

Laboratory

CSRL-Structwel Lab (Pune) Private Limited, 54, 'Progress House',
Mumbai-Pune Road, Shivajinagar, Pune, Maharashtra

Location 1: 54, 'Progress House', Mumbai-Pune Road, Shivajinagar, Pune,
Maharashtra

Location 2: Shop No. 5, Waghere Empire, Morewadi, Pune, Maharashtra

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-7258 (in lieu of T-1703, T-1339 & T-1340) Page 1 of 15

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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
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CHEMICAL TESTING

I.	BUILDING MATERIALS			
1.	Cement OPC PPC PSC	Loss on ignition	IS 4032:1985 (RA 2009) Amd 2	1.0 % to 5.0 %
		Silica (SiO ₂)		10.0 % to 50.0 %
		Ferric Oxide (Fe ₂ O ₃)		1.0 % to 10.0 %
		Alumina (Al ₂ O ₃)		1.0 % to 10.0 %
		Calcium Oxide (CaO)		10.0 % to 70.0 %
		Magnesia (MgO)		1.0 % to 10.0 %
		Sulphur as (SO ₃)		1.0 % to 5.0 %
		Insoluble Residue		0.1 % to 40.0 %
2.	Fly Ash	Chloride	IS 1727:1967 (RA 2008) Amd 2 IS 3812 (Part 1 & Part 2): 2013	0.005 % to 2.0 %
		Loss on ignition		0.1 % to 5.0 %
		Silica (SiO ₂)		25.0 % to 80.0 %
		Combined Ferric Oxide and Alumina		5.0 % to 40.0 %
		Calcium Oxide (CaO)		1.0 % to 15.0 %
		Magnesia (MgO)		0.01 % to 10.0 %
		Sulphuric Anhydride		0.1 % to 5.0 %
3.	Admixture	Chlorides	IS 9103:1999 (RA 2013) Amd 2 IS 6925:1973 (RA 2008)	0.005 % to 5.0 %
		pH		0 to 14
		Ash Content		1.0 % to 60.0 %
		Dry Material Content		1.0 % to 50.0 %
		Relative Density		1.0 to 2.0
4.	Sand and Aggregate	Chlorides	IS 2386 (Part 2): 1963 (RA 2016)	0.005 % to 5.0 %
		Deleterious Materials Organic Impurities		0.1 % to 20.0 % Qualitative

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		Soundness - Sodium sulphate - Magnesium sulphate	IS 2386 (Part 5): 1963 (RA 2016)	1.0 % to 20.0 %
		Alkali aggregate reactivity - Dissolved silica - Reduction in alkalinity	IS 2386 (Part 7): 1963 (RA 2016) Amd 3	1 mmol/L to 2500 mmol/L 1 mmol/L to 700 mmol/L
5.	Glazed Ceramic Tiles	Stains Household Chemicals Swimming Pool Salts Acids Alkalis	IS 13630 (Part 8): 2006 (RA 2017)	Qualitative Qualitative Qualitative Qualitative Qualitative
6.	Lime	Insoluble residue - dilute acid - alkali Loss on ignition Insoluble residue - Hydrochloric acid Silica (SiO ₂) Combined Alumina and Ferric Oxide Calcium Oxide (CaO) Magnesium Oxides (MgO)	IS 6932 (Part 1): 1973 (RA 2009) Amd 3	0.5 % to 70.0 % 1.0 % to 50.0 % 0.5 % to 30.0 % 0.5 % to 30.0 % 0.5 % to 20.0 % 10.0 % to 80.0 % 0.1 % to 20.0 %
7.	Mineral Gypsum	Free Water Combined Water Silica and Acid Insoluble	IS 1288:1982 (RA 2010) Clause 4 IS 1288:1982 (RA 2010) Clause 6 IS 1288:1982 (RA 2010) Clause 8	0.1 % to 10.0 % 0.1% to 30.0 % 0.2 % to 20.0 %

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		Iron and Aluminium Oxides	IS 1288:1982 (RA 2010) Clause 9	0.1 % to 20.0 %
		Calcium Oxide (CaO)	IS 1288:1982 (RA 2010) Clause 10.2	10.0 % to 45.0 %
		Magnesium Oxide (MgO)	IS 1288:1982 (RA 2010) Clause 11.2	0.1 % to 20.0 %
		Sulphur trioxide (SO ₃) and Calcium Sulphate dihydrate	IS 1288:1982 (RA 2010) Clause 12	10.0 % to 45.0 %
8.	Gypsum Plaster	Sulphur Trioxide (SO ₃)	IS 1288:1982 (RA 2010) Clause 12	1.0 % to 45.0 %
		Calcium Oxide (CaO)	IS 1288:1982 (RA 2010) Clause 10.2	15 % to 60 %
		Soluble Magnesium Salt (MgO)	IS 2547 (Part 1): 1976 (RA 2007) (App-A) Amd 3	0.1 % to 10.0 %
		Loss on Ignition	IS 2547 (Part 1): 1976 (RA 2007) (App-B) Amd 3	0.1 % to 20.0 %
		Free Lime	IS 2547 (Part 1): 1976 (RA 2007) (App-C) Amd 3	0.1 % to 10.0 %
II.	WOOD AND WOOD PRODUCTS			
1.	Plywood	pH Value	IS 1734 (Part 1): 1983 (RA 2008)	1 to 14
III.	SOIL AND ROCK			
1.	Soil	pH Value	IS 2720 (Part 26): 1987 (RA 2011)	2 to 12

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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
		Total Soluble Solids	IS 2720 (Part 21): 1977 (RA 2016) Amd 1	0.001 % to 20.0 %
		Total Soluble Sulphates	IS 2720 (Part 27): 1977 (RA 2015)	0.001 % to 5.0 %
		Calcium Carbonate	IS 2720 (Part 23): 1976 (RA 2010)	0.5 % to 15 %
		Organic Matter	IS 2720 (Part 22): 1972 (RA 2015) Amd 1	0.001 % to 5.0 %
IV.	METALS & ALLOYS			
1.	Carbon Steel - High Strength Deformed Steel Bars and Wires for Concrete Reinforcement	Carbon	IS 228 (Part 1): 1987 (RA 2018) Amd 1	0.01 % to 1.5 %
		Sulphur	IS 228 (Part 9): 1989 (RA 2014)	0.01 % to 0.25 %
		Phosphorus	IS 228 (Part 3): 1987 (RA 2018)	0.01 % to 0.25 %
V.	WATER			
1.	Water Construction	pH Value	IS 3025 (Part 11): 1983 (RA 2017)	1 to 14
		Total Suspended Solids	S 3025 (Part 17): 1984 (RA 2017) Amd 1	1mg/l to 2000 mg/l
		Volatile and Fixed Residue (Organic Residue and Inorganic Residue)	IS 3025 (Part 18): 1984 (RA 2017) Amd 1	1mg/l to 10000 mg/l

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		Alkalinity -0.02 N H ₂ SO ₄ Required to neutralize 100ml of water	IS 3025 (Part 23): 1986 (RA 2014) Amd 2	0.1 ml to 50 ml
		Acidity -0.02 N NaOH Required to neutralize 100ml of water	IS 3025 (Part 22): 1986 (RA 2014)	0.1 ml to 25 ml
		Sulphates	IS 3025 (Part 24): 1986 (RA 2014)	0.01mg/l to1000 mg/l
		Total Hardness	IS 3025 (Part 21): 2009 (RA 2014)	10mg/l to 2000 mg/l
		Chloride	IS 3025 (Part 32): 1988 (RA 2014)	0.5mg/l to 1000 mg/l
		Total Dissolved Solids	IS 3025 (Part 16): 1984 (RA 2017) Amd 1	1mg/l to 10000 mg/l

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MECHANICAL TESTING

LOCATION 1				
I.	BUILDING MATERIAL			
1.	Coarse Aggregate	Specific gravity	IS 2386 (Part 3): 1963 (RA 2016)	1 to 6
		Bulk density	IS 2386 (Part 3): 1963 (RA 2016)	1 g/cc to 2 g/cc
		Ten percent fines	IS 2386 (Part 4): 1963 (RA 2016, Amd 3)	5 kN to 250 kN
		Particle size distribution	IS 2386 (Part 1): 1963 (RA 2016, Amd 4)	4.75 mm to 125 mm
		Water absorption	IS 2386 (Part 3): 1963 (RA 2016)	0.1 % to 10 %
		Impact value	IS 2386 (Part 4): 1963 (RA 2016) Amd 3	5 % to 60 %
		Crushing value	IS 2386 (Part 4): 1963 (RA 2016) Amd 3	5 % to 60 %
		Elongation / Flakiness Index	IS 2386 (Part 1): 1963 (RA 2016) Amd 4	1 % to 50 %
		Abrasion Resistance -Los Angele's abrasion value	IS 2386 (Part 4): 1963 (RA 2016) Amd 3	5 % to 60 %
2.	Fine Aggregate	Specific gravity	IS 2386 (Part 3): 1963 (RA 2016)	1 to 6
		Bulkage	IS 2386 (Part 3): 1963 (RA 2016)	1 % to 50 %

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		Materials -finer than 75 micron	IS 2386 (Part 1): 1963 (RA 2016), Amd 4	0.1 % to 50 %
		Bulk density	IS 2386 (Part 3): 1963 (RA 2016)	0.5 g/cc to 4 g/cc
		Sieve analysis	IS 2386 (Part 1): 1963 (RA 2016), Amd 4	75 μ to 10 mm
		Water absorption	IS 2386 (Part 3): 1963 (RA 2016)	0.1 % to 20 %
3.	Concrete Core / Cube / Cylinder	Compressive strength	IS 456: 2000 (RA2016) Amd. 4 IS 516:1959 (RA 2013) Amd 2	5 N/mm ² to 80 N/mm ²
4.	Masonry Blocks	Density	IS 2185 (Part 1): 2005 (RA 2010)	100 kg/m ³ to 2500 kg/m ³
		Water absorption	IS 2185 (Part 1): 2005 (RA 2010)	1 % to 30 %
		Compressive strength	IS 2185 (Part 1): 2005 (RA 2010)	1 N/mm ² to 30 N/mm ²
5.	Bricks	Water absorption	IS 3495 (Part 2): 1992 (RA 2011)	5 % to 50 %
		Compressive strength	IS 3495 (Part 1): 1992 (RA 2011)	5N/mm ² to 50 N/mm ²
		Efflorescence	IS 3495 (Part 3): 1992 (RA 2011)	Qualitative
6.	Paving Block	Water Absorption	IS 15658:2006 (RA 2016)	0.1 % to 30 %
		Compressive Strength		10 N/mm ² to 100 N/mm ²
		Abrasion Resistance		500 mm ³ to 15000 mm ³
		Flexural Strength		1 N/mm ² to 20 N/mm ²
7.	Cement (OPC, PPC, PSC & SRC)	Consistency	IS 4031 (Part 4): 1988 (RA 2009) Amd 2	10 % to 50 %

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		Initial setting time	IS 4031 (Part 5): 1988 (RA 2009) Amd 2	5 min to 250 min
		Final setting time	IS 4031 (Part 5): 1988 (RA 2009) Amd 2	30 min to 700 min
		Soundness -Le-Chatelier method	IS 4031 (Part 3): 1988 (RA 2014) Amd 2	0.1 mm to 10 mm
		Fineness -dry Sieving	IS 4031(Part 1) : 1996 (RA 2016)	1 % to 30 %
		Compressive strength	IS 4031(Part 6): 1988 (RA 2009) & IS 516:1959 (RA 2013) Amd 2	5 N/mm ² to 80 N/mm ²
		Fineness -specific surface -Blaine air permeability	IS 4031 (Part 2): 1999 (RA 2008) Amd 2	200m ² /kg to 500 m ² /kg
		Density	IS 4031 (Part 11): 1988 (RA 2009)	1 g/cc to 4 g/cc
		Soundness - Autoclave	IS 4031 (Part 3): 1988 (RA 2014) Amd 2	0.01 % to 1 %
8.	Beam	Flexural Strength	IS 516:1959 (RA 2013) Amd 2	1 N/mm ² to 15 N/mm ²
9.	Concrete Cube	Water Permeability	Din-1048 (Part 5): 1991	1 mm to 150 mm
10.	Pulverized Fuel Ash	Standard Consistency	IS 4031 (Part 4): 1988 (RA 2009) Amd 2	1 % to 45 %
		Initial Setting Time	IS 4031 (Part 4): 1988 (RA 2009) Amd 2	5 min to 200 min
		Final Setting Time	IS 4031 (Part 4): 1988 (RA 2009) Amd 2	10 min to 700 min
		Density	IS 1727:1967 (RA 2008) Amd 2	1 g/cc to 3 g/cc

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		Fineness - specific surface -Blaine air permeability	IS 1727:1967 (RA 2008) Amd 2	200m ² /kg to 800 m ² /kg
		Fineness - wet sieving (Particles retained on 45 μ sieve)	IS 1727:1967 (RA 2008) Amd 2	1 % to 50 %
		Compressive Strength	IS 1727:1967 (RA 2008) Amd 2	5 N/mm ² to 80 N/mm ²
		Soundness - Autoclave	IS 1727:1967 (RA 2008) Amd 2	0.01 mm to 5 mm
11.	Plain, Chequered Cement Concrete Flooring Tiles	Wet Transverse	IS 1237:2012 RA 2016)	1 N/mm ² to 50 N/mm ²
		Water absorption	Amd 3	1 % to 30 %
		Resistance to wear	IS 13801:2013	1 mm to 5 mm
12.	Ceramic Tiles	Water Absorption	IS 13630 (Part 2): 2006 (RA 2017)	0.01% to 30 %
		Modulus of Rupture	IS 13630 (Part 6): 2006 (RA 2017)	5N/mm ² to 70 N/mm ²
		Crazing Resistance	IS 13630 (Part 9): 2006 RA 2017)	Qualitative
		Scratch Hardness surface - Mohs	IS 13630 (Part 13): 2006 (RA 2017)	1 to 10 Mohs' Scale
13.	Granulated glass blast furnace slag	Compressive strength	BS 6699:1992	1 N/mm ² to 80 N/mm ²
		Initial setting time	BS 6699:1992	5 min to 200 min
		Final Setting time	BS 6699:1992	30 min to 600 min
		Soundness	BS 6699:1992	0.01 mm to 5 mm

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II.	WOOD AND WOOD PRODUCTS			
1.	Particle Board	Moisture content	IS 2380 (Part 3): 1977, (RA 2013) Amd 4	1% to 20%
		Density	IS 2380 (Part 3): 1977, (RA 2013) Amd 4	500 kg/m ³ to 2000kg/m ³
2.	Timber	Moisture content	IS 1708 (Part 1): 1986, (RA 2010) Amd 2	1% to 30 %
		Density	IS 1708 (Part 2): 1986, (RA 2010) Amd 2	0.5 g/cc to 2 g/cc
3.	Door Shutter	Dimension and squareness	IS 4020 (Part 2): 1998, (RA 2008) Amd 1	25 mm to 5000 mm
		General flatness	IS 4020 (Part 3): 1998, (RA 2008) Amd 1	0.1 mm to 5 mm
		Planeness of the surface	IS 4020 (Part 4): 1998, (RA 2008) Amd 1	0.1 mm to 5 mm
		Impact indentation	IS 4020 (Part 5): 1998, RA 2008)	0.1 mm to 1 mm
		Edge loading	IS 4020 (Part 7): 1998, RA 2008) Amd 1	1 mm to 25 mm
		Resistance to shock	IS 4020 (Part 8): 1998, RA 2008) Amd 2	Qualitative
		Resistance to buckling	IS 4020 (Part 9): 1998, RA 2008)	1 mm to 150 mm
		Resistance to misuse	IS 4020 (Part 11): 1998 (RA 2008)	Qualitative
		Effect on door shutter due to slamming	IS 4020 (Part 10): 1998 (RA 2008)	Qualitative
		Resistance to end immersion in water	IS 4020 (Part 13): 1998 (RA 2008)	Qualitative

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		Glue adhesion strength with a knife	IS 4020 (Part 14): 1998 (RA 2008)	Qualitative
		Glue adhesion	IS 4020 (Part 15): 1998 (RA 2008)	Qualitative
		Screw withdrawal resistance of door shutter	IS 4020 (Part 16): 1998 (RA 2008)	10N to 5000N
9.	Plywood	Moisture content	IS 1734 (Part 1): 1983 (RA 2008)	1 % to 20 %
		Density	IS 1734(Part 1): 1983 (RA 2008)	500kg/m ³ to 2000 kg/m ³
		Adhesion of plies	IS 1734 (Part 5): 1983 (RA 2008)	Qualitative
		Water Resistance	IS 1734 (Part 6): 1983 (RA 2008)	Qualitative
III.	SOIL AND ROCK			
1.	Soil	Water Content	IS 2720 (Part 2): 1973 (RA 2015) Amd 1	5 % to 100 %
		Grain Size Analysis	IS 2720 (Part 4): 1985 (RA 2015)	75 µm to 80 mm
		Liquid Limit	IS 2720 (Part 5): 1985 (RA 2015)	5 % to 60 %
		Plastic Limit	IS 2720 (Part 5): 1985 (RA 2015)	5 % to 60 %
		Shrinkage limit	IS 2720 (Part 6): 1972 (RA 2011) Amd 1	1 % to 30 %
		Proctor density -Light compaction	IS 2720 (Part 7): 1980 (RA 2011) Amd 2	MDD 1.1 g/cc to 3 g/cc OMC 1% to 50%

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		Proctor density -Heavy compaction	IS 2720 (Part 8): 1983 (RA 2015)	MDD 1.0 g/cc to 3 g/cc OMC 5% to 50%
		Field California Bearing Ratio	IS 2720 (Part 31): 1990 (RA 2010)	1 % to 80 %
		Laboratory California Bearing Ratio	IS 2720 (Part 16): 1987 (RA 2011)	1% to 60 %
		Dry density by sand replacement method	IS 2720 (Part 28): 1974 (RA 2015) Amd 1	1g/cc to 3 g/cc
		Dry density by core cutter method	IS 2720 (Part 29): 1975 (RA 2015)	1000 kg/m ³ to 3000 kg/m ³
		Free Swell Index	IS 2720 (Part 40): 1977 (RA 2011)	1 % to 80 %
		Specific Gravity	IS 2720 (Part 3): 1980 (RA 2011)	1 to 3
		Standard Penetration Plate Load test	IS 2131:1981 (RA 2011) IS 1888:1982 (RA 2011)	N value 1 to 60 0.1 mm to 25 mm 1 kN to 50 kN
2.	Natural Building Stones and Rocks	Specific Gravity	IS 1122:1974 (RA 2008)	1 % to 45 %
		Water Absorption	IS 1124:1974 (RA 2013)	0.1 % to 20 %
		Porosity	IS 1124:1974 (RA 2013)	0 % to 50 %
		Unconfined Compressive Strength	IS 9143:1979 (RA 2010) IS 1121 (Part 1): 2013	5 N/mm ² to 100 N/mm ²
IV.	MECHANICAL PROPERTIES METALS			
1.	High Strength Deformed Steel Bars and Wires for Concrete Reinforcement	Tensile Test	IS 1608-2005 (RA 2011)	10 kN to 400 kN 20 kN to 1000 kN
		Tensile strength		200 N/mm ² to 900 N/mm ²
		Yield strength		200 N/mm ² to 800 N/mm ²
		Percentage Elongation		5 % to 40 %

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		Mass per meter	IS 1786-2008 Reaffirmed 2013 (Cl.7.2), Amd 3	0.20 to 10.0 kg/m
		Bend Test	IS 1599: 2015	Qualitative (Mandrel Diameter: 12, 16, 18, 20, 24, 30, 32, 36, 40, 42, 48, 50, 56, 60, 70, 72, 75, 84, 96, 108, 144, 168, 180, 192, 200, 216, 240 mm)
		Rebend Test	IS1786:2008 (RA 2013) Cl. 9.4, Amd 3	Qualitative (Mandrel Diameter: 12, 16, 18, 20, 24, 30, 32, 36, 40, 42, 48, 50, 56, 64, 70, 72, 75, 80, 84, 96, 100, 112, 120, 125, 128, 140, 150, 160, 168, 175, 192, 196, 200, 216, 224, 252, 240, 256, 280, 288, 320 mm)
V.	BITUMEN			
1.	Bitumen	Specific gravity	IS 1202:1978 (RA 2009)	0.5 to 2
		Penetration value	IS 1203:1978 (RA 2009)	0.1 to 225 (1/10 mm)
		Softening point	IS 1205:1978 (RA 2009)	5 °C to 90 °C
		Ductility	IS 1208:1978 (RA 2009)	1 cm to 100 cm

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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
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MECHANICAL TESTING

LOCATION 2				
I.	BUILDING MATERIAL			
1.	Hardened Concrete	Compressive strength	IS 456:2000 (RA 2016) Amd. 4 IS 516:1959 (RA 2013) Amd 2	5 N/mm ² to 80 N/mm ²

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NON - DESTRUCTIVE TESTING

I.	BUILDING MATERIALS – REINFORCED CONCRETE STRUCTURES			
1.	Hardened Concrete	Schmidt Rebound Hammer	IS 13311 (Part 2): 1992 (RA 2008)	5 N/mm ² to 80 N/mm ² (10 to 60) Rebound number
		Ultrasonic Pulse Velocity	IS 13311 (Part 1): 1992 (RA 2008)	0.5 km/s to 10 km/s

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