Laboratory	**Star Wire (India) Ltd., Diagnostic Centre, 21/4, Mathura Road, Ballabgarh, Haryana**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Discipline	**Mechanical Testing**	**Issue Date**	**15.01.2015**
Certificate Number	**T-0270**	**Valid Until**	**14.01.2017**
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S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
I.	**MECHANICAL PROPERTIES OF MATERIALS**			
1.	**Metallic Materials (Ferrous & Non Ferrous)**	Tensile Test	IS 1608: 2005 (RA 2010) ASTM: A-370-2012	
		Tensile Strength		2 kN to 100 kN 2 kN to 1000 kN
		Yield Stress		
		Breaking Load		
		0.2 % Proof Stress		
		% Elongation		0.40 % to 80.0 %
		% Reduction Area		20.0 % to 80.0 %
2.	**Metallic material**	Tensile test of steel from room temp. to elevated temp. up to 600 °C		
		Tensile Strength 0.2% proof stress yield strength % Elongation % Reduction	ASTM E-21-1992	2 kN to 50 kN 0.40 % to 80.0 % 20.0 % to 80.0 %
3.	**Metallic Materials Ferrous & Non Ferrous**	Weight per meter	IS 1786: 2013	0.001 kg to 10 kg
4.	**Welded Material**	Tensile Strength	ASME Section - IX -2010, AWS D1.1/D1.1M : 2010 AWS B 4.0: 2007	2 kN to 100 kN 2 kN to 1000 kN

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5.	**Metallic Material Ferrous & Non Ferrous**	Vickers Hardness	IS 1501: 2002 (RA 2007)	30 HV5 to 1449 HV5 50 HV10 to 1535 HV10 128 HV30 to 1925 HV30
		Micro Vickers Hardness	IS 1501: 2002 (RA 2007)	2 HV0.01 to 300 HV0.01 2 HV2 to 1550 HV2
		Brinell Hardness	IS 1500: 2005 (RA 2010)	10/3000 HBW (100 to 600) 2.5 / 187.5 HBW (100-600) 5/750 HBW (100 to 600) 5/250 HBW (100 to 600)
		Rockwell Hardness–Scale-A	IS 1586: 2000 (RA 2010) ASTM: A-370-2012 ASTM E 18 – 12	1 HRA to 88 HRA
		Rockwell Hardness–Scale-HRBW		1 HRBW to 100 HRBW
		Rockwell Hardness–Scale-C		1 HRC to 70 HRC
6.	**All Metals**	Izod Impact "V" Notch	IS 1598: 1977 (RA 2009) ASTM: A-370-2012 ASTM E 23 – 12 C	2 J to 160 J
		Charpy Impact "U" Notch	IS 1499: 1977 (RA 2009) ASTM : A-370.-2012	2 J to 300 J at room temp. to – 40 ˚C
		Charpy Impact "V" Notch	IS 1757: 1988 (RA 2009) ASTM : A-370-2012	2 J to 300 J at room temp. to – 40 ˚C

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7.	**Steel**	Jominy Hardenablity Test	IS 3848: 1981 (RA 2009)	Qualitative
8.	**Ferrous & Non Ferrous Welded Plate**	Bend Test(Root Bend & Face Bend)	ASME Section-IX 2010, AWS D1.1/D1.1M :2010 AWS B 4.0:2007	Qualitative (Mandrel Diameter : 6, 12, 24, 32, 36, 48, 60, 84, 100, 112, 128, 140, 174, 196, 224 mm)
9.	**Section of Ferrous Material, Steel And Copper, Copper Alloy, Aluminium & Aluminium Alloy and welded joints**	Bend Test	IS 1599: 2012 AWS B 4.0:2007	Qualitative (Mandrel Diameter : 6, 12, 24, 32, 36, 48, 60, 84, 100, 112, 128, 140, 174, 196, 224 mm)
10.	**Metal Sheets & Strips**	Erichsen Cupping Test	IS 10175: 2012	0.05 mm to 15 mm
11.	**Ferrous Materials**	Rebend Test	IS 1786: 2013	Qualitative (Mandrel Diameter : 6, 12, 24, 32, 36, 48, 60, 84, 100, 112, 128, 140, 174, 196, 224 mm)
12.	**Ferrous & Non Ferrous Pipes**	Drift Expansion Test	IS 2335: 2005 (RA 2010)	15 mm to 100 mm
		Flattening Test	IS 2328: 2005 (RA 2010)	Above 50mm diameter
13.	**Ferrous Metals & Alloys/ Bloom Forging & Casting**	Macro Analysis	ASTM E-381-2001(RA 2012) IS 11371: 1985 (RA 2007)	10 X Max
14.	**Steel**	Inter granular test as per practice A,B,C & E	ASTM-A-262-2013	Qualitative

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15.	**Ferrous Grey Iron-Malleable Iron, S.G. Iron & Steel in various H.T. condition**	Micro sample preparation & Etching Microstructure Analysis	IS 7739 (Part 1): 1975 (RA 2010) IS 7739 (Part 2): 1975 (RA 2007) IS 7739 (Part 5): 1975 (RA 2007) IS 7754: 1975 (RA 2007) ASM VOL 9, Metallography & Microstructures	500 X Max
16.	**Ferrous & Non - Ferrous Metals**	Estimation of Grain Size by Microscopic Method	ASTM E-112-2012 IS:4748-2009 RA	100 X
17.	**Steel**	Determination of Inclusion Rating (comparison method) & K4 Value	ASTM E-45-2013, IS 4163: 2004 (RA 2010) DIN 50602: 1985	100 X
		Determination of case depth by microscopic method	IS 6416: 1988 (RA 2007)	0 .01 mm to 1 mm
		Determination of depth of decarburization by microscopic method	ASTM E-1077-2001 (RA 2005) IS 6396: 2000 (RA 2007)	0.01 mm to 1 mm
		Determination of case depth by vicker's hardness method	IS 6416: 1988 (RA 2007)	0.1 mm minimum
II.	**BUILDING MATERIALS**			
1.	**Tile**	Water Absorption	IS 1237: 2012 IS 13801: 2013	0.5 % to 40 %
		Dimension	IS 1237: 2012 IS 13801: 2013	0.5 mm to 400 mm
		Abrasion value	IS 1237: 2012 IS 13801: 2013	0.10 mm to 5 mm

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	Tile	Wet transverses strength	IS 1237: 2012 IS 13801: 2013	Upto 10N/mm^2
		Modulus of Rupture	IS 13630 (Part 6): 2006 (RA 2011)	0.05 kN to 125 kN
		Breaking Strength	IS 4457: 2007 (RA 2012)	0.05 KN to 125 kN
2.	**Acid Resistance Tile / Bricks**	Water Absorption	IS 4860: 1968 (RA 2011)	0.5 % to 40 %
3.	**Fire Clay Refractory**	Bulk Density	IS 1528 (Part 12): 2007	1 g/cm^3 to 3 g/cm^3
		Cold Crushing Strength	IS 1528 (Part 4): 2012	0.5 kN to 3000 kN
4.	**Common Burnt Clay Bricks**	Water Absorption	IS 3495 (Part 2): 1992 (RA 2011)	0.1 % to 40 %
		Compressive Strength	IS 3495(Part 1): 1992 (RA 2011)	0.04 N/mm^{2}to 40 N/mm^2
		Efflorescence	IS 3495(Part 3): 1992 (RA 2011)	Qualitative
		Dimension	IS 1077: 1992 (RA 2011)	1 mm to 5000 mm
5.	**Aggregate**	Flakiness Index	IS 2386 (Part 1): 1963 (RA 2011)	Upto 50 %
		Elongation Index for Aggregate	IS 2386 (Part 1): 1963 (RA 2011)	Up to 50 %
		Sieve Analysis for Aggregate	IS 2386 (Part 1): 1963 (RA 2011)	75 microns to 80 mm
		Water Absorption	IS 2386 (Part 3): 1963 (RA 2011)	1 % to 25 %

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	Aggregate	Specific Gravity	IS 2386 (Part 3): 1963 (RA 2011)	2.3 to 3.5
		Bulk Density	IS 2386 (Part 3): 1963 (RA 2011)	1 gm/cc to 2 gm/cc
		Material Finer than 75 micron	IS 2386(Part 1): 1963 (RA 2011)	1 % to 20 %
		Impact Value	IS 2386 (Part 4): 1963 (RA 2011)	1 % to 80 %
		Crushing Value	IS 2386 (Part 4): 1963 (RA 2011)	1 % to 80 %
		10% Fine value	IS 2386 (Part 1): 1963 (RA 2011)	1 kN to 1000 kN
		Deleterious Materials	IS 2386 (Part 2): 1963 (RA 2011)	0.5 % to 5 %
		L.A. Abrasion value	IS 2386 (Part 4): 1963 (RA 2011)	10 % to 80 %
		Organic Impurities	IS 2386 (Part 2): 1963 (RA 2011)	Qualitative
		Soundness	IS 2386 (Part 5): 1963 (RA 2011)	1 % to 30 %
		Stripping value	IS 6241: 1971 (RA 2013)	Upto 100%
6.	**Concrete**	Flexural strength(using simple beam with third point loading)	IS 516: 1959 (RA 2008) ASTM : C-78-10 e1	0.5 kN to 100 kN
		Compressive Strength / Core test	IS 516: 1959 (RA 2008)	0.10 kN to 3000 kN
7.	**Stone**	Durability	IS 1126: 2013	Qualitative
		Water Absorption	IS 1124: 1974(RA 2013)	0.1 % to 40 %
		Apparent Porosity	IS 1124: 1974(RA 2013)	0.5 % to 40 %
		Apparent Specific Gravity	IS 1124: 1974(RA 2013)	2.30 % to 5.00 %

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8.	**Fly Ash**	Lime reactivity	IS 1727: 1967 (RA 2008)	0.5 kN to 100 kN
		Specific gravity	IS 1727: 1967 (RA 2008)	1.5 to 3.6
		Fineness by Blain's permeability method	IS 1727: 1967 (RA 2008)	5 m^2/kg to 500 m^2/kg
		Particle retained on 45 micron	IS 1727: 1967 (RA 2008)	1 % to 34 %
		Compressive strength at 28 days	IS 1727: 1967 (RA 2008)	1 N/mm^2 to 50 N/mm^2
		Soundness by autoclave	IS 1727: 1967 (RA 2008)	0.1 % to 1 %
9.	**Timber Testing**	Moisture Content by oven dry method	IS 287: 1993 (RA 2008)	0.5 % to 60 %
10.	**Bitumen Testing**	Bitumen Contents from DBM,BC,SDBC	MORTH Specification	1 % to 10 %
		Bitumen Penetration test	IS 1203: 1978 (RA 2009)	5 to 100
		Softening Point (R & B)	IS 1205: 1978 (RA 2009)	(-)10°C to 360 °C
		Ductility	IS 1208: 1978 (RA 2009)	1 cm to 100 cm
		Elastic recovery	IS 15462: 2004 (RA 2009) IRC SP-53	10 % to 100 %
		K. Viscosity	IS 1206 (Part 03): 1976 (RA 2007)	50 cst to 1500 cst
		Flash Point (COC)	IS 1209: 1973 (RA 2007)	40 °C to 390 °C
		Loss on Heating	IS 1212: 1976 (RA 2007)	0.01 % to 5.0 %
		Solubility in TCE	IS 1216: 1979 (RA 2007)	95.0 % to 100 %

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11.	**Cement (OPC, PPC, Slag Cement, White Cement)**	Consistency	IS 4031 (Part 4): 1988 (RA 2009)	10 % to 35 %
		Setting time		
		Initial Time Final Time	IS 4031 (Part 5): 1988 (RA 2009) EN-196 (Part 3): 2005	2.0 min to 720 min
		Fineness (blains)	IS 4031 (Part 2): 1999 (RA 2008)	100 m^2/kg to 700 m^2/kg
		Soundness Le-Chatlier	IS 4031 (Part 3): 1988 (RA 2009) EN-196 (Part 3): 2005	0.5 mm to 20mm
		Soundness Autoclave	IS 4031 (Part 3): 1988 (RA 2009) EN-196 (Part 3): 1993	0.008 % to 4 %
		Compressive strength	IS 4031 (Part 6): 1988 (RA 2009) EN-196 (Part 1): 2005	10 MPa to 75 MPa
12.	**Admixture**	Water content (% of control sample)	IS 9103: 1999 (RA 2008)	80 % maximum
		Slump	IS 9103: 1999 (RA 2008)	10 mm to 250 mm
		Time of setting (allowable deviation from control sample)	IS 9103: 1999 (RA 2008)	1 hr to 5 hrs
		Compressive strength (% of control sample 1,3,7, 28 days, 6 months and 1 year)	IS 9103: 1999 (RA 2008)	5 kN to 3000 kN
		Flexural strength (% of control sample 3,7,28 days)	IS 9103: 1999 (RA 2008)	1 kN to 100 kN
		Length change (% increase over control sample)	IS 9103: 1999 (RA 2008)	0.5 % to 20 %

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	Admixture	Bleeding (% increase over control sample)	IS 9103: 1999(RA 2008)	Upto 7 %
		Loss of workability	IS 9103: 1999 (RA 2008)	Upto 7%
		Air content (%)	IS 9103: 1999(RA 2008)	Upto 10 %
III.	**SOIL AND ROCK**			
1.	**Soil Site & Lab**	Liquid Limit	IS 2720 (Part 5): 1985 (RA 2010)	10 % to 500 %
		Plastic Limit	IS 2720 (Part 5): 1985 (RA 2010)	1 % to 50 %
		California Bearing Ratio	IS 2720 (Part 16): 1987 (RA 2011)	1 % to 100%
		Sieve Analysis	IS 2720 (Part 4): 1985 (RA 2010)	0.075 mm to 4.75 mm
		Water Content	IS 2720 (Part 2): 1973 (RA 2010)	0.5 % to 50 %
		Proctor Density	IS 2720 (Part 7): 1980 (RA 2011) IS 2720 (Part 8): 1983 (RA 2010)	0.5 gm/cm^3 to 3.0 gm/cm^3
		Direct Shearing Cohesion Angle	IS 2720 (Part 13): 1986 (RA 2011)	 Upto 0.5 kg/cm^2 1° to 50°
		Field Density (sand replacement method & core cutter method)	IS 2720 (Part 28): 1974(RA 2010) IS 2720 (Part 29): 1975 (RA 2010)	1.5 gm/cc to 2.5 gm/cc Compaction upto 100 %
		One dimensional consolidation	IS 2720(Part 15): 1986 (RA 2011)	0.005 N/mm^2 to 1 N/mm^2
		Tri axial (UU)	IS 2720 (Part 11): 1993 (RA 2011) IS 2720 (Part 12): 1981 (RA 2011)	0.005 N/mm^2 to 1 N/mm^2

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IV.	**PERFORMANCE TEST**			
1.	**PVC water stops**	Tensile strength	IS 8543 (Part 4/ Sec1): 1984 IS 13360 (Part 5/ Sec 11) : 2013	10 N to 5000 N
		Elongation	IS 8543 (Part 4/Sec1): 1984	Upto 600 %
		Hardness	IS 13360 (Part 5/ Sec 11): 2013	2 Shore A to 98 Shore A
		Water absorption	IS 15058: 2002 (RA 2013)	0 to 10 %
		Accelerated extraction	IS 15058: 2002 (RA 2013)	Qualitative
		Tensile strength		Upto 5000 N
		Elongation		0 to 500 %
		Stability in effects of alkalis	IS 15058: 2002 (RA 2013)	
		weight increase at 7 days		0 to 10 %
		weight decrease at 7days		0 to 10 %
		change in hardness at 7 days		±25 Shore A
		weight increase at 28 days		0 to 10 %
		weight decrease at 28 days		0 to 10 %
		dimension change		0 to 10 %
V.	**SOUND LEVEL**	Intensity of sound (Work Zone)	SWDC/WI/E/05 – 08.11.2012	35 dB to 130 dB

-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-