

Method for temperature-matched curing of concrete specimens

UDC 691.32:666.972.035.5:620.115.8

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Committees responsible for this Draft for Development

The preparation of this Draft for Development was entrusted by the Cement Gypsum, Aggregates and Quarry Products Standards Committee (CAB/-) to Technical Committee CAB/4 upon which the following bodies were represented:

- Association of Lightweight Aggregate Manufacturers
- British Aggregate Construction Materials Industries
- British Precast Concrete Federation
- British Ready Mixed Concrete Association
- Cement Admixtures Association
- Cement and Concrete Association
- Cement Makers' Federation
- Concrete Society
- County Surveyor's Society
- Department of the Environment (Building Research Establishment)
- Department of the Environment (Property Services Agency)
- Department of the Environment (Transport and Road Research Laboratory)
- Department of Transport
- Electricity Supply Industry in England and Wales
- Federation of Civil Engineering Contractors
- Greater London Council
- Institute of Concrete Technology
- Institution of Civil Engineers
- Institution of Highway Engineers
- Institution of Municipal Engineers
- Institution of Structural Engineers
- Institution of Water Engineers and Scientists
- National Federation of Building Trades Employers
- Royal Institute of British Architects
- Royal Institution of Chartered Surveyors
- Sand and Gravel Association
- Society of Chemical Industry

The following bodies were also represented in the drafting of the Draft for Development, through subcommittees and panels:

- British Civil Engineering Test Equipment Manufacturers' Association
- Coopted members

Amendments issued since publication

Amd. No.	Date of issue	Comments
5057	June 1986	Indicated by a sideline in the margin

This Draft for Development, having been prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 January 1984

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The following BSI reference relates to the work on this Draft for Development: Committee reference CAB/4

ISBN 0 580 13678 7

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Foreword

This Draft for Development has been prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee. The estimation of the strength of concrete in a structure by testing specimens that have undergone the same temperature history has been in limited use for a few years. The method is being published in this series so that its wider use will enable more data to be accumulated on its practical value. It is intended that the test will be published ultimately as a Part of BS 1881.

The strength of concrete is a function of the materials used and their mix proportions, its moisture state, time and temperature. For a given mix, the temperature and moisture state history of an element determines its rate of gain of strength and its ultimate strength. This history depends on a number of factors including:

- a) types and quantities of cementitious materials;
- b) size and shape of the section;
- c) insulating properties of the formwork;
- d) ambient conditions;
- e) concrete placing temperature.

In addition to these factors, the in situ cube strength as defined in BS 6089 is likely to differ from that of cubes made and cured in accordance with BS 1881-108 and BS 1881-111 on account of:

- 1) variations in mix proportions;
- 2) differences in compaction;
- 3) differences in moisture state.

With so many factors influencing the in situ strength, it would be coincidence if the in situ cube strength were the same as that of test cubes made and cured in accordance with BS 1881-108 and BS 1881-111. Design methods include an allowance for these differences in the partial factor of safety for concrete, but this is based on mature concrete and it does not take into account the difference that can occur at early ages due to gross differences in maturity.

This problem can be avoided if the partial factor of safety for concrete is based on a relationship between in situ cube strength and the strength of test cubes of equal maturity to the structure, i.e. the strength of temperature-matched cured cubes. This approach has practical advantages in the determination of minimum formwork striking and prestressing times. The bending equations in CP 110 with their built-in partial safety factors for concrete can be used to calculate the characteristic strength that temperature-matched cubes would be required to achieve (see reference 1 of Appendix A). Temperature-matched curing is an extremely efficient method of determining minimum formwork striking and prestressing times and this Draft for Development describes the equipment and procedures for this application.

Attention is drawn to the fact that it is claimed that this temperature-matched curing method is the subject of British Patent No 1300099, copies of which can be obtained from the Patent Office, 25 Southampton Buildings, London WC2A 1AY. BSI takes no position as to the validity of the patent or whether it is still in force. The patent is irrevocably endorsed "licences of right" under Section 46 of the Patents Act 1977 which states:

"(3) Where such an entry is made in respect of a patent —

- a) any person shall, at any time after the entry is made, be entitled as of right to a licence under the patent on such terms as may be settled by agreement or, in default of agreement, by the Comptroller on the application of the proprietor of the patent or the person requiring the licence".

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