Drift Test	IS 2335-2005-Ra2017 ASTM A370-2017a ASTM B153-2011(2017) IS 2501-1995(R2016) ASTM A1016/1016M-2016	Qualitative 6 mm to 168 mm (30°, 45°, 60°)
12	Ferrous ,Non Ferrous Metals & Alloys Bolt &Screws	Proof Load	IS 1367-Part 3-2002 ASTM A 370:2017a	10kN to 400kN 30kN to 1200kN Size M10 to M39
13	Ferrous ,Non Ferrous Metals & Alloys - Nuts	Proof Load	IS 1367 -Part 6-1994 (RA 2004) ASTM A194-2017a ASTM A370-2017a	10kN to 400kN 30kN to 1200kN Nut Size M3 to M39 (Mandrel Sizes.10,12,16,20,24,30 ,33,36,39,5/8",3/4",1", 1 1/8",1 1/4",1 1/2")
14	Welded / Brazed Products	Peel Test Fracture Test	ASME Sec. IX – 2017	Qualitative

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II	METALLOGRAPHY	TEST		
1.	Ferrous ,Non Ferrous Metals, Alloys& Welded Joints	Macro Examination	ASTM E381-2017 ASTM E340-2015 IS 11371-1985 BS EN ISO 17639-2013 ASME Sec IX-2017	Qualitative (5X to 50X)
2.	Ferrous Alloys	Inclusion Rating Method A & D	ASTM E45-2018 Comparison Method IS 4163 - 2004	Qualitative (100X)
3.	Ferrous &Non Ferrous Alloys	Microstructure Examination	ASM Handbook Volume 9-2004, ASTM E3-2011(2017) ASTM E 407:2015	Qualitative (50X,100X, 200X, 500X, 1000X)
		Average grain Size	(Comparison method)	(100X)
4.	Cast Iron Products	Microstructure of Graphite Cast iron Nodularity in SG Iron	IS7754-1975(R2003) ASTM A247-2017	Qualitative (50X,100X, 200X, 500X, 1000X)
5.	Metallic / Non Metallic Coatings on ferrous, aluminum, copper base material	Thickness of Coating (Microscopic Method)	ASTM B487-2013	0.01 mm to 1.6mm (100X)
6.	Steel Products	Determination of depth Of decarburized layer in Steel	IS-6396:2000 Rev. 2 Reaffirmed 2007 ASTM E1077-2014	0.01 mm to 1.6mm (100X)
7.	Case Hardened Steels	Determination of case Depth, microscopic Method in steel.	IS 6416 :1988 (RA2003)	(100X) 0.1 mm to 5 mm
8.	Austenitic Stainless Steel	IGC Practice A	ASTM A 262-2015	250X & 500X

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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
		IGC Practice B (Weight loss Method) IGC Practice C (Weight loss Method) IGC Practice E		1 mills/ year to 2500 mills/ year 1 mills/ year to 2500 mills/ year Qualitative (5X TO 20X) 180 ⁰ bend (1t & 4t)
		IGC Practice F (Weight loss Method)		1 mills/ year to 2500 mills/ year
9.	Metals and Coated metals	Salt spray test	ASTM B117-2016 ISO 9227-2017	Qualitative
10.	Stainless Steel and Related Alloys	Ferric Chloride pitting test (Method A)	ASTM G48 - 2015	Visual & Weight loss Method, 22°C and 50°C, 0.001 g/cm² to 20 g/cm²
		Ferric Chloride crevice test (Method B)		Visual & Weight loss Method, 22°C and 50°C, 0.001 g/cm² to 20g/cm²
11.	Nickel base and chromium bearing alloy	Critical pitting temperature test (Method C)	ASTM G48-2015	0.001 g/cm ² to 50g/cm ²
12.	Ferritic, Austenitic and Duplex	IGC Method A	ISO 3651 Part-2:1998	Magnification 5X to 20X (1t & 4t Bend min 90º)
	Stainless Steel	IGC Method C(Huey Test) Weight loss Method	ISO 3651 Part-1:1998	1 mills/ year to 2500 mills/ year
13.	Nickel Rich Chromium	IGC - Method A (Weight loss Method)	ASTM G28-2015	1 mills/ year to 2500 mills/ year
	Bearing Alloys	IGC - Method B (Weight loss Method)	ASTM G28-2015	Upto 2500 mills/ year
14.	Ferrous Metals & Alloys	Ferrite Content Test (By Metallography) Ferrite Content Test	ASTM E-562-11 ASTM A800-14	25 % to 65% 0.10 % to 85%
		(Ferrite Content Test (Ferritescope method)	AS 11VI A0UU-14	0.10 % to 85% 0.10 FN to 110 FN

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15.	Ferrous Metal & Alloys (Pipes & Pressure vessel Steels)	Hydrogen Induced Cracking	NACE TM 0284-2016	Upto 20% (CLR, CTR, CSR)
16.	Duplex Stainless Steel, Stainless Steel, Ferrous Metals and Its Alloys	Sulphide Stress Cracking & Stress Corrosion Cracking -Method A,B,C	NACE TM0177-2016	Qualitative (Room Temperature to 120°C)
17.	Ferrous Metals & Alloys (Wrought Cast & Welded Stainless Steels)	Chloride Stress Corrosion Cracking Test in boiling MgCl2 / CaCl2 Solution	ASTM G36-94 (2013)	Qualitative
18.	Duplex Stainless steel	Detection of Detrimental Intermetallic Phases Method A	ASTM A923-2014	Qualitative (400X / 500X)
19.	Duplex Stainless steel	Detection of Detrimental Intermetallic Phases Method C	ASTM A923-2014	0.001 g/cm ² to 20 g/cm ²
20.	Ferrous Metals & Alloys (Tubes & Tube Sheets)	Macro etch Test (Minimum Leak Path & Leg Length)	ASME Sec. IX – 2017 AWS D1.1-2015	5 X to 20 X 1 mm to 20 mm