

**Laboratory** Mukesh A. Patel Technical Consultancy & Civil Engineering  
 Laboratory, Plot No. E-217, Electronics Estate, GIDC, Sector-26,  
 Gandhinagar, Gujarat

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

**Certificate Number** TC-7224 (in lieu of T-2149, T-2150)

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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><u>CHEMICAL TESTING</u></b>				
<b>I.</b>	<b>WATER</b>			
<b>1.</b>	<b>Water for construction purpose</b>	pH Value	IS 3025 (Part-11) 1983 (RA 2012)	3 to 11
		Sulphate (SO <sub>3</sub> )	IS 3025 (Part-24) 1986 (RA 2014)	20 mg/l to 1000 mg/l
		Chloride (Cl)	IS 3025 (Part-32) 1988 (RA 2014)	20 mg/l to 5000 mg/l
		Total Suspended solids	IS 3025 (Part-17) 1984 (RA 2012)	1 mg/l to 3000 mg/l
		Total dissolved solids	IS 3025 (Part-16) 1984 (RA 2012)	10 mg/l to 1000 mg/l
		Acidity [Volume of 0.02 N NaOH required to neutralize 100ml of water sample using phenolphthalein as an indicator.(ml)]	IS 3025 (Part-22) 1986 (RA 2014)	Upto 50 ml
		Alkalinity [Volume of 0.02N H <sub>2</sub> SO <sub>4</sub> required to neutralize 100ml of water sample using phenolphthalein as an indicator.(ml)]	IS 3025 (Part-23) 1986, (RA 2014)	Upto 50 ml
		Volatile Residue	IS 3025 (Part-18) 1984 (RA 2012)	10 mg/l to 1000 mg/l
		Fixed Residue	IS 3025 (Part-18) 1984 (RA 2012)	10 mg/l to 5000 mg/l

**Sunita Rawat**  
 Convenor

**N. Venkateswaran**  
 Program Manager

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II.	<b>BUILDING MATERIALS</b>			
1.	<b>Cement</b>	Loss On Ignition	IS 4032-1985, (RA 2014)	0.1 % to 10 %
		Silica	IS 4032-1985, (RA 2014)	15 % to 35 %
		Ferric Oxide	IS 4032-1985, (Clause 4.5.1) (RA 2014)	0.5 % to 10 %
		Alumina	IS 4032-1985, (Clause 4.6.1) (RA 2014)	1.0 % to 15.0 %
		Calcium Oxide	IS 4032-1985, (Clause 4.7.1) (RA 2014)	20 % to 70 %
		Magnesium Oxide	IS 4032-1985, (Clause 4.8.1) (RA 2014)	0.05 % to 10%
		Sulphuric Anhydride	IS 4032-1985, (RA 2014)	0.1 % to 5 %
		Insoluble Residue	IS 4032-1985, (RA 2014)	0.5 % to 35 %
		Sodium as Na <sub>2</sub> O	IS 4032-1985, (RA 2014)	0.05 % to 5.0 %
		Chloride	IS 4032-1985, (RA 2014)	0.05 % to 0.5 %
		Alkalis as potassium	IS 4032-1985, (RA 2014)	1.05% to 5.0 %
2.	<b>Admixture</b>	pH	IS 9103-1999 Annex-E (RA 2013)	3.0 to 11.0
		Chloride ion	IS 9103-1999	0.2 % to 10.0 %

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			Annex-E (RA 2013)	
		Relative Density	IS 9103-1999 Annex-E (RA 2013)	
		Ash Content	IS 9103-1999 Annex-E (RA 2013)	Upto 5.0 %
		Dry material Content	IS 9103-1999 Annex-E (RA 2013)	Upto 60.0 %
<b>III.</b>	<b>PLASTIC AND POLYMERS</b>			
<b>1.</b>	<b>UPVC Pipe</b>	Sulphated ash content	IS 12235 (Part-17), Method-B (RA 2010)	Upto 10.0 %
<b>IV.</b>	<b>METALS AND ALLOYS</b>			
<b>1.</b>	<b>Low Alloy Steel</b>	C	ASTM E 415:2017	0.030 % to 1.100 %
		Si		0.030 % to 1.200 %
		Mn		0.200 % to 1.100 %
		P		0.005 % to 0.080 %
		S		0.010 % to 0.07 %
		Cr		0.020 % to 1.50 %
		Ni		0.050 % to 3.30 %
		Mo		0.015 % to 0.600 %
		Al		0.002 % to 0.100 %
		Cu		0.150 % to 0.400 %
		V	0.005% to 0.400%	

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<b><u>MECHANICAL TESTING</u></b>				
<b>I.</b>	<b>BUILDING MATERIALS</b>			
<b>1.</b>	<b>Concrete</b>	Compressive strength	IS 516:1959 (RA 2013)	5 N/mm <sup>2</sup> to 75 N/mm <sup>2</sup>
		Slump test	IS 1199:1959 (RA 2013)	1 mm to 300 mm
		Flexural Strength	IS 516:1959 (RA 2013)	1 N/mm <sup>2</sup> to 20 N/mm <sup>2</sup>
<b>2.</b>	<b>Burnt clay bricks and Fly ash bricks</b>	Compressive strength	IS 3495 (Part-1):1992 (RA 2016)	1 N/mm <sup>2</sup> to 20 N/mm <sup>2</sup>
		Efflorescence	IS 3495 (Part-3):1992 (RA 2016)	Qualitative
		Water absorption	IS 3495 (Part-2):1992 (RA 2016)	1 % to 25 %
		Dimension	IS 1077:1992 (RA 2016)	L: 3800 mm to 5800 mm W : 1800 mm to 2200 mm H : 1200 mm to 1600 mm
<b>3.</b>	<b>Paver Blocks</b>	Compressive strength	IS 15658:2006 (RA 2017)	1 N/mm <sup>2</sup> to 75 N/mm <sup>2</sup>
		Water absorption	IS 15658:2006 (RA 2017)	1 % to 20 %
		Flexural Strength	IS 15658:2006 (RA 2017)	1 N/mm <sup>2</sup> to 50 N/mm <sup>2</sup>
<b>4.</b>	<b>Coarse Aggregates</b>	Gradation	IS 2386 (Part-1):1963, (RA 2016)	4.75mm to 125 mm/ Upto 100%
		Flakiness index	IS 2386 (Part-1):1963 (RA 2016)	5 % to 50 %
		Elongation index	IS 2386 (Part-1):1963, (RA 2016)	5 % to 50 %
		Specific gravity	IS 2386 (Part-3):1963 (RA 2016)	1.50 to 4.00

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		Water absorption	IS 2386 (Part-3):1963 (RA 2016)	1 % to 25 %
		Crushing value	IS 2386 (Part-4):1963, (RA 2016)	1 % to 50 %
		Impact value	IS 2386 (Part-4):1963, (RA 2016)	1 % to 50 %
		Los angeles abrasion value	IS 2386 (Part-4):1963, (RA 2016)	1 % to 50 %
		Soundness	IS 2386 (Part-5):1963, (RA 2016)	1 % to 50 %
		Stripping Value	IS 6241:1971 (RA 2017)	75 % to 100 %
		10% Fines Value	IS 2386 (Part-4):1963, (RA 2016)	1 Ton to 30 Ton
<b>5.</b>	<b>Fine Aggregates</b>	Gradation (Sieve analysis-0.075 to 10 mm sieve size)	IS 2386 (Part-1):1963, (RA 2016)	0.075 mm to 10 mm
		Specific gravity	IS 2386 (Part-3):1963 (RA 2016)	1.50 to 4.00
		Water absorption	IS 2386 (Part-3):1963 (RA 2016)	1 % to 25 %
		Soundness	IS 2386 (Part-5):1963, (RA 2016)	1 % to 50 %
<b>6.</b>	<b>Tar and bituminous materials</b>	Softening point	IS 1205:1978 (RA 2014)	20 °C to 70 °C
		Penetration	IS 1203:1978 (RA 2013)	50 to 150 (1/10 mm)
		Ductility	IS 1208:1978 (RA 2014)	1 cm to 100 cm
		Specific gravity	IS 1202:1978 (RA 2009)	0.9 cm to 1.10 cm
		Absolute Viscosity	IS 1206:1978 (RA 2014)	1200 poise to 24000 poise

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		Kinematics Viscosity	IS 1206:1978 (RA 2014)	60 cSt to 1000 cSt
		Loss on heating	IS 1212:1978, RA 2014	0.1 % to 5.0 %
7.	<b>Bituminous Mix Design</b>	Stability	ASTM D 1559:1989 and ASTM D 6927:2015	2 kN to 30 kN
		Flow	ASTM D 1559:1989 and ASTM D 6927:2015	1.0 mm to 8.2 mm
8.	<b>Cement</b>	Bitumen content	ASTM D 2172:2017	0.1 % to 10.0 %
		Consistency	IS 4031 (Part-4):1988 (RA 2014)	20 % to 40%
		Initial setting time	IS 4031 (Part-5):1988, (RA 2014)	5 minutes to 300 minutes
		Final setting time	IS 4031 (Part-5):1988, (RA 2014)	5 minutes to 600 minutes
		Compressive strength	IS 4031 (Part-6):1988, (RA 2014)	1 N/mm <sup>2</sup> to 100 N/mm <sup>2</sup>
		Soundness by Le-chatelier methods	IS 4031 (Part-3):1988, (RA 2014), Clause No. 5	0.01 mm to 10 mm
		Soundness by Autoclave Methods	IS 4031 (Part-3):1988, (RA 2014), Clause No. 6	0.01 % to 2 %
		Fineness by blaine air permeability	IS 4031 (Part-2):1999, (RA 2013)	150 m <sup>2</sup> /kg to 600 m <sup>2</sup> /kg
		Fineness by dry sieving (% retained)	IS 4031:1996 (Part-1) Clause No.5, (RA 2016)	Upto 40%
		Specific Gravity	IS 4031 (Part-11):1988, (RA 2016)	1.00 to 4.00
9.	<b>Autoclave Aerated Block</b>	Compressive Strength	IS 6441:1972 (Part-5), (RA 2017)	1 kg/cm <sup>2</sup> to 90 kg/cm <sup>2</sup>
		Drying and Shrinkage	IS 6441:1972 (Part-2), (RA 2017)	1.01 % to 0.2 %
		Thermal Conductivity	IS 3346:1980, (RA 2010)	0.01 W/mK to 0.5 W/mK

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		Moisture Content	IS 6441:1972 (Part-1), (RA 2017)	1 % to 20 %
		Dimension	IS 2185:1984, (Part-3), (RA 2015)	L:390 mm to 610 mm B:190 mm to 310 mm H:90 mm to 260 mm
		Dry Density	IS 6441:1972 (Part-1), (RA 2017)	200 kg/m <sup>3</sup> to 1200 kg/m <sup>3</sup>
10.	Pressed ceramic tiles/Ceramic Tiles	Dimensions	IS 13630:2006 (Part-1) (RA 2017)	L:100 mm to 1000 mm W: 100 mm to 1000 mm T : 0.1 mm to 15 mm
		Straightness of Sides	IS 13630:2006 (Part-1) (RA 2017)	± 0.01% to 0.18 %
		Rectangularity	IS 13630:2006 (Part-1) (RA 2017)	± 0.01% to 0.18 %
		Surface Flatness	IS 13630:2006 (Part-1) (RA 2017)	± 0.01% to 0.25 %
		Surface Quality	IS 13630:2006 (Part-1) (RA 2017)	Qualitative
		Water absorption	IS 13630:2006 (Part-2) (RA 2017)	0.01% to 25 %
		Modulus of rupture	IS 13630:2006 (Part-6) (RA 2017)	5 N/mm <sup>2</sup> to 55 N/mm <sup>2</sup>
		Breaking Strength	IS 13630:2006 (Part-6) (RA 2017)	100 N to 3000 N
11.	Pressed ceramic Tiles-Ceramic Tiles	Moisture expansion	IS 13630:2006 (Part-3) (RA 2017)	Upto 0.06 mm/m
		Scratch hardness	IS 13630:2006 (Part-13) (RA 2017)	1 to 10 Moh's Scale
		Co-efficient of linear Thermal Expansion From Ambient to 100° C	IS 13630:2006 (Part-4) (RA 2017)	1x10 <sup>-6</sup> K <sup>-1</sup> to 10x10 <sup>-6</sup> K <sup>-1</sup>
		Thermal Shock	IS 13630:2006 (Part-5)	1 Cycle to 20 Cycle

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		Resistance	(RA 2017)	
		Crazing Resistance	IS 13630:2006 (Part-9) (RA 2017)	1 Cycle to 7 Cycle @75 bar
		Resistance to Deep Abrasion	IS 13630:2006 (Part-12) (RA 2017)	40 mm <sup>3</sup> to 2906 mm <sup>3</sup>
		Resistance to Surface abrasion	IS 13630:2006 (Part-11) (RA 2017)	Qualitative
<b>12.</b>	<b>Flush Door</b>	End immersion Test	IS 4020:1998 (Part-13) (RA 2013)	Qualitative
		Knife Test	IS 4020:1998 (Part-14) (RA 2013)	Qualitative
		Glue adhesion Test	IS 4020:1998 (Part-15) (RA 2013)	Qualitative
<b>II.</b>	<b>SOIL AND ROCK</b>			
<b>1.</b>	<b>Natural building stone</b>	Apparent specific gravity	IS 1124:1974, (RA 2013)	2.20 to 3.15
		Water absorption	IS 1124:1974, (RA 2013)	0.01% to 10.0%
		True specific gravity	IS 1122:1974 (RA 2017)	2.0 to 4.0
		Compressive strength	IS 1121:2013, (Part-1) (RA 2017)	1 N/mm <sup>2</sup> to 600 N/mm <sup>2</sup>
<b>2.</b>	<b>Soil</b>	Gradation (Sieve analysis-0.075 to 125 mm sieve size)	IS 2720 (Part-4):1985, (RA 2015)	0.1 % to 100 %
		Liquid Limit	IS 2720 (Part-5):1985, (RA 2015)	15 % to 150 %
		Plastic Limit	IS 2720 (Part-5):1985, Part-5 (RA 2015)	5 % to 50 %
		Proctor Test (Modified/Heavy)	IS 2720 (Part-8):1983 (RA 2015)	



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		MDD: OMC:		1.40 g/cc to 2.90 g/cc 3.0% to 30.0 %
		Proctor Test (Standard/Light)	IS 2720 (Part-7):1980 (RA 2016)	MDD: 1.40 g/cc to 2.90 g/cc OMC: 3.0% to 30.0 %
		California Bearing Ratio	IS 2720 (Part-16):1985, (RA 2016)	1% to 100 %
		Free Swell Index	IS 2720 (Part-40):1977, (RA 2016)	Upto to 80 %
		Direct Shear Test	IS 2720 (Part-13):1986, (RA 2016)	C = 0 to 5 kg/cm <sup>2</sup> Φ = 0 to 45°
		Consolidation Test	IS 2720 (Part-15):1965, (RA 2016)	0.1 kg/cm <sup>2</sup> to 8 kg/cm <sup>2</sup>
		Unconfined Compression Strength	IS 2720 (Part-10):1991, (RA 2015)	0.2 kg/cm <sup>2</sup> to 4 kg/cm <sup>2</sup>
		Direct Shear Test	IS 2720 (Part-13):1986, (RA 2016)	C = 0 to 5 kg/cm <sup>2</sup> Φ = 0 to 45°
		Consolidation Test	IS 2720 (Part-15):1965, (RA 2016)	0.1 kg/cm <sup>2</sup> to 8 kg/cm <sup>2</sup>
		Swelling Pressure	IS 2720 (Part-41):1977, (RA 2016)	0.01 kg/cm <sup>2</sup> to 3.00 kg/cm <sup>2</sup>
		Shrinkage Limit	IS 2720 (Part-6):1972, (RA 2016)	5 % to 20 %
		Permeability	IS 2720 (Part-17):1986, (RA 2016) By Falling head method	1x10 <sup>1</sup> cm/sec to 10x10 <sup>-7</sup> cm/sec
		Specific gravity	IS 2720 (Part-3):1986, (RA 2016)	2.20 to 2.80
		Tri axial test (Unconsolidated Undrained)	IS 2720 (Part-15):1965, (RA 2016)	C: 0.1 kg/cm <sup>2</sup> to 8 kg/cm <sup>2</sup> Ø: Upto 50°
3.	Rock	Unconfined	IS 9143: 1979,	1.0 N/mm <sup>2</sup> to 600 N/mm <sup>2</sup>

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4.	Soil (Field Test)	Compression Strength Field Density	(RA 2016) IS 2720 (Part 29): 1974, (RA 2015) by Core cutter method	1.0 g/cc to 3.00 g/cc
		Field Density by Sand Replacement	IS 2720 (Part 28): 1974, (RA 2015)	1.0 g/cc to 3.00 g/cc
		Field Moisture Content	IS 2720 (Part 2): 1973, (RA 2015)	Upto 50 %
III.	<b>MECHANICAL PROPERTIES OF METAL</b>			
1.	Reinforcement Steel	Ultimate Tensile Strength	IS 1608:2005 (RA 2017)	50 N/mm <sup>2</sup> to 900 N/mm <sup>2</sup>
		Yield stress	IS 1786:2008 (RA 2013)	50 N/mm <sup>2</sup> to 750 N/mm <sup>2</sup>
		0.2 % proof stress	IS 1786:2008 (RA 2013)	50 N/mm <sup>2</sup> to 750 N/mm <sup>2</sup>
		Elongation	IS 1608:2005 (RA 2017)	5 % to 50 %
		Rebend	IS 1786:2008 (RA 2013)	Qualitative: [(Mandrel Diameter: (32 mm, 40mm, 48 mm, 50mm, 56 mm, 60 mm, 70 mm, 72 mm, 84mm, 96 mm, 112mm, 120 mm, 128 mm, 140 mm, 150 mm, 160 mm, 175 mm, 192 mm, 200 mm, 224 mm, 256 mm,)]

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		Bend	IS 1599:2012 (RA 2017)	Qualitative: (Mandrel Diameter: (16 mm, 20mm, 24mm, 30mm, 32mm, 36mm, 40mm, 48mm, 50mm, 60mm, 64mm, 75 mm, 80mm, 96mm, 100mm, 125mm, 128mm, 150 mm, 160 mm, 192 mm))
		Nominal mass	IS 1786:2008 (RA 2013)	0.02 kg/m to 10 kg/m
		Cross section area	IS 1786:2008 (RA 2013)	28.03 mm <sup>2</sup> to 804.5 mm <sup>2</sup>
<b>IV.</b>	<b>PLASTIC AND POLYMERS</b>			
<b>1.</b>	<b>UPVC Pipe</b>	Density	IS 12235 (Part-14): 2004 (RA 2014)	1.35 g/cm <sup>3</sup> to 1.55 g/cm <sup>3</sup>
		Outside diameter	IS 12235 (Part-1): 2004, Clause No.4, (RA 2014)	20.00 mm to 300.00 mm
		Wall thickness	IS 12235 (Part-1): Clause No.5.1.2 (RA 2014)	5.00 mm to 8.00 mm