Concrete Cube Test: 7-Day Strength & Acceptance Chart

IS 456:2000 (Amendment No. 4, Table 11) · IS 516 test method · M20 to M40

CUBE STRENGTH

fc = P / A = failure load (N) ÷ 22,500 mm²

- Standard cube: 150 × 150 × 150 mm (A = 22,500 mm²)
- Test result = average of 3 cubes from one sample
- If any cube varies more than ±15% from the average, that result is invalid (IS 456 Cl. 15.4)
- Example: 562.5 kN ÷ 22,500 mm² = 25.0 N/mm²

SAMPLING FREQUENCY (IS 456 CL. 15.2.2)

Quantity of concrete (m³)	No. of samples
1–5	1
6–15	2
16–30	3
31–50	4
51 and above	4 + 1 per extra 50 m³ or part

7-day strength and 28-day acceptance

N/mm² (crushing load on a 150 mm cube in kN)

Grade	Typical 7-day OPC, 65–70% of fck	28-day fck characteristic strength	Min. each result fck − 3 (load)	Min. mean of 4 results max(fck + 0.825σ, fck + 3)	Assumed σ IS 456 Table 8	Load for fck 150 mm cube
M20	13.0–14.0	20	17 382.5 kN	23.5	4.0	450.0 kN
M25	16.3–17.5	25	22 495.0 kN	28.5	4.0	562.5 kN
M30	19.5–21.0	30	27 607.5 kN	34.0	5.0	675.0 kN
M35	22.8–24.5	35	32 720.0 kN	39.0	5.0	787.5 kN
M40	26.0–28.0	40	37 832.5 kN	44.0	5.0	900.0 kN

Mean of 4 = four non-overlapping consecutive results; fck + 0.825σ is rounded to the nearest 0.5 N/mm². Use the site's own standard deviation once enough results are available.

READING 7-DAY RESULTS

- **IS 456 does not set a 7-day requirement**: acceptance is judged on 28-day results.
- For OPC under standard curing, 7-day strength is typically 65–70% of fck. PPC and slag (PSC) cements gain strength more slowly, so lower 7-day values are normal for them.
- A 7-day result far below the typical range is an early warning: check sampling, compaction and curing of the cubes.

SMALL POURS AND NON-CONFORMITY

- **Up to 30 m³ / fewer than 4 samples:** mean ≥ fck + 4 and each result ≥ fck − 2 (Table 11, Note 2). A single sample must reach fck + 4.
- A result below fck − 3, or a mean of 4 below the limit, means the concrete does not conform: investigate (e.g. core tests) with the structural engineer.

TEST METHOD CHECKLIST (IS 516)

- Fill moulds in layers and compact fully (tamping bar or vibrator)
- Keep cubes covered and undisturbed for the first 24 hours
- Then cure in water at 27 ± 2 °C until testing
- Test at 7 and 28 days, loading on the cast side faces (not the top)
- Apply load steadily at 140 kg/cm² per minute (about 14 N/mm²/min, ≈ 315 kN/min for a 150 mm cube)
- Record failure load, failure pattern and cube weight

For guidance only. Check acceptance against the project specification and your structural engineer's instructions. Prepared by TheCivilStudies, November 2026.