



TECHNICAL REFERENCE

Sample Size Requirements

Minimum material for every test in the accredited scope
TCR Engineering Services Pvt. Ltd., Navi Mumbai

- 10 numbered sections, citable in a quotation
- 36 civil and building material groups
- Metals, welding, fracture mechanics, corrosion
- Every dimension in millimetres

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Transparency. Competence. Reliability.

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Sample size requirements

This document states the minimum quantity of material TCR Engineering needs to carry out a test. A sample that arrives short of it either cannot be tested or has to be tested outside the standard, and both are avoidable with one look at the relevant table before despatch.

All dimensions in this document are in millimetres. W is width, L is length and FT is full thickness.

0.1 How to use this document

Find the product form or material in the contents, read the quantity against the test, and despatch that quantity or more. Sending more than the stated quantity is never a problem, though additional machining may be charged. Sending less is a problem, and it is better to telephone before despatch than after.

Where limited material is available, contact TCR. Sub-size specimens are permitted by several standards, and where they are not, an alternative method often exists. That conversation is free and it is faster than a rejected sample.

0.2 Units

Every dimension in this document is in millimetres unless a unit is stated. Mass is in grams or kilograms, volume in millilitres or litres, and quantity in numbers of pieces. There are no inch dimensions in this document.

0.3 Marking and identification

Grain or rolling direction governs the result of most mechanical and corrosion tests. Mark it on the sample with an arrow before despatch. Where a standard requires the specimen to be taken from a stated location in the product, state the location; TCR cannot infer it from the coupon.

Each sample must carry an identification that matches the identification on the test request. An unmarked sample cannot be reported against a heat number, a cast number or a line number.

0.4 Despatch address

TCR Engineering Services Pvt. Ltd., Plot EL-182, MIDC-TTC Industrial Area, Electronic Zone, Behind NELCO, Mahape, Navi Mumbai 400710, Maharashtra, India. Telephone +91 98335 30200, electronic mail sales@tcrceng.com.

1 Metals, by product form

Quantities for the routine mechanical and chemical tests, by the form the material arrives in.

Test	Sheet	Plate	Angle	Bar	Pipe	Tubing
Chemical	50 x 50 x FT	50 x 50 x 10 (note 6)	50 long	50 long	50 long	50 long
Tensile	50 W x 200 L	note 1	full section x 500 L	150 L (note 2)	note 3	300
Flattening	—	—	—	—	full section x 100 L	full section x 100 L
Bend	note 4	note 4	—	note 4	note 4	note 4
Charpy	—	note 5	150 L	200 L	75 L	—
Hardness	50 x 50 x FT	50 x 50 x FT (note 6)	50 long	50 long	50 long	50 long

1.1 Notes to the table above

- Note 1. Plate up to 75 thick: 50 W x 250 L. Plate over 75 thick: 50 W x 150 L.
- Note 2. Bar or wire under 25 diameter: 450 L.
- Note 3. Pipe up to 75 wall thickness: full ring x 375 long. Pipe over 75 wall thickness: full ring x 150 long.
- Note 4. Depends on size and specification. TCR prefers 250 length.
- Note 5. 100 W x 150 L, longitudinal direction marked, at 2.54 thickness.
- Note 6. Where thickness exceeds 20, full thickness shall be at least 10.

2 Mechanical, hardness and metallography specimens

Test	Length	Width	Thickness	Grain
Tensile test, wire (up to 2 dia)	1500	—	—	mark
Vickers (micro-indentation) hardness	25	25	> 0.75	mark
Rockwell hardness	25	25	> 0.75	mark
Brinell hardness	25	25	> 6	mark
Plating hardness	25	25	> 25	mark
Plating thickness	25	25	as actual	—
Hydrogen embrittlement	150	25	as actual	mark
Atomic absorption, 1 g of sample	—	—	—	—
LECO carbon, sulphur and nitrogen, 1 g of sample	—	—	—	—
Optical emission spectroscopy, flat specimen	50	25	10	—
Optical emission spectroscopy, round specimen	25	dia ≥ 12	—	—
Microstructure	25	25	as actual	mark

Test	Length	Width	Thickness	Grain
Inclusion rating	13	13	13	mark
Scanning electron microscopy (SEM)	any size	—	—	—
Corrosion testing	subject to raw material dimension			
Salt spray test panels	80	205	—	mark

Where chemical analysis alone is ordered, supply the coupon above. Where other tests are ordered on the same material, a separate piece for chemical analysis is not needed. “Mark” means the grain or rolling direction must be marked on the sample.

3 Fracture mechanics: CTOD, K_{IC} , J_{IC} and FCGR

- Specimen thickness 8 to 32 for testing at sub-zero down to -20°C and at elevated temperature up to $1,100^{\circ}\text{C}$.
- Specimen thickness 8 to 50 (CT or SENB) at room temperature; over 50 to 100 (SENB only, depending on the strength of the material).
- Span length accommodated: 55 to 1,600.

4 Reinforcement bar couplers (mechanical splices)

One set per test per size.

Rebar dia	Fatigue LCF	Fatigue HCF	Cyclic tensile (100 cycles)	Slip test	Static tensile	Spectro chemical
8 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no
10 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no
12 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no
16 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no
20 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no
25 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no
32 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no
36 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no
40 mm	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	1,000 mm length, 3 nos	coupler, 1 no

- In a mechanical splice the coupler is positioned at the centre of the sample.
- One piece of 1,000 mm length is required per test per size, per IS 1786.

5 Wet chemical analysis

- Metals: 5 g minimum, 10 g preferred.

- Aqueous samples: 500 ml minimum, 1 litre preferred.
- Solid particulate, coarse (over 6): 1 kg minimum.
- Solid particulate, medium (1 to 5): 500 g minimum.
- Solid particulate, fines (under 1): 100 g minimum.

6 Welding procedure qualification

- Welded test plate: minimum 250 wide x 300 long along the weld, or 400 along the weld where Charpy V-notch impacts are required.
- Pipe qualification, over 80 nominal outside diameter: 1 welded pipe coupon.
- Pipe qualification, 50 to 80 nominal outside diameter: 2 welded pipe coupons.
- Pipe qualification, under 50 nominal: 4 to 5 welded pipe coupons.
- Charpy V-notch impacts may require more material, depending on pipe size and the number of impact tests.

7 Chemical, micro and IGC to ASTM A262 Practice E

- Rod under 10 diameter: 150 long.
- Rod over 10 diameter: 120 long.
- Plate: 50 x 100.
- Pipe: 100 long.

8 Hydrogen-induced cracking (HIC), NACE TM0284

- Plate: 150 x 150, rolling direction marked. Plate over 88 thick: 250 x 250.
- Pipe up to 50 outside diameter: 210 long. Pipe over 50 outside diameter: 120 long.
- Bar up to 88 diameter: 300 long. Bar over 88 to 130 diameter: 200 long. Bar over 130 diameter: 100 long.
- Up to 88 thick or diameter: a set of 3 test specimens.
- Over 88 thick or diameter: 5 or more test specimens, and the number must be odd.
- Time for completion: 2 weeks.

9 Sulphide stress cracking and SCC, NACE TM0177

- Plate: 25 x 200 long with rolling direction marked, 3 test specimens. The location of the test piece is as specified in the relevant standard.
- Pipe: 160 long pieces irrespective of diameter.
- Bar: 160 long pieces irrespective of diameter.
- Time for completion: minimum 35 working days. The quantity above is required for each stress level and each temperature.

10 Civil and building materials

Quantities for the civil and building materials scope, by material. The test method column carries the IS, ASTM, BS or EN designation the quantity is set by. Where the source draws one method or one quantity beside a block of tests, it is shown once, against the block, exactly as the source draws it.

10.1 Admixture

Sr.	Material / test	Test method	Quantity required
1	Physical	IS: 9103	Adm. 3-4 ltrs
2	Chemical		1 litre
3	Dry material content		
	a) For liquid admixture		
	b) For solid admixture		
4	Relative density		
5	Chloride ion content		
6	pH		
7	Ash Content		
8	Marsh Cone Test	ASTM C939	1 Litre + 1 Bag Cement

10.2 Aggregate - Coarse & Fine

Sr.	Material / test	Test method	Quantity required
A)	Physical Tests Coarse Aggregate		
1	Sieve Analysis	IS: 2386 (Part 1): 1963	50 kg
2	Specific Gravity	IS: 2386 (Part 3): 1963	10 kg
3	Bulk Density	IS: 2386 (Part 3): 1963	30 kg
4	Water Absorption	IS: 2386 (Part 3): 1963	10 kg
5	Impact Value	IS: 2386 (Part 4): 1963	15 Kg
6	Crushing Value	IS: 2386 (Part 4): 1963	30 kg
7	Abrasion value (Los Angeles)	IS: 2386 (Part 4): 1963	50 kg
8	Elongation Index	IS: 2386 (Part 1): 1963	50 kg
9	Flakiness Index	IS: 2386 (Part 1): 1963	50 kg
10	10 % Fines	IS: 2386 (Part 4): 1963	50 kg
11	Complete Physical Analysis (1 - 10)	IS: 383/IS 2386	50 kg
B)	Chemical Tests Coarse Aggregate		
1	Soundness by Na ₂ SO ₄	IS: 2386 (Part 5): 1963	5 kg
2	Total Deleterious Material	IS: 2386 (Part 2): 1963	2 kg
3	Alkali Aggregate Reactivity	IS: 2386 (Part 7): 1963	2 kg
4	Chloride Content	BS EN 1744 - 1 2009 + A1 2012	2 kg

Sr.	Material / test	Test method	Quantity required
5	Sulphate Content		2 kg
6	pH	IS: 3025	1 kg
7	Complete Chemical Analysis (1 - 6)	IS: 383/IS 2386	5 kg
C)	Physical Tests Fine Aggregate		
1	Sieve Analysis	IS: 2386 (Part 1): 1963	25 kg
2	Specific Gravity	IS: 2386 (Part 3): 1963	5 kg
3	Water Absorption	IS: 2386 (Part 3): 1963	5 Kg
4	Bulk Density	IS: 2386 (Part 3): 1963	25 kg
5	% Finer than 75μ	IS: 2386 (Part 1): 1963	5 kg
6	Complete Physical Analysis (1 - 5)	IS: 383/IS 2386	25 kg
D)	Chemical Tests on Fine Aggregate		
1	Soundness by Na ₂ SO ₄	IS: 2386 (Part 5): 1963	5 kg
2	Total Deleterious Material	IS: 2386 (Part 2): 1963	2 kg
3	Alkali Aggregate Reactivity	IS: 2386 (Part 7): 1963	2 kg
4	Organic Impurities	IS: 2386 (Part 2): 1963	1 kg
5	Chloride Content	BS EN 1744 - 1 2009 + A1 2012	2 kg
6	Sulphate Content	BS EN 1744 - 1 2009 + A1 2012	2 kg
7	Ph Value	IS: 3025	2 kg
8	Complete Chemical Analysis (1 - 7)	IS: 383	5 kg

10.3 Alcofine

Sr.	Material / test	Test method	Quantity required
A)	Alcofine Physical		
1	Percent retained on 45 Micron	IS: 1727	5 Kg Alcofine + 5 kg Cement
2	Specific Gravity		
3	Comparative Compressive Strength		
B)	Alcofine Chemical		
1	Loss on Ignition	IS: 4032 - 1985	2 Kg
2	Insoluble Residue		
3	SO ₃		
4	SiO ₂		
5	Fe ₂ O ₃		
6	AL ₂ O ₃		
7	CaO		
8	MgO		

10.4 Bentonite Powder

Sr.	Material / test	Test method	Quantity required
1	Moisture Content	IS: 6186, IS: 12446, IS: 2911, IS 2720	3 kg
2	pH		
3	Gel Formation Index		
4	Dry Fineness (150 Micron)		
5	Dry Fineness (75 Micron)		
6	Wet Fineness (45 Micron)		
7	Free Swelling		
8	Liquid Limit		

10.5 Bricks - Building / Flyash

Sr.	Material / test	Test method	Quantity required
1	Water Absorption	IS: 3495(Part 1 to 4) 1992/ IS 12894-1990	5 Nos
2	Compressive Strength		5 Nos
3	Efflorescence		5 Nos
4	Dimensions	IS: 1077-1992 RA 2007/IS 2180	20 Nos
5	Drying Shrinkage (Flyash Bricks only)	IS 12894	3 Nos
6	Bulk Density	IS 2180	3 Nos
7	Full Physical Test - (Set of 20nos.) (Water Absorption, Compressive strength, Density, Efflorescence and Drying Shrinkage	IS 3495/IS 1077/ IS 12894/ IS 2180	20 Nos

10.6 Blocks

Sr.	Material / test	Test method	Quantity required
A)	Paver Blocks (Rate per block)		
1	Dimensions	IS 15658-2006	8 Nos
2	Water Absorption		3 Nos
3	Compressive Strength		8 Nos
4	Flexural Strength		8 Nos
5	Split Tensile Test		8 Nos
6	Abrasion Resistance		8 Nos
7	Complete Physical Analysis (1 - 6)		35 Nos
B)	Light Weight Concrete Block (AAC) (Rates per Block)		
1	Cutting and Conditioning Charges	IS: 2185 (Pt-3) /IS 6441	18 Nos

Sr.	Material / test	Test method	Quantity required
2	Dimensions		24 Nos
3	Compressive Strength	IS: 2185 (Pt-3) /IS 6441	12 Nos
4	Block Density		3 Nos
5	Drying Shrinkage		3 Nos
6	Moisture Content		3 Nos
7	Thermal Conductivity		3 Nos
8	Complete Physical Analysis (1 - 7)		24 Nos
C)	Solid Blocks (Rates per Block)		
1	Cutting and Conditioning Charges	IS 2185 (Pt 1):2005	11 Nos
2	Dimensions		20 Nos
3	Compressive Strength		8 Nos
4	Block Density		3 Nos
5	Drying Shrinkage		3 Nos
6	Moisture Movement		3 Nos
7	Water Absorption		3 Nos
8	Complete Physical Analysis (1 - 7)		20 Nos
D)	Cover Block (Rates per Block)		
1	sample Preparation Charges	-	1 Nos
2	Compressive Strength	-	1 Nos

10.7 Bonding Agent

Sr.	Material / test	Test method	Quantity required
1	Specific Gravity @ 30°C	ASTM D 1475	5 litres
2	Viscosity @ 30°C	ASTM D 2556	
3	Pull off test	ASTM D 4541	
4	Pot Life/Gel Time	-	
5	Bond Strength (Slant Shear Strength)	ASTM C 882	
6	Compressive Strength	ASTM C 109	
7	Flexural Strength	ASTM C 348	
8	Tensile Strength	ASTM D 638	

10.8 Cement

Sr.	Material / test	Test method	Quantity required
A)	Chemical Tests on Cement		
1	Chemical Analysis (SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ , CaO, MgO) (SO ₃ , Na ₂ O, K ₂ O)	IS 4032:1985	1 kg

Sr.	Material / test	Test method	Quantity required
2	Loss On Ignition		
3	Insoluble Residue		
4	Free Lime		
5	Complete Chemical Analysis OPC (1-4)		
6	Complete Chemical Analysis PPC (1-4)		
7	Complete Chemical Analysis PSC (1-4)		
B)	Physical Tests on Cement		
1	Fineness (Blaine's, m ² /kg)	IS: 4031-1996 (Pt II)	15 kg
2	Setting Time (Minutes) Initial Final	IS: 4031-1988 (Pt V)	
3	Compressive Strength (Mpa) 3,7 & 28 Days	IS: 4031 (Pt 6)	
4	Soundness Le-Chatelier's Expansion (mm)	IS: 4031 (Pt 2)	
	Autoclave Method (%)	IS: 4031 (Pt 3)	
5	Normal Consistency	IS: 4031 (Pt 4)	
6	Specific Gravity	IS 4031(Pt11):1988	
7	Drying Shrinkage, (%)	IS: 4031 (Pt 10)	15 kg
8	Complete Physical Analysis OPC	IS: 4031	
9	Complete Physical Analysis PPC	IS: 4031	
10	Complete Physical Analysis PSC	IS: 4031	

10.9 Cementitious Grout

Sr.	Material / test	Test method	Quantity required
1	Density of fresh mixture	ASTM 1107	15 Kg
2	Workability (i.e. Flow & Flow retention after 20min)		
3	Setting time - Using Vicat apparatus	ASTM C 191	
4	Compressive strength (MPa)	ASTM C 109	
5	Flexural strength (MPa)	ASTM C 348	
6	Tensile Strength (MPa)	ASTM C 496	
8	Alkali	IS: 4032 - 1985	
9	Autoclave Expansion	ASTM C 1107	
10	Chloride Content	IS: 4032 - 1985	
11	Silica	IS 1727 - 1963	
12	Sulphate Content	IS: 4032 - 1985	
13	Water Absorption	ASTM C 1403 - 99a	

10.10 Concrete

Sr.	Material / test	Test method	Quantity required
1	Compressive strength of Cubes up to M50	IS 516:1959	3 Nos
2	Compressive strength of Cubes Above M50	IS 516:1959	3 Nos
3	Core/Cylinder - Compressive Strength	IS 516:1959	1 Nos
4	Extraction of Concrete Core	-	1 Nos
5	Flexural Strength of concrete	IS 516:1959	3 Nos
6	Cement Content	IS: 14959:2001/ ASTM C	5 Kgs
		1084	
7	Chloride Content	BS: 1881 - 124	2 kgs
8	Sulphate Content	BS: 1881 - 124	1 kg
9	pH	BS: 1881 - 124	1 kg
10	Cement: Sand Proportion	-	5 Kgs

10.11 Concrete Durability Test

Sr.	Material / test	Test method	Quantity required
1	Rapid Chloride Penetration Test (RCPT)	ASTM C 1202	3 nos Cube
2	Water Permeability of concrete (WP)	EN 12390-part 8/IS 516	3 nos Cube
3	Initial Surface absorption test (ISAT)	BS 1881 Part 208	3 nos Cube
4	Modulus of Elasticity (MOE)	IS 516	1 nos Cube
5	Drying Shrinkage	IS-1199	3 nos Cube
6	Moisture Movement		3 nos Cube
7	Water Absorption (WA)	BS-1881	3 nos Cube

10.12 Concrete Mix Design

Sr.	Material / test	Test method	Quantity required
1	Grade of Concrete M10	SP: 23	Material For Each Mix CA-4 Bags FA-3 Bags Cement-2 Bags Admix. - 2 Liter Mineral Admix. -1 Bag No Admix. For DLC Material for Each Mix
2	Grade of Concrete M15	IS: 10 262	
3	Grade of Concrete M20		
4	Grade of Concrete M25		
5	Grade of Concrete M30		
6	Grade of Concrete M35		
7	Grade of Concrete M40		
8	Grade of Concrete M45		
9	Grade of Concrete M50 and Above		

Sr.	Material / test	Test method	Quantity required
10	Design Mix for PQC	IRC 15	
11	Design of SCC	IS: 10 262	Material For Each Mix CA-4 Bags FA-3 Bags Cement-2 Bags Admix. - 2 Liter Mineral Admix. -1 Bag No Admix. For DLC Material for Each Mix
12	Design of FRC		
13	Design Mix for DLC	MORTH	
14	Concrete design mix verification for Any Grade	IS: 10 262	-
15	Each Additional trial to arrive at economical mix		-

10.13 Curing Compound

Sr.	Material / test	Test method	Quantity required
1	Colour	ASTM C 156 and ASTM C -	1 ltr
2	Density	309 - Type I	
3	Water Retention (Loss of water in 72 hrs)	and Class B and Type II and	
4	Drying time	Class AASTM C 156 and	
6	Non-Volatile Content	ASTM C - 309 - Type I	
7	pH	IS 3025	

10.14 Flyash

Sr.	Material / test	Test method	Quantity required
A)	Lime Reactivity (LR)	IS: 1727	10 Kg
B)	Physical Test		
1	Fineness by Blaine's	IS: 1727	1 Bag Flyash + 1 Bag Cement
2	Particles Retained on 45 Micron		
3	Compressive Strength @ 28 days		
4	Soundness by Autoclave		
5	Normal Consistency		
6	Fineness by Dry Sieving		
7	Soundness by Le Chatelier's Method		
8	Initial and Final Setting time		
9	Specific Gravity		
C)	Chemical Testing		
1	SiO ₂ + Al ₂ O ₃ + Fe ₂ O ₃ %	IS: 1727	1 Kg
2	SiO ₂ %		

Sr.	Material / test	Test method	Quantity required
3	Magnesium Oxide		
4	Sulphate %		
5	Available Alkalis %		
6	Total Chlorides %		
7	Loss of Ignition %		
8	Aluminium Oxide		
9	Ferric Oxide		
10	Calcium Oxide		

10.15 GGBS

Sr.	Material / test	Test method	Quantity required
A)	Physical Test		
1	Slag Activity Index	ASTM C 989/IS 16714	10 Kg of GGBS & 5 Kg of OPC Cement
2	Fineness by Retain on 45 Micron		
B)	Chemical Test		
1	Insoluble Residue	IS: 4032 - 1985 / IS: 12089	2 Kg of GGBS
2	Magnesia Content		
3	Silica Content		
4	Aluminium Oxide		
5	Iron Oxide		
6	Calcium Oxide		
7	Sulphide Sulphur		
8	Chloride Content		
C)	Glass Content of GGBS		
1	Glass Content	IS - 12089	2 KG of GGBS slate

10.16 Gypsum Plaster

Sr.	Material / test	Test method	Quantity required
A)	Chemical Test		
1	SO ₃	IS 2547: Part - 1	1 Kg
2	CaO		
3	MgO		
4	Na ₂ O		
5	Loss of Ignition		
6	Free Lime		

Sr.	Material / test	Test method	Quantity required
B)	Physical Test		
1	Setting Time	IS 2547: Part - 1	20 kg
2	Traverse / Flexural Strength		
3	Residue on 90 Micron		
4	Normal Consistency		
5	Compressive Strength (1 and 7 days)		
6	Loose Bulk Density		
7	Mechanical Resistance of set neat plaster		

10.17 Gypsum Board

Sr.	Material / test	Test method	Quantity required
A)	Physical Test		
1	Mass of Plaster	IS 2095-I:1996	Size: 1,000 mm x 1,000 mm
2	Transverse Strength		
a	Breaking load in Transverse direction		
b	Breaking load in Longitudinal Direction		
3	Dimension of Board		
B)	Chemical Test		
1	Na ₂ O	IS 2095-I:1996	Size: 1,000 mm x 1,000 mm
2	MgO		
3	Loss on Ignition	IS: 2547	
4	Sulphate		
5	CaO		
6	Free Lime		

10.18 Jointing Mortar

Sr.	Material / test	Test method	Quantity required
1	Compressive strength @ 7 & 28 days	ASTM C 109	15 kg
2	Pullout test @ 7 & 28 days	ASTM D 4541	
3	Dry shrinkage	IS 4031	15 kg
4	Pot life	-	
5	Soundness by Autoclave	IS 4031	
6	Initial setting & Final setting	IS 4031	
7	Split tensile strength	ASTM C 1660	

10.19 LIME

Sr.	Material / test	Test method	Quantity required
1	Chemical	IS: 712	1 kg

10.20 Micro Silica

Sr.	Material / test	Test method	Quantity required
A)	Micro silica Physical		
1	Percent retained on 45 Micron	ASTM C 1240 / IS 15388	15 kg Micro silica + 15 kg Cement
2	Accelerated Pozzolanic Strength		
3	Bulk Density		
4	Compressive Strength @ 7 days		
B)	Micro Silica Chemical		
1	SiO ₂	ASTM C 1240 / IS 15388	2 Kg
2	Moisture		
3	LOI		
4	Alkali		
5	Chloride		

10.21 NDT Tests

Sr.	Material / test	Test method	Quantity required
1	UPV Testing	IS 516 Part 1/ Sec 1 – 2018	Min. 10 points per visit
2	RH Testing	IS 516 Part 1/ Sec 4 – 2018	Min. 10 points per visit
3	Dye Penetration Test	IS : 3658	1,000 mm
4	Half Cell Potential	BS EN 14630-200	1 No
5	Cover Meter	ASTM C 876-2015	1 No
6	Carbonation	BS EN 14630-2006	1 No

10.22 Refractory Castable

Sr.	Material / test	Test method	Quantity required
1	Cold Crushing Strength	IS: 10570	3 Prism
2	Modulus of Rupture		

10.23 Ready-mix Plaster (RMP) / Mortar

Sr.	Material / test	Test method	Quantity required
1	Initial Setting Time	IS: 4031	15 kg
2	Final Setting Time		
3	Compressive Strength (3, 7 & 28 days)	ASTM C 109	
4	Bulk Density	-	

Sr.	Material / test	Test method	Quantity required
6	Soundness by Autoclave	IS 4031	
7	Pull-off Adhesion Strength	ASTM D 4541	
8	Flexural strength.	ASTM C 348	
9	Split tensile strength	ASTM C 1660	

10.24 Rock Sample

Sr.	Material / test	Test method	Quantity required
1	Compressive Strength	IS: 9143	1 No.
2	Water content	IS: 13030	1 No.
3	Specific Gravity	IS: 13030	1 No.
4	Density	IS: 13030	1 No.
5	Porosity	IS: 13030	1 No.
6	Preparation of Core	IS: 9179	1 No.

10.25 Special Test

Sr.	Material / test	Test method	Quantity required
1	Pull off Test (in Lab)	ASTM D 4541	5 kg
2	Pull off Test (on Site)	ASTM D 4541	3 No

10.26 Stones

Sr.	Material / test	Test method	Quantity required
I	Marble		
A)	Physical Test		
1	Water Absorption	IS: 1124-1974	5 Nos of 300 * 300 mm size and working Thickness
2	True Specific Gravity	IS: 1122-1974	
3	Moh's hardness	IS: 13630	
4	Porosity	IS: 1124-1974	
5	Compressive Strength	IS: 1121 Part 1	
6	Modulus of Rupture	IS: 1121 Part 2	
7	Abrasion Resistance	IS 1706 :1972 RA 2008	
B)	Chemical Test		
1	Staining Test	IS: 13630	1 Nos of 300 * 300 mm size
2	Acid & Alkali Resistance		
3	Household Chemicals		
4	Swimming Pool Salts		

Sr.	Material / test	Test method	Quantity required
II	Granite		
1	Moisture Content	IS: 13030	3 Nos (300mm x
2	Dry Density	IS: 13030	300mm with thickness
3	Porosity	IS: 1124-1974	3 Nos
4	Water Absorption	IS: 1124-1974	3 Nos
5	True Specific Gravity	IS: 1122-1974	3 Nos
6	Moh's hardness	IS: 13630	3 Nos
7	Comp. Strength	IS: 1121 (Pt-1)-1974	(50x50x50) 5 Nos
8	Flexural Strength	IS 1121 (Part2)-1974	(200x50x50) 3 Nos
9	Abrasion Resistance	IS 1706 :1972	3 Nos

10.27 Soil

Sr.	Material / test	Test method	Quantity required
A)	Physical		
1	Standard Maximum Dry Density/OMC	IS 2720 (Part 7): 1980 / IS:	30 kg
		2720 (Pt-8) 1983	
2	Plastic Limit	IS: 2720 (Pt-5) 1985	1 kg
3	Liquid Limit	IS: 2720 (Pt-5)1985	1 kg
4	Sieve Analysis	IS: 2720 (Pt-4) 1985	15 kg
5	CBR	IS: 2720 (Pt-16) 1987	30 kg
9	Specific Gravity	IS: 2720 (Pt-3)1980	1 kg
10	Natural Moisture	IS: 2720 (Pt-9) 1992	2 kg
12	Unconfined Compression of soil	IS: 2720 (Pt-10) 1991	2 kg
13	Differential Free swell Index	IS: 2720 (Pt-40) 1977	1 kg
15	Hydrometer analysis	IS: 2720 (Pt-4) 1985	1 kg
17	FDD by Sand Replacement Method per point	IS: 2720 (Pt-28) 1974	Min. 3 points per visit
18	Field CBR	IS: 2720 (Pt-31)	Min. 3 points per visit
19	Field Density by Core Cutter Method per point	IS: 2720 (Pt-29)	Min. 3 points per visit
20	pH	IS 2720 (Pt 26):1987	1 kg
21	Chloride	-	1 kg
22	Soluble Sulphates	IS 2720 (Pt 27):1987	1 kg
23	Organic Matter	IS 2720 (Pt 22)	1 kg
24	Calcium Carbonates	IS 2720 (Pt 23)	1 kg
25	Total Soluble Solid	IS 2720 (Pt 21)	1 kg
26	Colloidal Silica	IS 2720 (Pt 25)	1 kg

Sr.	Material / test	Test method	Quantity required
27	Modified Maximum Dry Density/OMC	IS 2720 (Part 7/8)	35 kg

10.28 Tiles

Sr.	Material / test	Test method	Quantity required
A)	Ceramic or Vitrified Tiles (Rate per Tile)		
1	Centre Curvature	IS: 13630 /IS 15622/ IS 4457	Based on Tile Size
2	Edge Curvature		
3	Warpage (Flatness)		
4	Deviation in Length & Width		
5	Deviation in thickness		
6	Measurement of Rectangularity		
7	Measurement of Straightness		
8	Modulus of Rupture		
9	Breaking Strength		
10	Water Absorption		
11	Moh's hardness		
12	Crazing test		
13	Surface Abrasion resistance		
14	Resistance to Deep Abrasion		
15	Moisture Expansion		
16	Co-efficient of linear Thermal Expansion		
17	Impact Resistance		
18	Co efficient of Friction (Floor tiles only)		
19	Frost Resistance		
20	Thermal Shock Resistance		5 Nos
21	Chemical Resistance test		5 Nos
22	Stain Resistance Test		5 Nos
23	Household Chemicals		1 Nos
24	Swimming Pool Salts		1 Nos
25	Acid Resistance		1 Nos
26	Alkali Resistance		1 Nos
B)	CHEQUERED/PLAIN CONCRETE TILE (Rate per tile)		
1	Dimensions	IS-1237 /13801	6 Nos
2	Flatness		6 Nos
3	Straightness		6 Nos

Sr.	Material / test	Test method	Quantity required
4	Rectangularity		6 Nos
5	Water absorption		6 Nos
6	Wet Transverse Strength		6 Nos
7	Resistance to wear		6 Nos
8	Complete Test on C. Tiles		24 Nos

10.29 Tile Adhesive

Sr.	Material / test	Test method	Quantity required
1	Tensile Adhesion Strength	IS 15477 - 2018	25 Kg per type of Adhesive
a)	Dry condition		
b)	Wet condition		
2	Shear Adhesion Strength		
a)	Dry condition		
b)	Wet condition		
c)	Heat Ageing test		
3	Open Time		
4	Adjustment Time		
5	Slip		
6	Deformability		

10.30 Tests On Embankment/ Subgrade

Sr.	Material / test	Test method	Quantity required
1	Sand Content	IS 2720 Part-4	10 kg
2	Plasticity Test	IS 2720 Part-5	10 kg
3	Density (OMC/MDD)	IS 2720 Part-7 &8	30 kg
4	Deleterious content	IS 2720 Part-27	5 kg
5	Moisture content	IS 2720 Part-2	5 kg
6	Soaked CBR Test	IS 2720 Part-16	30 kg

10.31 Test On Granular Subbase (GSB)

Sr.	Material / test	Test method	Quantity required
1	Gradation	IS: 2386 (Part 1)	30 kg
2	10 % Fines	MORTH	30 Kg
3	Atterberg limits	IS 2720 Part-5	10 kg
4	Deleterious Constituents	IS 2386 Part 1 & 2	5 kg
5	Soaked C.B.R.	IS 2720 Part-16	30 kg

Sr.	Material / test	Test method	Quantity required
6	Wet Impact Value	IS: 5640	10 kg
7	Maximum Dry Density/OMC	IS 2720 (Part 7): 1980 / IS:	30 kg
		2720 (Pt-8) 1983	
8	Design Mix for GSB	MORTH	40,20,10mm & Stone
			Dust -Each 2 Bags

10.32 Test On Wet Mix Macadam (WMM)

Sr.	Material / test	Test method	Quantity required
1	Aggregate Impact Value	IS: 2386 (Part 4)	10 kg
2	Grading	IS: 2386 (Part 1)	40 kg
3	Flakiness and Elongation Index	IS: 2386 (Part 1)	20 kg
4	Atterberg's limits	IS: 2720 (Pt-5)	10 kg
5	Design Mix for WMM	MORTH	40,20,10mm & Stone Dust -Each 2 Bags

10.33 Wall Putty

Sr.	Material / test	Test method	Quantity required
1	Tensile Strength @ 7 and 28 days	ASTM C 307	15 kg
2	Compressive Strength@1, 3, 7 & 28 days	EN 196	
3	Setting Time (Initial & Final)	EN 196	
4	Average Shrinkage (%)	-	
5	Consistency	-	
6	Water Capillary Absorption at 24 hours(ml)	KARSTEN TUBE	

10.34 Water

Sr.	Material / test	Test method	Quantity required
A)	Water for Construction Purpose		
1	Acidity	IS: 456-2000	1 Litre
2	Alkalinity		
3	Chlorides		
4	Sulphates		
5	Inorganic Solids		
6	Suspended Matter		
7	Organic Solids		
8	pH Value		
B)	Water For Drinking Purpose		

Sr.	Material / test	Test method	Quantity required
1	pH	IS 10500	2 Liter
2	Conductivity		
3	Turbidity		
4	Total Dissolved Solids		
5	Total Hardness (as CaCO ₃)		
6	Calcium (as Ca)		
7	Magnesium (as Mg)		
8	Total Alkalinity (as CaCO ₃)		
9	P-Alkalinity (as CaCO ₃)		
10	M.O. Alkalinity (as CaCO ₃)		
11	Chloride (as Cl)		
12	Sulphate (as SO ₄)		
13	Nitrate (as NO ₃)		
14	Iron (as Fe)		
15	Silica (as SiO ₂)		
16	Water for Drinking Purpose (1-8)		
C)	Microbiological test		
16	Coliform	IS 10500	1 Liter
17	E-coli		
D)	Water for Machine Cooling Purpose		
1	Chemical Test	IS 3025	2 Liter
E)	Sewage Water Testing		
1	pH	IS 30 25	1 Liter
2	TSS (Total Suspended Solids)		
3	COD (Chemical Oxygen Demand)		
4	BOD (Biological Oxygen Demand)		
5	Oil & Grease		

10.35 Water Proofing Compound

Sr.	Material / test	Test method	Quantity required
A)	Physical Test		
1	Permeability to Water	IS: 2645	1 Litre of sample + 10 Kg Cement OPC Grade
2	Setting Time		
3	Compressive -Strength		
B)	Chemical Test		

Sr.	Material / test	Test method	Quantity required
1	Chloride Content	IS: 2645	200 ml sample

10.36 Wood

Sr.	Material / test	Test method	Quantity required
A)	Timber Wood		
1	Moisture & Density	IS:1708	305 mm
B)	Door Shutter		
1	Dimensions and squareness	IS: 2202 (Part 1): 1999	full Size Door Shutter
2	General Flatness Test		
3	General Planeness		
4	Impact identification test		
5	Flexural Test		
6	Edge loading test		
7	Shock Resistance		
8	Buckling resistance test		
9	Slamming test		
10	Misuse test		
11	End immersion test		
12	Knife Test		
13	Glue adhesion Test		
14	Screw withdrawal resistance test		
15	Misuse		
16	Moisture Content		
C)	Plywood		
1	Dimension	IS 710: 2010 or IS 303: 1989 or IS :1734	3 nos each of 1,000 mm x 1,000 mm
a	Length		
b	Width		
c	Thickness		
2	Squareness		
3	Edge Straightness		
4	Moisture Content		
5	Density		
6	Glue adhesion strength in dry state		
i	Glue shear Strength		
ii	Adhesion of piles (Knife test)		

Sr.	Material / test	Test method	Quantity required
7	Resistance to water (After 72 hrs. Of boiling)		
i	Glue Shear Strength		
ii	Adhesion of piles (Knife test)		
8	Tensile Strength		
i	Parallel to face grain		
ii	Perpendicular to Grain.		
9	Static Bending (Dry state)		
i	Modulus of Rupture		
a	Along the Grain		
b	Across the grain		
10	Static Bending (Wet state)		
i	Modulus of Rupture		
a	Along the Grain		
b	Across the grain		
11	Nail and Screw Holding Power		
12	Water Resistance		

Quantities not listed here are available on request. Where a project specification sets a larger sample than this document, the specification governs.