Laboratory	**Analytical Research & Metallurgical Laboratories Private Limited (ARML), #A 101 & A 102, Block II, KSSIDC Complex, Electronics City Phase-I, Bangalore, Karnataka**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Certificate Number	**TC-7254** ***(in lieu of T-2857, T-2858)***	**Page 1 of 11**	
Validity	**22.04.2018 to 21.04.2020**	**Last Amended on 18.05.2018**	

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

CHEMICAL TESTING

I.	**WATER**			
1.	**Drinking Water Ground Water Irrigation Water**	pH	IS 3025 (Part 11)-1983 (RA 2012) APHA 23rd Edn. 4500 - H+	1 to 14
		Turbidity	IS 3025 (Part 10) -1984 (RA 2012) APHA 23rd Edn. 2130 B	0.5 NTU to 100 NTU
		Conductivity	IS 3025 (Part 14) -1984 (RA 2013) APHA 23rd Edn. 2510 B	10 µS/cm to 10000 µS/cm
		Total Solids	IS 3025 (Part 15) -1984 (RA 2009) APHA 23rd Edn. 2540 B	10 to 1000 mg/l
		Total Suspended solids	IS 3025 (Part 17)-1984 (RA 2012) APHA 23rd Edn.2540 E	10 mg/l to 1000 mg/l
		Total Hardness as $CaCO_3$	IS 3025 (Part 21) -2009 APHA 23rd Edn. 2340 C	10 mg/l to 2000 mg/l
		Calcium as Ca	IS 3025 (Part 40) -1991 (RA 2009) APHA 23rd Edn. 3500 Ca B	10 mg/l to 1000 mg/l
		Magnesium as Mg	IS 3025 (Part 46)-1994 (RA 2009) APHA 23rd Edn. 3500 Mg B	10 mg/l to 500 mg/l
		Total Alkalinity as $CaCO_3$	IS 3025 (Part 23)-1986 (RA 2009) APHA 23rd Edn. 2320 B	10 mg/l to 500 mg/l

Nitan Garg
Convenor

N. Venkateswaran
Program Director

Laboratory	**Analytical Research & Metallurgical Laboratories Private Limited (ARML), #A 101 & A 102, Block II, KSSIDC Complex, Electronics City Phase-I, Bangalore, Karnataka**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Certificate Number	**TC-7254** ***(in lieu of T-2857, T-2858)***	**Page 2 of 11**	
Validity	**22.04.2018 to 21.04.2020**	**Last Amended on 18.05.2018**	

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Chloride as Cl	IS 3025 (Part 32)-1988 (RA 2009) APHA 23rd Edn. 4500 Cl- B	10 mg/l to 1000 mg/l
		Sulphates as SO_4	IS 3025 (Part 24)- 1986 (RA 2009) APHA 23rd Edn. 4500 SO_4 4500 E	1 mg/l to 200 mg/l
		Fluoride as F	IS 3025 (Part 60) -2008, APHA 23rd Edn. 4500 F B, D	0.1 mg/l to 100 mg/l
		Chlorine Residual	IS 3025 (Part 26) - 1986 (RA 2009) APHA 23rd Edn. 4500 Cl B	1 mg/l to 10 mg/l
		Hexavalent Chromium Cr^{6+}	IS 3025(Part 52 -2003 (RA 2009) APHA 23rd Edn. 3500 - Cr B	0.05 mg/l to 10 mg/l
2.	**Industrial Water**	pH	IS 3025 (Part 11)-1983 (RA 2002)APHA 23rd Edn. 4500 - H+	1 to 14
		Total Solids	IS 3025 (Part 15) -1984 (RA 2003) APHA 23rd Edn. 2540 B	10 mg/l to 10000 mg/l
		Total Suspended solids	IS 3025 (Part 17)-1984 (RA 2012) APHA 23rd Edn.2540 E	10 mg/l to 1000 mg/l
		Chloride as Cl	IS 3025 (Part 32)-1988 (RA 2009) APHA 23rd Edn. 4500 Cl- B	10 mg/l to 5000 mg/l
		Sulphates as SO_4	IS 3025 (Part 24)- 1986 (RA 2009) APHA 23rd Edn. 4500 SO_4 4500 E	1 mg/l to 2000 mg/l

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Dissolved Oxygen as O_2	IS 3025 (Part 38) - 1989 (RA 2003) APHA 23rd Edn. 4500 O B,C	0.2 mg/l to 8 mg/l
		Chemical Oxygen Demand	IS 3025 (Part 58) - 2006 APHA 23rd Edn. 5220 B & C	2 mg/l to 5000 mg/l
		Biological Oxygen Demand	IS 3025 (Part 44) - 1993 (RA 2003) APHA 23rd Edn.5210 B	2 mg/l to 5000 mg/l
		Oil & Grease	IS 3025 (Part 39) - 1991 (RA 2209) APHA 23rd Edn. 5520 O&G - B	10 mg/l to 500 mg/l
		Chlorine Residual	IS 3025 (Part 26) - 1986 (RA 2009) APHA 23rd Edn. 4500 Cl B	1 mg/l to 10 mg/l
		Hexavalent Chromium Cr^{6+}	IS 3025(Part 520 -2003 (RA 2009) APHA 23rd Edn. 3500 - Cr B	0.05 mg/l to 10 mg/l
II.	**ANIMAL FOOD AND FEEDS**			
1.	**Animal Feeds**	Moisture	IS : 7874 (Part I) - 1975 (RA 2014)	1.0 % to 10 %
		Crude Protein		1.0 % to 75 %
		Crude Fat		1.0 % to 10 %
		Total Ash		0.5 % to 50 %
		Acid Insoluble Ash		0.1 % to 10 %
		Iodine Content		0.1 % to 10 %
		Carbohydrates	IS 1656-2007 (Annexure C)	1 % to 20 %
		Energy	Food and Agricultural Organisations of the United Nations / World Health	100 kcal to 1000 kcal/100g

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
			Organisation - Fifth Edition, 2007	
III	**FOOD AND AGRICULTURAL PRODUCTS**			
1.	**Spices & Condiments**	Moisture	IS : 1797 - 2017	0.1 % to 25 %
		Total Ash	IS : 1797 - 2017	0.1 % to 15 %
		Acid Insoluble Ash	IS : 1797 - 2017	0.1 % to 5 %
		Water Insoluble Ash	IS : 1797 - 2017	0.1 % to 5 %
		Cold water soluble extract	IS : 1797 - 2017	0.1 % to 25 %
		Alcohol soluble extract	IS : 1797 - 2017	0.1 % to 20 %
		Crude fiber	IS : 1797 - 2017	0.1 % to 25 %
		Non volatile ether extract	IS : 1797 - 2017	1 % to 15%
		Volatile oil	IS : 1797 - 2017	0.5 % to 20 %
2.	**Vegetable Edible Oil**	Moisture & Volatile Matter Content	IS : 548 (Part I) - 1964, (RA 2015)	0.05 % to 10 %
		Acid Value	IS : 548 (Part I) - 1964, (RA 2015)	0.1 mg KOH/g to 10 mg KOH/g
		Free Fatty Acids(FFA)	IS : 548 (Part I) - 1964 (RA 2015)	0.05 % to 5 %
		Iodine Value	IS : 548 (Part I) - 1964 (RA 2015)	30 to 165
3.	**Prepackaged Cereal base Foods**	Crude Protein	IS 7219 - 1973 (RA 2010)	1 g to 50 g/100g
		Crude Fat	IS 1011 - 2002 (RA 2009)	1 g to 50 g/100g
		Carbohydrates	IS 1656-2007 (Annexure C)	10 g to 70 g/100g
		Energy	Food and Agricultural Organisations of the United Nations / World Health Organisation - Fifth Edition, 2007	100 kcal/100g to 1000 kcal/100g

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
IV.	**METALS & ALLOYS**			
1.	**Carbon steel & alloy steels**	Carbon	IS 8811:1998 (RA 2006) ASTM E415-2017	0.05 % to 1.50 %
		Silicon		0.05 % to 1.50 %
		Manganese		0.10 % to 1.50 %
		phosphorous		0.01 % to 0.08 %
		Sulphur		0.01 % to 0.35 %
		Chromium		0.01 % to 8.00 %
		Titanium		0.001 % to 0.05 %
		Nickel		0.01 % to 0.30 %
		Aluminum		0.02 % to 0.05 %
		Copper		0.05 % to 0.30 %
2.	**Stainless Steel**	Carbon	IS 9879:1998 (RA 2006)	0.01 % to 0.15 %
		Silicon		0.15 % to 2.0 %
		Manganese		0.01 % to 2.0 %
		phosphorous		0.01 % to 0.07 %
		Sulphur		0.01 % to 0.07 %
		Chromium		10.0 % to 25.0 %
		Molybdenum		0.1 % to 3.0 %
		Nickel		0.3 % to 12.0 %
		Copper		0.1 % to 0.15 %
3.	**Aluminum & Its Alloys**	Silicon	ASTM E 1251: 2011 IS 11035 : 1984 (RA 2000)	0.6 % to 12.0 %
		Copper		0.01 % to 2.20 %
		Nickel		0.01 % to 0.15 %
		Chromium		0.01 % to 0.23 %
		Titanium		0.01 % to 0.07 %

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Magnesium		0.035 % to 0.90 %
		Manganese		0.01 % to 0.70 %
		Zinc		0.05 % to 5.0 %
		Iron		0.1 % to 3.0 %
4.	**Copper & its alloys**	Iron	BS EN 15079:2015	0.02 % to 0.50 %
		Manganese		0.04 % to 0.05 %
		Nickel		0.01 % to 0.20 %
		Lead		0.028 % to 4.00 %
		Tin		0.8 % to 1.30 %
		Zinc		0.01 % to 42.50 %
5.	**Metals**	Salts Spray Testing	ASTM B117-11, ISO 9227, JIS Z 2371, IS 101 (Part 6/Sec 1) – 1988, (RA 2010)	Qualitative
V.	**PLASTIC AND RESINS**			
1	**Plastics and Polymers**	Identification test	ASTM E1252 – 2013	Qualitative
		Ash/Filler Content	ASTM D 5630-2013	0.05 % to 50 %
		Density & Specific Gravity (Relative Density)	ASTM D 792 – 2013, ISO 1183-2012	0.900 g/cc to 1.340 g/cc
VI.	**RUBBER AND RUBBER PRODUCTS**			
1	**Rubber Products**	Identification test	ASTM E1252 – 2013	Qualitative
		Ash/Filler Content	ISO 247-2015	0.05 % to 50 %

Laboratory	**Analytical Research & Metallurgical Laboratories Private Limited (ARML), #A 101 & A 102, Block II, KSSIDC Complex, Electronics City Phase-I, Bangalore, Karnataka**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Certificate Number	**TC-7254** ***(in lieu of T-2857, T-2858)***	**Page 7 of 11**	
Validity	**22.04.2018 to 21.04.2020**	**Last Amended on 18.05.2018**	

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

MECHANICAL TESTING

I.	**METALS AND ALLOYS**			
1.	**Ferrous & non ferrous materials**	**Tensile Test** UTS Yield Stress 0.2% Proof Stress Elongation % Reduction in Area %	IS:1608-2005 ISO 6892-1998(RA:2011) ASTM E8/E8M- 2016 ASTM A370-2017	0.1kN to 950kN 0.5 % to 100 % 0.5 % to 80 %
		Vickers hardness	IS: 1501(Part-1)-2013 ISO 6507-1-2005 ASTM E 384-17 BS EN ISO 9015-1-2011 BS EN ISO 9015-2-2011	100HV to 1200HV (HV0.2 ,HV0.3 ,HV0.5, HV1, HV5,HV10)
		Brinell hardness	IS: 1500(Part-1) - 2013 ISO 6506-1-2005 ASTM E 10 - 2017 ASTM A370-2017	100 HBW to 550 HBW (5mm/750kgf) 30 HBW to 240 HBW (10mm/1000 kgf) 100 HBW to 550 HBW (10mm/3000kgf)
		Rock well hardness	IS: 1586(Part-1)-2012 ISO 6508-1-2005 ASTM E 18 - 2017 ASTM A370-2017	20 to 100 HRB 20 to 70 HRC 20 to 92 HRA
		Bend	IS: 1599-2012 ISO 7438-2005(RA 2015)	Qualitative (Mandrel diameter 4, 6,10, 20, 32, 44, 50, 60 & 72 mm)

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Shear	IS 5242-1979 (RA2010)	Qualitative (3- 25mm diameter Load:0.1 to 800kN)
2.	**High Strength Deformed Steel Bars**	Mass per metre	IS: 1786 – 2008(RA 2013)	0.09 kg to 16 kg
3.	**Metallic Tubes**	Flattening	IS 2328-2005 ISO 8492-1998(RA 2011)	Qualitative (5 mm to 100 mm diameter)
		Crushing	IS 3074-2005(RA 2010)	Qualitative (10 mm to 100 mm diameter)
		Drifting	IS 2335-2005 ISO 8493-1998(RA 2016)	Qualitative (10 mm to 100 mm diameter)
4.	**Metallic wires**	Reverse Bend Test	IS 1716-1985(RA 2011)	Qualitative (0.3 mm to 10 mm diameter)
5.	**Welded and Brazed Products**	Tensile (Ultimate Tensile Strength)	IS:3600(Part-3)-2009 ASME Sec. IX -2017 ISO 4136-2012 AWS D1.1/D1.1M:2015 AWSD1.2/D1.2M:2014 AWS D1.6/D1.6M:2007	0.1kN to 950kN (0.04kN) 0.5 % to 100 % 0.5 % to 80 %
		Bend	IS:3600(Part-5)-1983 (RA 2013) ASME Sec. IX -2017 ISO 5173:2009 AWS D1.1/D1.1M:2015 AWSD1.2/D1.2M:2014 AWS D1.6/D1.6M:2007	Qualitative (Mandrel diameter 4, 6,10, 20, 32, 44, 50, 60 & 72 mm)
		Fracture	ISO 9017 - 2001 ASME Sec. IX -2017	Qualitative (2.0 mm to 20.0 mm thick)

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
			AWS D1.1/D1.1M:2015 AWSD1.2/D1.2M:2014 AWS D1.6/D1.6M:2007	
6.	**Spot welded sheets**	Shear	ISO 14273-2016 ASME Sec IX-2017	Qualitative (0.5 mm to 10.0 mm thick sheets Load 0.1 to 50kN)
		Peel	ISO 10447-2006 ASME Sec IX-2017	Qualitative (0.5 to 3.0mm thick sheets)
		Chisel	ISO 10447-2006	Qualitative (0.5 to 3.0mm thick sheets)
II.	**METALLOGRAPHY TEST**			
1.	**Metals and Alloys (Ferrous & non ferrous)**	Macrostructural analysis	IS :7739 (Part-3)-1975 (RA2007) IS :7739 (Part-4)-1975 (RA2007) IS :7739 (Part-5)-1976 (RA2007) IS :13015-1991 (RA2012) IS :11371-1985 (RA2007) IS :12573-2010 (RA 2016) ASTM E340-2013 ASTM E 381-2001 (RA 2006) ASM Handbook Vol. 9 -2004	Qualitative (3.5X, 5X, 7X, 10X, 15X, 20X, 25X, 30X, 35X,40X & 45X magnifications)
		Microstructrual analysis	IS :7739 (Part-3)-1975 (RA2007) IS :7739 (Part-4)-1975	Qualitative (50X, 100X, 200X, 500X & 1000X magnification)

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
			(RA 2007) IS :7739 (Part-5)-1976 (RA2007) IS :7739 (Part-6)-1975 (RA2007) IS :7739 (Part-8)-1975 (RA2007) IS :7739 (Part-11)-1976 (RA2007) IS :7754-1975 (RA2012) ASTM E3-2011 ASM Handbook Vol. 9 -2004.	
		Grain size by comparison method	IS :4748 -2009 ASTM E112-13	Qualitative (Grain Size No. 0 to 10 at 100X)
2.	**Welded and Brazed Products**	Macro Examination	IS :3600(Part- 9) -1985 (RA 2008), ASME Sec. IX -2017, ISO 17639-2003, AWS D1.1/D1.1M:2015 AWSD1.2/D1.2M:2014 AWS D1.6/D1.6M:2007 ASM Handbook Vol. 9 -2004	Qualitative (3.5X, 5X, 7X, 10X, 15X, 20X, 25X, 30X, 35X,40X & 45X magnifications)
		Micro structural analysis	IS :3600 (Part -9) - 1985(RA 2008) ASM Handbook Vol. 9 -2004	Qualitative (50X, 100X, 200X, 500X & 1000X magnification)
3.	**Steel Products**	Inclusion rating, Method 'A'	IS:4163-2004 ISO 4967-1998(RA2010) ASTM E45-13	Type A to D&DS, 0 to 5 100X
		Depth of decarburized layer by Microscopic	IS: 6396-2000 (RA2012)	0.001mm to 10mm

Laboratory	**Analytical Research & Metallurgical Laboratories Private Limited (ARML), #A 101 & A 102, Block II, KSSIDC Complex, Electronics City Phase-I, Bangalore, Karnataka**	
Accreditation Standard	**ISO/IEC 17025: 2005**	
Certificate Number	**TC-7254** ***(in lieu of T-2857, T-2858)***	**Page 11 of 11**
Validity	**22.04.2018 to 21.04.2020**	**Last Amended on 18.05.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Method		
4.	**Metallic plated/ coated parts**	Plating/Layer thickness by microscopic method	IS:3203-1982 (RA2016)	0.001mm to 10mm
5.	**Case Hardened Steel**	Effective case depth by hardness traverse method	IS :6416-1988 (RA 2012) IS:13691-1993 (RA 2007)	0.01mm to 5 mm
		Total case depth by microscopic method	IS :6416-1988 (RA 2012) IS:13691-1993 (RA 2007)	0.01mm to 5 mm
		Total case depth by macroscopic method	IS :6416-1988 (RA 2012)	0.01mm to 10mm

Nitan Garg
Convenor

N. Venkateswaran
Program Director