



DMSA TECHNICAL KNOWLEDGE LIBRARY

DMSA TECHNICAL NOTE

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Title

When a Concrete Cube Fails Engineering Response Protocol

1. Objective

To provide a systematic engineering approach for investigating a failed concrete cube before taking any decision regarding concrete quality or structural safety.

2. Background

Concrete cube testing is one of the most widely used methods for assessing concrete quality. However, a failed cube does not always indicate poor concrete in the structure. The result may be influenced by production, sampling, specimen preparation, curing or testing practices.

Every failed cube should therefore trigger an engineering investigation rather than an immediate decision.

3. Engineering Principle

A failed cube is not a failed structure.

It is an engineering signal that deserves investigation.

The objective is to identify the root cause and take the right engineering decision based on evidence.

4. Problem Statement

A failed cube may occur due to one or more of the following:

- Concrete quality
- Batching errors
- Sampling errors
- Improper cube casting
- Poor compaction
- Inadequate curing
- Damaged or uncalibrated cube moulds
- Testing machine or operator errors
- Improper testing procedure

The root cause should always be established before accepting or rejecting the concrete.

5. Immediate Response

When a cube sample fails:

Do not reject the concrete immediately.

Verify the test result.

Review all available records.

Protect the structure, if necessary.

Start a systematic engineering investigation.

6. Investigation Checklist

Review the following:

Production

- Mix design
 - Batching records
 - Material quality
 - Water and admixture dosage
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Transportation

- Transit Mixer number
- Delivery time
- Travel duration

Site

- Workability
- Placing method
- Compaction
- Curing

Cube Preparation

- Sampling method
- Representative sample
- Cube mould condition
- Cube identification
- Cube curing

Testing

- Cube age
- CTM calibration
- Loading rate
- Test procedure

7. Engineering Evaluation

Evaluate the complete picture before taking a decision.

Check whether:

- The cube mould was within tolerance.
- The mould was calibrated.
- Sampling was representative.
- One cube behaved as an outlier.
- The average strength met the specified requirement.
- Testing was carried out correctly.

One test result should never be interpreted in isolation.

8. Recommended Engineering Actions

- Maintain unique identification for every cube mould.
- Calibrate cube moulds at regular intervals.
- Collect sufficient concrete for representative cube casting.
- Follow proper sampling and curing procedures.
- Maintain calibrated compression testing machines.
- Investigate every abnormal cube result before taking corrective action.

9. Preventive Practices

A strong quality system should ensure:

- Standard sampling procedures.
- Proper specimen preparation.
- Equipment calibration.
- Complete traceability.
- Periodic review of test data.
- Continuous improvement based on investigation findings.

10. DMSA Engineering Recommendation

The purpose of cube testing is not merely to obtain a strength value.

Its purpose is to understand the behaviour of concrete and improve quality through engineering investigation.

Every failed cube is an opportunity to learn.

11. SM Technical Logic

Don't Reject.

Investigate.

Know Your Concrete before taking an engineering decision.

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And Concrete Solution
