

**Office of The Engineer-in-Chief
Water Resources Department Chhattisgarh
Shivnath Bhawan North Block, Sector 19
Atal Nagar, Nava Raipur**

Technical Circular No. 02/2025

Memo No. 038/Bodhi/TC/2003/

Nava Raipur, Dated /04/2025

To,

1. The Chief Engineer, Mahanadi Projects, Raipur
2. The Chief Engineer, Mahanadi Godawari Basin, Raipur
3. The Chief Engineer, Minimata (Hasdeo) Bango Project, Bilaspur
4. The Chief Engineer, Hasdeo Basin, Bilaspur
5. The Chief Engineer, Hasdeo Ganga Basin, Ambikapur
6. The Chief Engineer, W.R. Department, Jagdalpur
7. The Chief Engineer, SDSO, O/O the E-in-C, Nava Raipur

Sub :- Grade of Concrete and Durability Requirements.

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The concrete used in Dams its appurtenant works, canal structures (Regulators, Outlets, Road and Drainage crossing etc) and canal lining is subjected to mild and moderate exposure conditions.

IS 456:2000 (fourth revision) defines mild exposure conditions (concrete surfaces protected against weather or aggressive conditions except those situated in coastal area) and in moderate exposure conditions (concrete surfaces sheltered from severe rain or freezing whilst wet, concrete exposed to condensation and rain, concrete in contact or buried under non aggressive soil/ground water, concrete surfaces sheltered from saturated salt air in coastal area) in Table-3.

Grade of concrete to be used for different exposure conditions as mentioned in Table-3 of IS 456:2000 (fourth revision) are given in Table-5 of the same IS Code. The minimum grade of concrete in mild exposure condition is M-20 for reinforced concrete work and in moderate exposure condition, it is M-15 for plain concrete and M-25 for reinforced concrete works.

2. Strength of Concrete :

The specified characteristic compressive strength of 150mm cube at 28 days in N/mm^2 for different grades of concrete are given in Table-2 of IS 456:2000 (fourth revision).

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following :-

Quantity of concrete in the work (cum)	Number of Samples
1-5	1
6-15	2
16-30	3
31-50	4
51 and above	4+1 additional sample for each additional 50 cum or part thereof

(2)

There test specimen shall be made for each sample for testing at 28 days. Additional samples may be required for various purpose such as to determine the strength of concrete at 7 days or at the time of striking the form work. Additional samples may also be required for testing samples cured by accelerated methods as described in IS-9103. The specimen shall be tested as described in IS-516.

The test results of the sample shall be average of the strength of three specimens. The individual variation should not be more than ± 15 percent of the average. If more the test results of the sample are invalid.

3. Acceptance Criteria

The concrete shall be deemed when both the following conditions are met:-

(a) The mean strength determined form group of four consecutive test results complies with the appropriate limits in column 2 of Table-11 of IS 456:2000 (fourth revision).

(b) Any individual test result complies with the appropriate limit in column 3 of Table-11 of IS 456:2000 (fourth revision).

The target mean strength and acceptable criteria for various grade of concrete is derived for a particular mix design knowing the standard deviation of the results of samples or assumed standard deviation as given in Table-8 of IS 456:2000 (fourth revision). The target mean strength of concrete mix should be equal to the characteristic strength plus 1.65 times the standard deviation.

Following table is derived as per norms of IS 456:2000 (fourth revision) to calculate target mean strength and acceptable criteria for compressive strength of concrete cube at 28 days :-

Grade of Concrete	Characteristic Compressive strength 28 days (fck) N/mm ²	Assumed Standard deviation (sd)	Target mean strength (fck+1.65xsd)	Acceptable criteria (fck+0.825xsd) rounded to nearest 0.50 N/mm ²
1	2	3	4	5
M-15	15	3.50	20.80	18.00
M-20	20	4.00	26.60	23.50
M-25	25	4.00	31.60	28.50
M-30	30	5.00	38.30	34.00

The target mean strength as shown in column 4 above is used to design concrete mix that meet the strength requirements of a concrete work.

Test results showing less strength than acceptable criteria as shown in column 5 of above table should not be accepted.

Sd/-
(Indrajeet Uikey)
Engineer-in-Chief
Water Resources Dept. Chhattisgarh
Nava Raipur, Atal Nagar

(3)

Endt. No. 038/Bodhi/TC/2003/ 4068

Nava Raipur, Dated 07/04/2025

Copy to :-

1. The Account General, Chhattisgarh, Zero Point, Near Vidhansabha, Balodabazar Road, Raipur
2. The Secretary, Government of Chhattisgarh, Water Resources Department, Mantralaya, Mahanadi Bhawan, Atal Nagar, Nava Raipur
for favour of information please.
3. All The Superintending Engineer, WRD, C.G.
4. All The Executive Engineer, WRD, C.G.
5. All The CE/SE/EE/AE of O/O the E-in-C, Atal Nagar, Nava Raipur
- ✓ 6. The Superintending Engineer (MIS), O/O the E-in-C, Atal Nagar, Nava Raipur
for uploading in Departmental Website and for email to all CE, SE and EE.
for information and strict compliance.



(Indrajeet Uikey)
Engineer-in-Chief

Water Resources Dept. Chhattisgarh
Nava Raipur, Atal Nagar

MIS
Gavel
9/5/25