Material Testing Sample Size Requirements

TCR Engineering Services undertakes Material Testing, NDT & Inspection and Assets Integrity Services. The following sample requirements will provide optimal sample size for our engineers to conduct the required tests. If your sample size does not meet the requirements listed below, please contact TCR because sub sized samples can be used, or we may have other methods for conducting similar analysis. Sample sizes larger than those listed will not present a problem, but additional machining may be required. The table below is considered as a good reference point for most samples. For special items or if limited amount of material available, please contact TCR.

(All dimensions in mm): Where: W= Width, L=Length, FT= Full Thickness						
TESTING	**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	50Wx200L	Note (1)	Full Section x500L	150L Note (2)	Note (3)	300
Flattening	----	----	----	----	Full Section X 100L	Full Section X 100L
Bend	Note (4)	Note (4)	----	Note (4)	Note (4)	Note (4)
Charpy	----	Note (5)	150L	200L	75L	----
Hardness	50 x 50 x FT	50 x 50 x FT Note (6)	50 long	50 long	50 long	50 long

Note:

1. Plate up to 75mm thick requires 50mm W x 250mm L; Plate greater than 75mm thick requires 50mm W x 150mm L
2. Bar or wire under 25mm diameter requires 450mm L
3. Pipe up to 75mm wall thickness requires full ring x 375mm long; Pipe greater than 75mm wall thickness requires full ring x 150mm long
4. Requirement depends upon size and specification. We prefer 250mm length
5. 100mm W x 150mm L with longitudinal direction noted with 2.54mm thickness
6. If the thickness exceeds 20mm, then FT shall be at least 10mm

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Sample Size Requirements for Reinforcement Bar Coupler (Mechanical Splice)

Sr. No.	Description of rebar coupler joint	Fatigue LCF	Fatigue HCF	Cyclic Tensile (100 cycles)	Slip Test	Static Tensile Test	Spectro Chemical Test
1	Coupler joint with dia. 08 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos
2	Coupler joint with dia. 10 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos
3	Coupler joint with dia. 12 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos
4	Coupler joint with dia. 16 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos
5	Coupler joint with dia. 20 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos
6	Coupler joint with dia. 25 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos
7	Coupler joint with dia. 32 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos
8	Coupler joint with dia. 36 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos
9	Coupler joint with dia. 40 mm rebar	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	1 mtr Length QTY- 3 Nos	Coupler QTY- 1 Nos

Note:

1. In a mechanical splice, the coupler should be positioned at the center.
2. The required reinforcement bar sample size is 1 nos of 1-meter length per test per size, as per IS 1786.

Fracture Toughness (KIC) Test, J-Integral (JIC) Test and Fatigue Crack Growth Rate (FCGR) Test and CTOD Test (Crack Tip Opening Displacement)

- Specimen Size: We can test specimens ranging from 8mm to 32mm in thickness on Test temperature range: at subzero up to -20 °C & at elevated temperature up to 1100 °C
- Specimen Size: We can test specimens ranging from 8mm to 50mm (CT/SENB specimen) at Room Temperature & over 50 mm to 100mm (SENB specimen only, depends on the strength of material)
- Span Length: Our testing equipment accommodates span lengths between 55mm and 1,600mm.

(All dimensions in mm)				
Test Procedures	**Length**	**Width**	**Thickness**	**Grain**
Tensile Test Wire	1500 (upto 2mm Dia)	-	-	*
Vicker (Micro Indentation) Hardness	25	25	> 0.75	*
Rockwell Hardness	25	25	> 0.75	*
Brinell Hardness	25	25	> 6	*
Plating Hardness	25	25	> 25	*
Plating Thickness	25	25	As Actual	-
Hydrogen Embrittlement	150	25	As Actual	*
Spectrometer	50	25	> 2	*
Atomic Absorption - 1 gram of sample	**	**	**	**
LECO Carbon, Sulfur and Nitrogen - 1 gram of sample	**	**	**	**
Optical Emission Spectroscopy (OES)	50	25 **	10 **	**
Microstructure	25	25	As Actual	*
Inclusion Rating	13	13	13	*
Scanning Electron Microscopy (SEM)	Any Size	*	*	-
Corrosion Testing	Subject to raw material dimension			
Salt spray test Panels	80	205	*	*

- ***Grain direction is very important when submitting sheet or plate for testing. Always mark grain direction with an arrow on the sample
- ** When performing chemical analysis only, supply the above referenced size coupon. If other testing is to be performed (i.e. tensile, flattening, etc.), a separate piece for chemical analysis is not needed

Wet Chemical Analysis

- Metals - 5 grams minimum, 10 grams preferred
- Aqueous Samples - 1/2 liter minimum, 1 liter preferred
- Solid Particulate Samples - coarse (> 6mm) 1 kilogram minimum, medium (1 to 5 mm) 500 grams minimum, fines (< 1 mm) 100 grams minimum

Weld Procedure Qualification

The welded test plate should be a minimum of 250mm wide by 300mm long the weld, 400mm along the weld if Charpy V-Notch impacts required.

- Pipe qualifications:
- *Over 80mm nominal outer diameter (O.D.) – 1 Nos welded pipe coupon
- *50mm to 80mm nominal outer diameter (O.D.) - 2 Nos welded pipe coupon
- *Less than 50mm nominal pipe – 4-5 Nos welded pipe coupon
- *Charpy V-Notch impacts may require more material depending on pipe size and quantity of impact tests

Chemical, Micro and IGC ASTM A262 Prac E

- Rod less than 10mm dia - 150mm long
- Rod more than 10mm dia - 120mm long
- Plate - 50mm X 100mm
- Pipe - 100 mm long

Hydrogen-Induced Cracking (HIC) Test, NACE TM0284

- **Plate:** 150mm x150mm (rolling direction shall be marked on it. If the plate is more than 88mm think - 250mm x 250mm sample size is required)
- **Pipe:** upto 50mm OD - 210mm long. (If the pipe is more than 50mm OD, 120mm long sample size is required)
- **Bar:** upto 88mm dia - 300mm long. (If the Bar is more than 88mm dia to 130mm dia - 200mm long sample size is required. If the Bar is more than 130mm dia, 100mm long sample size is required)
- Number of pieces to be tested upto 88mm thick/dia - set of 3 test specimens to be tested
- Number of pieces to be tested more than 88mm thick/dia - 5 and more test specimens (there must be an uneven number) to be tested
- Time for completion - 2 weeks

Sulfide & Stress Corrosion Cracking (SSC/SCC), NACE TM0177

The SSCC tests at TCR Engineering in India are performed routinely for customers using tensile and bent beam specimens. Time for completion is minimum 35 working days. For each stress level and temperature, the following sample size is required:

- **Plate:** 25mm x 200mm long along with rolling direction marked on it – 3 test specimens (the location of the test piece as specified in relevant standards)
- **Pipe:** 160mm long pieces irrespective of dia (the location of the test piece as specified in relevant standards)
- **Bar:** 160mm long piece irrespective of dia

Civil Testing Sample Size Requirement

Sr. No.	Material / Test	Test Method / Specification	Approx Qty. Required
Admixture			
1	Physical	IS: 9103	Adm. 3-4 ltrs
2	Chemical		1 liter
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
Aggregate - Coarse & Fine			
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 Angles)	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 Na2SO4	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
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 Na2SO4	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
Alcofine			
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	SO3		
4	SiO2		
5	Fe2O3		
6	AL2O3		
7	CaO		
8	MgO		
Bentonite Powder			
1	Moisture Content	IS: 6186, IS: 12446, IS: 2911, IS 2720	3 kg
2	pH		
3	Gel Formation Index		
4	Dry Finess (150 Micron)		
5	Dry Finess (75 Micron)		
6	Wet Finess (45 Micron)		
7	Free Swelling		
8	Liquid Limit		
Bricks - Building / Flyash			
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
Blocks			
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
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
Bonding Agent			
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	
Cement			
A)	**Chemical Tests on Cement**		
1	Chemical Analysis (SiO_2, Al_2O_3, Fe_2O_3, CaO, MgO) (SO_3, Na_2O, K_2O)	IS 4032:1985	1 kg
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, m2/kg)	IS: 4031-1996 (Pt II)	15 kg
2	Setting Time (Minutes)	IS: 4031-1988 (Pt V)	
	Initial		
	Final		
3	Compressive Strength (Mpa)	IS: 4031 (Pt 6)	
	3,7 & 28 Days		
4	Soundness	IS: 4031 (Pt 2)	
	Le-Chatelier's Expansion (mm)		
	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	
Cementitious Grout			
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	
Concrete			
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 1084	5 Kgs
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
Concrete Durability Test			
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
Concrete Mix Design			
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: 10262	
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		
10	Design Mix for PQC	IRC 15	

11	Design of SCC	IS: 10262	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: 10262	-
15	Each Additional trial to arrive at economical mix		-
Curing Compound			
1	Colour	ASTM C 156 and ASTM C - 309 - Type I and Class B and Type II and Class AASTM C 156 and ASTM C - 309 - Type I	1 ltr
2	Density		
3	Water Retention (Loss of water in 72 hrs)		
4	Drying time		
6	Non-Volatile Content		
7	pH	IS 3025	
Flyash			
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 Lechtelier's Method		
8	Initial and Final Setting time		
9	Specific Gravity		
C)	**Chemical Testing**		
1	$SiO_2 + Al_2O_3 + Fe_2O_3$ %	IS: 1727	1 Kg
2	SiO_2 %		
3	Magnesium Oxide		
4	Sulphate %		
5	Available Alkalis %		
6	Total Chlorides %		
7	Loss of Ignition %		
8	Aluminium Oxide		
9	Ferric Oxide		
10	Calcium Oxide		
GGBS			
A)	**Physical Test**		
1	Slag Activity Index	ASTM C 989/IS 16714	10 Kg of GGBS & 5 Kg of OPC Cement
2	Finess 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
Gypsum Plaster			
A)	**Chemical Test**		
1	SO3	IS 2547: Part - 1	1 Kg
2	CaO		
3	MgO		
4	Na2O		
5	Loss of Ignition		
6	Free Lime		
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		
Gypsum Board			
A)	**Physical Test**		
1	Mass of Plaster	IS 2095-I:1996	Size: 1 Mtr * 1 Mtr
2	Transerve Strength		
a	Breaking load in Transerve direction		
b	Breaking load in Longitudinal Direction		
3	Dimension of Board		
B)	**Chemical Test**		
1	Na2O	IS 2095-I:1996	Size: 1 Mtr * 1 Mtr
2	MgO		
3	Loss on Ignition	IS: 2547	
4	Sulphate		
5	CaO		
6	Free Lime		
Jointing Mortar			
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	

LIME			
1	Chemical	IS: 712	1 kg
Micro Silica			
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	SiO2	ASTM C 1240 / IS 15388	2 Kg
2	Moisture		
3	LOI		
4	Alkali		
5	Chloride		
NDT Tests			
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 Meter
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
Refractory Castable			
1	Cold Crushing Strength	IS: 10570	3 Prism
2	Modulus of Rupture		
Ready-mix Plaster (RMP) / Mortar			
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	-	
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	
Rock Sample			
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.
Special Test			
1	Pull off Test (in Lab)	ASTM D 4541	5 kg
2	Pull off Test (on Site)	ASTM D 4541	3 No

Stones			
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		
II	**Granite**		
1	Moisture Content	IS: 13030	3 Nos (300mm x 300mm with thickness
2	Dry Density	IS: 13030	
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
Soil			
A)	**Physical**		
1	Standard Maximum Dry Density/OMC	IS 2720 (Part 7): 1980 / IS: 2720 (Pt-8) 1983	30 kg
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
27	Modified Maximum Dry Density/OMC	IS 2720 (Part 7/8)	35 kg

Tiles			
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
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
Tile Adhesive			
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		

Tests On Embankment/ Subgrade			
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
Test On Granular Subbase (GSB)			
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
6	Wet Impact Value	IS: 5640	10 kg
7	Maximum Dry Density/OMC	IS 2720 (Part 7): 1980 / IS: 2720 (Pt-8) 1983	30 kg
8	Design Mix for GSB	MORTH	40,20,10mm & Stone Dust -Each 2 Bags
Test On Wet Mix Macadam (WMM)			
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
Wall Putty			
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	

Water			
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 Drinkng Purpose**		
1	pH	IS 10500	2 Liter
2	Conductivity		
3	Turbidity		
4	Total Dissolved Solids		
5	Total Hardness (as CaCO3)		
6	Calcium (as Ca)		
7	Magnesium (as Mg)		
8	Total Alkalinity (as CaCO3)		
9	P-Alkalinity (as CaCO3)		
10	M.O. Alkalinity (as CaCO3)		
11	Chloride (as Cl)		
12	Sulphate (as SO4)		
13	Nitrate (as NO3)		
14	Iron (as Fe)		
15	Silica (as SiO2)		
16	Water for Drinkng 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 3025	1 Liter
2	TSS (Total Suspended Solids)		
3	COD (Chemical Oxygen Demand)		
4	BOD (Biological Oxygen Demand)		
5	Oil & Grease		
Water Proofing Compound			
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**		
1	Chloride Content	IS: 2645	200 ml sample
Wood			
A)	**Timber Wood**		
1	Moisture & Density	IS:1708	1 Feet

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	Flexture 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 mtr * 1 mtr
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 (Knief test)		
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		