



Report on

CONCRETE DESIGN MIX

GRADE OF CONCRETE: M30

CEMENT: OPC 53 GRADE

Conducted in

MARCH 2023

For

ASTRON CONCRETE PRODUCTS

Kaipoorikkara South, Vazhakkulam,

Aluva, Kerala 683105

ENGINEERS DIAGNOSTIC CENTRE (P) LTD.,

41/1004, Vadakumthala Building,

Pulleppady, Cochin - 682 018,

Kochi, Kerala

CONCRETE MIX DESIGN REPORT FOR M30 GRADE

Name of the Customer	:	M/s Astron Concrete Products
Name of the Project*	:	Astron Cover Blocks
Site	:	Astron Production Unit, Aluva
Condition of Sample	:	Satisfactory
Cement Used*	:	OPC 53 Grade
Fine Aggregate Used*	:	Manufactured Sand
Fine Aggregate Source*	:	Not mentioned
Coarse Aggregate Used*	:	Angular crusher aggregate 6mm
Coarse Aggregate Source*	:	Not mentioned
Grade of Concrete*	:	M30
Admixture Used*	:	1). Chemical admixture 2). Mineral admixture
Client Reference No	:	Letter # dated on 20.03.2023

*As furnished by client.

Note:

- The physical properties of specified material were tested as per relevant IS and presented below in Table 1 to 7.
- All the materials shall be weighing batched. Suitable corrections are to be applied for weight of aggregates, if they are not saturated and surface dry.
- The bulk density and specific gravity of materials to be used shall be confirmed by testing of such materials from time to time. If any deviations in the above parameters are observed, suitable corrections for proportions shall be applied at site.
- Suitable correction is to be applied to water-cement ratio, if the aggregates are not saturated and surface dry. Minor adjustments in water-cement ratio (on the lower side) may be carried out in actual work to get the desired slump, if necessary
- The coarse aggregates and fine aggregate used shall conform to the graded aggregate requirements as given in IS: 383-2016.
- At site, it is suggested to use suitable vibrators for compaction.
- The quality of water to be used for concreting shall conform to IS: 456-2000.
- In the design calculations, the degree of quality control considered is Control Level B. Hence, it is mandatory to exercise at least the same degree of quality control in the actual work.

Table-1: Design Stipulation

SI. No	Mix Design Data	
1	Mix to be designed	M30 with aggregates of maximum size 6 mm.
2	Characteristic compressive strength of concrete at 28 days (fck)	For M30, it is 30N/sq.mm and
3	Desired degree of workability*	Corresponding to a slump of 150 - 160 mm
4	Type and maximum size of aggregate supplied.	Granite, Angular 6 mm and down
5	Expected degree of quality control in the field.(See Note : 1)*	Control level B
6	Target mean compressive strength of concrete at 28 days	For M30 it is 38.25/mm ²
7	Type of exposure .(See Note : 2)	Moderate
<p>Note 1 :Site control having proper storage of cement; volume - batching of all materials except cement ; cement by weight only ` controlled addition of water; occasional checking of all materials ; aggregate grading and moisture content; and periodical checking for workability and strength.</p>		
<p>Note 2 : IS: 456-2000 describes 'Moderate' as Concrete surfaces sheltered from severe rain or freezing whilst wet. Concrete exposed to condensation and rain. Concrete continuously under water. Concrete in contact or buried under non-aggressive soil / ground water. Concrete surfaces sheltered from saturated salt air in coastal area</p>		

*As furnished by client.

Table-2: Physical Properties of Ordinary Portland Cement – 53 Grade

SI. No	Test Conducted	Results	Requirement for PPC Grade as per IS 8112 – 2013
1	Normal Consistency	30.8	Not Specified
2	Initial Setting Time	169	Shall not be less than 30 minutes
3	Final Setting Time	278	Shall not be more than 600 minutes
4	Compressive Strength a. 72 ± 1 Hour (3 day strength) b. 168 ± 2 Hour (7 day strength) b. 672 ± 4 Hour (28 day strength)	32.0 43.6 57.5	Minimum 27.0 Mpa Minimum 37.0 Mpa Minimum 53.0 Mpa
5	Fineness (by Blaine's Air Permeability method)	289	Shall not be less than 225 m2/kg
6	Soundness (by Le – Chatelier's method)	1.3	Shall not be more than 10 mm
6	Specific Gravity	3.15	Not Specified

Table-3: Gradation of Fine Aggregate – M. Sand

SI. No	Sieve Size	Cumulative percent		Specification as per IS: 383-2016 (Percentage Passing)			
		Retained	Passed	Zone-I	Zone-II	Zone-III	Zone-IV
1	10 mm	0	100	100	100	100	100
2	4.75 mm	0.4	99.6	90-100	90-100	90-100	95-100
3	2.36 mm	19.5	80.5	60-95	75-100	85-100	95-100
4	1.18 mm	39.8	60.2	30-70	55-90	75-100	90-100
5	600 micron	55.4	44.6	15-34	35-59	60-79	80-100
6	300 micron	72.4	27.6	5-20	8-30	12-40	15-50
7	150 micron	95.6	4.4	0-10	0-10	0-10	0-15

The sample supplied satisfies the requirements of grading **Zone-II** as per IS: 383-2016. According to IS: 383-2016 for Crushed Stone Sands, the permissible limit on 150 micron IS Sieve is increased to 20%. This does not affect the 5% allowance permitted in Cl. 4.3

Table-4: Gradation of Coarse Aggregate – 6 mm

SI. No	Sieve Size	Cumulative percent		Specification as per IS: 383-2016 in respect of 20 mm nominal size aggregate (% Passing)	
		Retained	Passed	Graded	Single Size
1	12.5 mm	0	100	100	100
2	10 mm	0	100	90-100	85-100
3	4.75 mm	13.8	86.2	40-85	0-20
4	2.36 mm	100	0	0-10	0-5

The above tested sample conforms to the requirement of **single sized aggregate** as per IS: 383-2016

Table-5: Test Data of Materials

SI. No	Ingredients	Type of Material	Specific Gravity	Water Absorption %
1	Cement	OPC 53	3.15	-
2	Fine Aggregates	M. Sand	2.5	2.35
3	Coarse Aggregates	6mm	2.7	0.40

Table-6: Final Proposed Properties of M30 Grade of Concrete

SI. No	Properties	Properties & Proportions		
		Cement	FA	CA
1	Mix Proportion (By weight)	1 : 3.44 : 2.06		
2	Fresh Density of concrete Kg/m ³	2345		
3	Free water cement Ratio	0.42		
4	Slump Obtained in, mm			
	a) Initial Slump	70 mm		
	b) After 30 minutes	30 mm		
	c) After 1 hour	---		
5	Average Compressive strength of the Concrete Cube @ 7Days (N/mm ²) @ 28 Days (N/mm ²)	29.46 N/mm² YTC		

Table-7: Suggested Mix (By Weight) for Concrete

SI. No	Material	Quantity per m ³ Kg	
1	Cement – OPC 53	330	
2	Fine Aggregates – M. Sand	1136	
3	Coarse Aggregates – 6 mm	681	
	White cement	33.5	
	Italian cement	22.5	
4	Free Water Content	138.6	
5	Mineral Admixtures	1.	1.24
		2.	1.24

Table 8: Compressive Strength of concrete cubes – M30 Grade

Mix	Sl.No.	Weight of Cube (kg)	Ultimate Load (kN)	Strength (N/mm ²)	Average Strength (N/mm ²)	Remarks
M30/1	1.	0.860	147.2	29.52	29.46	Average 7 days strength
	2.	0.854	145.1	29.10		
	3.	0.742	148.5	29.78		
	4.				YTC	Average 28 days strength
	5.					
	6.					

RANJIT P
GENERAL MANAGER (OPERATIONS)
ENGINEERS DIAGNOSTIC CENTRE (P) LTD

Remarks:

- Correction of Moisture Content for sand and coarse aggregate to be applied at site.
- The recommended design mix proportion should be tried in the field for trial mix. Before casting and Structure finalized by observing and actual performance of the concrete mix.
- The result relates only to the items tested, any correction invalidates this report.
- It is recommended to use graded/single size coarse aggregates & zone-II fine aggregates to ensure workability criteria.
- Admixture usage is recommended to ensure workability. However, if the same is achieved in the mix without admixture usage, the mix may be used after approval from client.
- **Admixture from BASF, Sika, Fosroc, Mappaietc may be used after confirming workability on site and cement content reduced based on trials and observations. However, in no case shall the minimum cement go below the designated grade of concrete.**

Technical Reference:

- 1) IS: 10262-2009 (Reaffirmed 2014) - Indian standard recommended method of concrete mix design
- 2) IS: 456-2000 (Reaffirmed 2011) - Code of practice for plain and reinforce concrete.
- 3) IS: 383-1970 (Reaffirmed 2011) - Specification of coarse and fine aggregate from natural Source for concrete.
- 4) IS: 1199-1959 (Reaffirmed 2013) - Indian Standard specifications for methods of sampling and analysis of concrete.
- 5) IS: 2386-1963 (Reaffirmed 2011) - Method of test aggregate for concrete.
- 6) IS: 516-1959 (Reaffirmed 2013) - Method of test for strength of concrete.
- 7) IS 8112 :2013 - Indian Standard Specifications for OPC 53.

*****End of Report*****