

Laboratory Nanji Kalabhai Patel & Co. (NKPC), Plot No. 515, Phase-2, New GIDC
Gundlav, Valsad, Gujarat

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6617

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CHEMICAL TESTING

I.	WATER			
1.	Potable and Domestic/ Bore/ Irrigation Water	Odour	IS 3025 (Part 5): 1983 (RA 2017)	Qualitative (Agreeable)
		pH -by Electrometric Method	IS 3025 (Part 11): 1983 (RA 2017)	1.0 to 14
		Total dissolved solids -by Gravimetric method	IS 3025 (Part 16): 1984 (RA 2017)	10 mg/l to 2000 mg/l
		Chloride -by Argentometric method	IS 3025 (Part 32): 1988 (RA 2014)	1 mg/l to 3000 mg/l
		Total Hardness -by EDTA method	IS 3025 (Part 21): 2014	1 mg/l to 1000 mg/l
		Total Alkalinity	IS 3025 (Part 23): 1983 (RA 2014)	1 mg/l to 600 mg/l
		Turbidity	IS 3025 (Part 10): 1984 (RA 2017)	0.1 NTU to 50 NTU
		Sulphate -by Gravimetric method	IS 3025 (Part 24): 1996 (RA 2014)	5 mg/l to 2000 mg/l
		Fluoride	IS 3025 (Part 60): 2008 (RA 2013)	0.1 mg/l to 10 mg/l
		Chlorine Residual -by Iodometric method	IS 3025 (Part 26): 1986 (RA 2014)	1 mg/l to 10 mg/l
		Calcium -by EDTA Titrimetric method	IS 3025 (Part 40): 1991 (RA 2014)	5 mg/l to 1000 mg/l
		Magnesium -by Gravimetric method	IS 3025 (Part 46): 1994 (RA 2014)	5 mg/l to 1000 mg/l

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II.	BUILDING MATERIALS			
1.	Construction water	pH -by Electrometric Method	IS 3025 (Part 11): 1983 (RA 2017)	1 to 14
		Acidity (To neutralize 100ml sample, 0.02N NaOH required)	IS 3025 (Part 22): 1996 (RA 2014)	0.1 ml to 25 ml
		Total dissolved solids -by Gravimetric method	IS 3025 (Part 16) (RA 2017)	10 mg/l to 2000 mg/l
		Sulphate as SO ₃ -by Gravimetric method	IS 3025 (Part 24): 1996 (RA 2014)	5 mg/l to 2500 mg/l
		Chloride (Cl) -by Argentometric method	IS 3025 (Part 32): 1988 (RA 2014)	20 mg/l to 3000 mg/l
		Total Suspended Solids -by Gravimetric method	IS 3025: (Part 17 1984 (R.A. 2017)	5 mg/l to 1000 mg/l
		Alkalinity -To neutralize 100ml sample, 0.02N H ₂ SO ₄ required	IS 3025: (Part 23-1983 (R.A. 2014)	0.1 ml to 50 ml
2.		Admixtures	Dry Material Content	IS 9103:1999 (RA 2013)
	Ash Content		IS 9103:1999 (RA 2013)	1 % to 20 %
	Relative Density		IS 9103:1999 (RA 2013)	1 to 1.5
	Chloride content -by Volumetric method		IS 6925:1973 (RA 2008)	0.001 % to 1 %
	pH		IS 9103:1999 (RA 2013)	4 to 12
3.	Curing Compound	pH	BS 7542	4 to 12.0
4.	Aggregate (Coarse & Fine)	Alkali Aggregate Reactivity	IS 2386 (Part 7): 1963 (RA 2016)	2 mmo/L to 700 mmo/L
5.	Sand	Loss on Ignition	IS 1917 (Part 3): 1991 (RA 2006)	0.1 % to 5 %
		Silica	IS 1917 (Part 3): 1992	25 % to 98 %

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6.	Concrete	Chlorides	(RA 2005) IS 14959 (Part 2): 2001 (RA 2011)	0.01 % to 1.0 %
III.	SOIL & ROCK			
1.	Soil	Total Soluble Solid	IS 2720 (Part 21): 1977 (RA 2016)	0.002 % to 5 %
		Calcium Carbonate	IS 2720 (Part 23): 1976 (RA 2010)	1 % to 90 %
		pH	IS 2720 (Part 26): 1987 (RA 2011)	2 to 12
		Sulphate	IS 2720 (Part 27): 1977 (RA 2015)	0.001 % to 10 %
		Organic Matter	IS 2720 (Part 22) (RA 2015) ASTM-2974	0.1 % to 90 %
		Loss On Ignition	BS 1377-3 :1990	0.1 % to 25 %
2.	Bentonite	pH	IS 2720 (Part 26): 1987 (RA 2011)	4 to 12
		Gel Formation Index	IS 6186:1986 (RA 2010)	Qualitative
		Loss On Index	IS 6186:1986 (RA 2010)	1 % to 20 %
		Matter Soluble in Water	IS 6186:1986 (RA 2010)	1 % to 15 %
3.	Limestone and Dolomite	Loss on Ignition	IS 1760 (Part 1): 1991 (RA 2006)	5 % to 47 %
		Silicon as Silicon Dioxide (SiO ₂)	IS 1760 (Part 2): 1991 (RA 2006)	0.1 % to 57 %
		Chloride (Cl)	IS 1760 (Part 5): 1991 (RA 2006)	0.002 % to 2 %

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MECHANICAL TESTING

I.	MECHANICAL PROPERTIES OF METALS			
1.	Reinforcement & Structural Steel	Ultimate Tensile Strength	IS 1608:2005 (RA 2011)	200 N/mm ² to 700 N/mm ²
		Yield Strength	IS 1608:2005 (RA 2011)	200 N/mm ² to 700 N/mm ²
		Elongation	IS 1608:2005 (RA 2011)	10% to 40%
		Bend Test	IS 1599:2012 (RA 2015)	Qualitative (Mandrel Size (dia) (mm) (18,24,30,32,36,40,48,50, 60,64,80,84))
		Re-bend Test	IS 1786:2008 (RA 2013)	Qualitative (Mandrel Size (dia.) (mm) (18,24,30,32,36,40,48,50, 60,64,80,84))
II.	BUILDING MATERIALS			
1.	Cement Testing OPC -33 Grade OPC -43 Grade OPC -53 Grade PPC	Standard Consistency	IS 4031 (Part 4): 1988 (RA 2013)	10 % to 40 %
		Setting Time- Initial	IS 4031 (Part 5): 1988 (RA 2013)	5 min to 600 min
		Setting Time- Final	IS 4031 (Part 5): 1988 (RA 2013)	30 min to 600 min
		Compressive Strength	IS 4031 (Part 6): 1988 (RA 2009)	10 N/mm ² to 80 N/mm ²
		Soundness- Le Chatelier	IS 4031 (Part 3): 1988 (RA 2009)	0.1mm to 15 mm
		Fineness - by air Permeability (only for OPC)	IS 4031 (Part 2): 1988 (RA 2008)	150 m ² /kg to 600 m ² /kg
		Density	IS 4031 (Part 11): 1988 (RA 2009)	2.8 g/cc to 3.3 g/cc
		Fineness by Dry	IS 4031 (Part 1): 1996	0.1 % to 10 %

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2.	Coarse Aggregate	Sieving	(RA 2009)	
		Gradation - Sieve Analysis	IS 2386 (Part 1): 1963 (RA 2016)	4.75 mm to 125 mm
		Flakiness Index	IS 2386 (Part 1): 1963 (RA 2016)	5 % to 70 %
		Elongation Index	IS 2386 (Part 1): 1963 (RA 2016)	5 % to 70 %
		Water Absorption	IS 2386 (Part 3): 1963 (RA 2016)	0 to 25 %
		Impact Value	IS 2386 (Part 4): 1963 (RA 2016)	5 % to 40 %
		10% Fines Value	IS 2386 (Part 4): 1963 (RA 2016)	10 kN to 490 kN
		Specific Gravity	IS 2386 (Part 3): 1963 (RA 2016)	1.5 to 4
		Abrasion Value	IS 2386 (Part 4): 1963 (RA 2016)	5 % to 55 %
		Bulk Density	IS 2386 (Part 3): 1963 (RA 2016)	1.2 kg/L to 1.7 kg/L
		Crushing Value	IS 2386 (Part 4): 1963 (RA 2016)	5 % to 55 %
		Finer than 75 Micron	IS 2386 (Part 1): 1963 (RA 2016)	1 % to 10 %
		Soundness -by MgSO4 -by Na2SO4	IS 2386 (Part 5): 1963 (RA 2016)	1 % to 20 % 1 % to 15 %
3.	Fine Aggregate/ Sand	Striping Value	IS 6241:1971 (RA 2008)	Qualitative
		Sieve Analysis -Gradation	IS 2386 (Part 1): 1963 (RA 2016)	150 micron to 4.75 mm
		Water Absorption	IS 2386 (Part 3): 1963 (RA 2016)	Up to 15 %
		Specific Gravity	IS 2386 (Part 3): 1963 (RA 2016)	1.5 to 4
		Finer than 75 Micron	IS 2386 (Part 1): 1963	1% to 20%

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			(RA 2016)	
		Bulk Density	IS 2386 (Part 3): 1963 (RA 2016)	1.4 kg/L to 2.2 kg/L
		Soundness -by MgSO ₄ -by Na ₂ SO ₄	IS 2386 (Part 5): 1963 (RA 2016)	1 % to 20 % 1 % to 15 %
4.	Bitumen	Penetration	IS 1203:1978 (RA 2009)	10 to 400 (1/10mm)
		Absolute Viscosity	IS 1206 (Part 2): 1978 (RA 2011)	600 Poise to 3000 Poise
		Kinematic Viscosity	IS 1206 (Part 3): 1978 (RA 2011)	100 cSt to 600 cSt
		Softening Point	IS 1205:1978 (RA 2009)	10 °C to 70 °C
		Ductility	IS 1208:1978 (RA 2009)	10 cm to 100 cm
		Specific Gravity	IS 1202:1978 (RA 2004)	0.95 to 1.05
		Loss on Heating	IS 1212: 1978 (RA 2009)	Up to 1 %
5.	Bitumen Mix	Binder Content	IRC SP 11/ASTM D 2172	3.5 % to 6.5 %
		Stability	ASTM D 6927-06	2 kN to 20 kN
		Flow	ASTM D 6927-06	1 mm to 6.2 mm
6.	Concrete Mix/ Concrete Core/ Cylinder/ Cube	Compressive Strength	IS 516:1959 (RA 2013)	10 N/mm ² to 80N/mm ²
		Slump Test	IS 1199:2005 (RA 2013)	Up to 250 mm
		Split Tensile Strength	IS 5816:1999 (RA 2008)	1 N/mm ² to 5 N/mm ²
		Permeability of Concrete	IRS Indian Bridge Code	0.1 mm to 50.0 mm
7.	Burnt Clay/ Building Brick & Burnt Clay/ Fly Ash Building Brick	Compressive Strength	IS 3495 (Part 1): 1992 (RA 2011)	1 N/mm ² to 15 N/mm ²
		Water Absorption	IS 3495 (Part 2): 1992 (RA 2011)	1 % to 30 %
		Dimensions -Length -Width -Height	IS 1077:1997(RA 2011) IS 13757:1993 (RA 2007)	2000 mm to 5000 mm 1600 mm to 2500 mm 1000 mm to 2300 mm
		Efflorescence	IS 3495 (Part 3): 1992 (RA 2011)	Qualitative
8.	Autoclave Cellular	Dimensions	IS 2185 (Part 3): 1984	

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	(Aerated) Concrete Blocks	-Length -Width -Height	(RA 2010)	400 mm to 600 mm 100 mm to 250 mm 200 mm to 300 mm
		Block Density	IS 2185 (Part 3): 1984 (RA 2010) IS 6441 (Part 1): 1972 (RA 2011)	450 kg/m ³ to 1000 kg/m ³
		Compressive Strength	IS 2185 (Part 3): 1984 (RA 2010) IS 6441 (Part 5): 1972 (RA 2011)	1 N/mm ² to 10 N/mm ²
9.	Paving Block	Water Absorption	IS 15658:2006 (RA 2016) Annex C	3 % to 10 %
		Compressive Strength	IS 15658:2006 (RA 2016) Annex D	20 N/mm ² to 70N/mm ²
		Abrasion Resistance	IS 15658:2006 (RA 2016) Annex E	3000 mm ³ to 15000 mm ³
		Flexural Strength/ Breaking Load	IS 15658:2006 (RA 2016) Annex G	2 N/mm ² to 8 N/mm ²
10.	Ceramic Tiles/ Pressed Ceramic (Vitrified) Tiles	Water Absorption	IS 13630 (Part 2): 2006 (RA 2012)	Up to 12 %
		Dimensions -Length -Width -Height	IS 15622:2006 (RA 2017)	30 cm to 60 cm 20 cm to 60 cm 6 mm to 12 mm
11.	Plain & Chequered Concrete Tiles	Flatness of Surface	IS 1237:2012 (RA 2016) Annex B IS 13801:2013 (RA 2013) Annex B	0.1 mm to 1 mm
		Perpendicularity	IS 1237:2012 (RA 2016) Annex C IS 13801:2013 (RA 2013) Annex C	0.1 mm to 2 mm
		Straightness	IS 1237:2012 (RA 2016)	0.1 mm to 2 mm

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			Annex D IS 13801:2013 (RA 2013) Annex D	
		Water Absorption	IS 1237:2012 (RA 2016) Annex E IS 13801:2013 (RA 2013) Annex E	5 % to 15 %
		Resistance to Wear	IS 1237:2012 (RA 2016) Annex G IS 13801:2013 (RA 2013) Annex G	0.2 mm to 4 mm
III.	SOIL AND ROCK			
1.	Soil	Gradation -Grain Size Analysis (Wet sieving)	IS 2720 (Part 4): 1985 (RA 2015)	0.075 mm to 40 mm
		Grain Size analysis -by Hydrometer	IS 2720 (Part 4):1985 (RA 2015)	0.1 % to 100 %
		Liquid Limit	IS 2720 (Part 5): 1985 (RA 2015)	5 % to 70 %
		Plastic Limit	IS 2720 (Part 5): 1985 (RA 2015)	Up to 70 %
		Light Compaction	IS 2720 (Part 5): 1985 (RA 2015)	MDD: 1.2 gm/cc to 2.5 gm/cc OMC: 5 % to 30 %
		Heavy Compaction	IS 2720 (Part 8): 1983 (RA 2015)	MDD 1.3 gm/cc to 2.5 gm/cc OMC 5 % to 25 %
		California Bearing Ratio (CBR)	IS 2720 (Part 16): 1987 (RA 2011)	1 % to 80 %
		Moisture Content	IS 2720 (Part 2): 1973 (RA 2015)	1 % to 50 %
		Specific Gravity	IS 2720 (Part 3/Sec I): 1980	2.0 to 2.9

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		- Fine Grained Soil	(RA 2011)	
		Shrinkage Limit	IS 2720 (Part 6): 1972 (RA 2011)	1 % to 45 %
		Unconfined Compression strength	IS 2720 (Part 10): 1980 (RA 2010)	0.2 kg/cm ² to 4.0 kg/cm ²
		Shear Strength -by Tri-axial	IS 2720 (Part 11): 1980 (RA 2015)	C: 0.0 to 2.0 kg/cm ² Ø: 5° to 40°
		Shear strength Direct Shear Test	IS 2720 (Part 13): 1986 (RA 2015)	C: 0.0 to 1.0 kg/cm ² Ø: 5° to 45°
		Consolidation Cc/pc	IS 2720 (Part 15): 1986 (RA 2011)	0.1 kg/cm ² to 3.2 kg/cm ²
		Free Swell Index	IS 2720 (Part 40): 1977 (RA 2011)	1 % to 400 %
		Swelling Pressure	IS 2720 (Part 41): 1977 (RA 2011)	0.1 kg/cm ² to 2.0 kg/cm ²
		Permeability -Constant Head	IS 2720 (Part 17): 1986 (RA 2011)	10-1cm/sec – 10-5cm/sec
		Permeability - Falling Head		10-4cm/sec – 10-7cm/sec
		Permeability		
2.	Rock	Uniaxial Compressive Strength	IS 9143: 1979 (RA 2010)	5 N/mm ² to 200 N/mm ²
		Water Absorption	IS 13030:1991 (RA 2010)	0.5 % to 10 %
		Porosity	IS 13030:1991 (RA 2010)	1 % to 50 %
		Density	IS 13030:1991 (RA 2010)	1.5 g/cc to 4 g/cc
		Point Load Index	IS 8764:1998 (RA 2008)	1 N/mm ² to 30 N/mm ²
		Rock Hardness	IS 13630 (Part 13) : 2006	1 to 10 (Moh's Hardness Scale)
4.	Deflection of Pavements	Benkelman Beam	IRC 081:1997	0.1 mm to 5 mm
5.	Field Load Test	Plate load test -Load	IS 1888:1982 (RA 2011)	Up to 50 t Up to 50 mm
		-Deflection		
		Pile load test	IS 2911 (Part 4): 1985	

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		-Load -Deflection		Up to 100 t Up to 50 mm
		Strength of Soil -by Plate Loading Test (EV2)	DIN 18134 (September 2012)	0.0001 MN/m ² to 300 MN/m ²

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MECHANICAL TESTING

AT SITE				
I.	SOIL & ROCK			
1.	Soil	Dry Density of soil -by Core Cutter	IS 2720 (Part 29): 1975 (RA 2010)	1.2 g/cc to 2.4 g/cc 6 % to 30 %
		Dry Density of soil -by Sand Replacement	IS 2720 (Part 28): 1974 (RA 2010)	1.2 g/cc to 2.4 g/cc 2 % to 15%
		Field CBR	IS 2720 (Part 31): 1990 (RA 2010)	1 % to 50 %
		Water Content -by Rapid Moisture Meter	IS 2720 (Part 2/Sec 5) IS 12175	1 % to 50 %
		Standard Penetration -N value	IS 2131:1981 (RA 2011)	1 to 100

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NON - DESTRUCTIVE TESTING

I.	BUILDING MATERIALS - REINFORCEMENT CONCRETE STRUCTURES			
1.	Reinforcement Concrete Structures	Rebound Hammer	IS 13311 (Part 2): 1992	10 N/mm ² to 100 N/mm ²
		Ultrasonic Pulse Velocity	IS 13311 (Part 1): 1992	1 km/s to 10 km/s
		Half Cell Potential Difference	ASTM C876:2015	(-) 600 mV to 200 mV
		Depth of Carbonation	BS EN 14630:2006	Up to 100 mm
		Cover Meter	BS 1881 (Part 204): 1988	Up to 15 cm
		Pile Integrity	ASTM D-5882 (RA 2007) Published June 2007	Qualitative (5 m to 80 m depth of pile)

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