

Testing concrete

Part 130. Method for temperature-matched curing of concrete specimens

ICS 91.100.30

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Committees responsible for this British Standard

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- Association of Lightweight Aggregate Manufacturers
- Association of Metropolitan Authorities
- British Aggregate Construction Materials Industries
- British Cement Association
- British Civil Engineering Test Equipment Manufacturers
- British Iron and Steel Producers' Association
- British Precast Concrete Federation
- British Ready Mixed Concrete Association
- Building Employers' Confederation
- Cement Admixtures Association
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- Concrete Society
- County Surveyors' Society
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- Highways Agency
- Institute of Concrete Technology
- Institution of Structural Engineers
- Institution of Water and Environmental Management
- National House Building Council
- Quality Ash Association
- Sand and Gravel Association
- Society of Chemical Industry

This British Standard, having been prepared under the direction of the Sector Board for Building and Civil Engineering, was published under the authority of the Standards Board and comes into effect on 15 November 1996

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Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference B/517/1
Draft for comment DD 92

ISBN 0 580 25890 4

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Foreword

This Part of BS 1881 has been prepared by Subcommittee B/517/1. It describes a method for temperature-matched curing of concrete specimens and is based on the method described in DD 92 : 1984.

During the period between fresh concrete in an element setting, and it being subjected to working loads, an estimate of the in situ strength may be required for a number of reasons. Some of the more common are:

- to provide information on the gain of concrete strength in cold conditions;
- to determine the striking time for vertical and soffit formwork;
- to determine the time at which prestressing operations may be started
- to determine the time at which a member may be subjected to all or part of the working load;
- to provide information on the effects of temperature on the long term strength of the concrete.

The in situ cube strength (as defined in BS 6089) differs from the standard strength of water-stored cubes cured at 20 °C (as defined in BS 1881 : Part 111) for a number of reasons. These include:

- variations in mix proportions within or between batches;
- differences in compaction;
- differences in moisture conditions during curing;
- differences in temperature history.

This test procedure only addresses the difference in temperature history.

The temperature history of concrete in an element will depend on the types and quantities of cement, the thermal properties of the concrete, the size and shape of the section, the insulating properties of the formwork, the ambient temperature conditions and the concrete placing temperature. From the foregoing, it can be seen that standard cubes may not give a reliable indication of the concrete strength in the element particularly at early ages, where large differences in temperature history can occur between cubes stored at 20 °C, and the concrete in the element. An alternative method is therefore needed for estimating the early-age strength of the concrete in the element under consideration.

Several methods are in use, but these vary considerably in accuracy and appropriateness for the following reasons.

- Tests conforming to BS 1881 : Part 207 : 1992 are only suitable for estimating the concrete strength near to the surface as they are dependent on impact, penetration resistance, or rupture of the concrete surface. However, this is the concrete that is protecting the reinforcement and it is often the most highly stressed part of the cast section.
- Cubes cured alongside the cast section provide a safe and reasonable means by which the strength of the cast section can be estimated only if the cast section is thin and not insulated. In larger cast sections, cubes cured alongside will substantially underestimate the early-age strength of the cast section.
- By matching the temperature of water in a curing bath to the rise and fall of temperature in a concrete element, cubes cured in the bath are subjected to the same temperature history as the concrete at a selected point in the element. When tested for strength, these cubes should give a more accurate estimate of the concrete strength at a selected point in the element at the time of testing. This method of curing cubes is termed ‘temperature-matched curing’.