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Specification for

Dental glass ionomer cements

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The Dental Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

- Association of Dental Hospitals of the United Kingdom*
- British Dental Association*
- British Dental Trade Association*
- British Society for the Study of Prosthetic Dentistry
- Dental Materials Panel*
- Department of Health and Social Security*
- Department of Industry (Laboratory of the Government Chemist)*
- Department of Industry (National Engineering Laboratory)*
- Department of Industry (National Physical Laboratory)*
- Institute of Dental Surgery
- Ministry of Defence*
- Royal Society of Medicine
- Scottish Health Services

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

- British Endodontic Society
- British Society for Restorative Dentistry
- London Dental Study Club
- Society of University Dental Instructors

This British Standard, having been prepared under the direction of the Dental Standards Committee, was published under the authority of the Executive Board and comes into effect on 30 January 1981

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The following BSI references relate to the work on this standard:
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Foreword

This British Standard was prepared at the request of the Department of Industry (Laboratory of the Government Chemist) and under the direction of the Dental Standards Committee.

The responsible Technical Committee gave particular consideration to the specimen size used for the compressive strength test, specified as a 12 mm high cylinder of 6 mm diameter. This may present problems in preparing specimens of capsulated materials or of certain fast-setting materials, although manufacturers would be able to test the component materials prior to encapsulation.

The specimen size specified in BS 3365-3 for capsulated silicate and silico-phosphate cements is a 6 mm high cylinder of 4 mm diameter. However, in view of the increased scatter of test results using the 6×4 specimen as compared to the 12×6 specimen, and the considerable amount of research work required to set realistic limits for a 6×4 specimen size, the Technical Committee decided that this British Standard should utilize the 12×6 specimen. It is possible that the use of capsulated materials will increase, and a programme of work will be undertaken on the 6×4 specimen to provide data for a future revision incorporating the 6×4 specimen, either for capsulated materials only, or for both hand-mixed and capsulated materials.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies requirements for hand-mixed dental glass ionomer cements produced by the reaction between a powder of acid-soluble, aluminosilicate glass and an aqueous solution of a poly (alkenoic acid).

Glass ionomer cements prepared by the addition of water to a mixture of dry acid and aluminosilicate glass are also covered by this standard.

The glass ionomer cements specified in this British Standard may be used as luting agents, restorative materials, or to fill or seal pits and fissures.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 Classification

The cements specified in this British Standard shall be classified according to their intended use as follows:

Type 1: luting agent;

Type 2: restorative material.

Materials used to fill or seal pits and fissures may be of either type 1 or type 2.

4 Requirements

4.1 Components

4.1.1 Liquid. The liquid shall be clear and free from visible deposits or filaments on the inside of its container. There shall be no visible signs of gelling.

4.1.2 Powder. The powder shall be free from extraneous material. If the powder is coloured, the pigment shall be uniformly dispersed throughout the powder.

4.2 Unset cement. The cement, prepared and mixed in accordance with **6.1.3**, shall be of uniform smooth texture and shall not evolve gases.

4.3 Colour of set cement (applicable only to those cements with which a shade guide is supplied). After immersion in water for 5 days, the colour of the set cement, viewed when under water and in natural daylight shall, within the limits of professional acceptance, match the manufacturer's shade guide.

4.4 Physical and chemical properties. The consistency, film thickness, setting time, working time, compressive strength, diametral tensile strength, water-leachable content, opacity, acid-soluble arsenic content, and lead content shall be as specified in Table 1, when tested in accordance with the appropriate test methods described in clause 6.

4.5 Toxicity. The cement shall comply with the appropriate requirements of BS 5828.

4.6 Manufacturer's instructions. Instructions for the preparation, mixing and manipulation shall accompany each container of liquid and shall include the following items:

- the recommended temperature range for preparation; the condition and type of both the slab and spatula;
- the optimum powder/liquid ratios over the recommended temperature range [see also h)];
- the rate of incorporation of the powder and the method of mixing;
- the mixing time;
- the manipulation time after completion of mixing;
- a statement recommending that, when clinical conditions warrant, a liner should be placed between the cement and dentine;
- a recommendation that the liquid should be kept in a moisture-tight container to avoid contamination or loss of moisture;
- the precise powder/liquid ratio on 3 mass/mass basis, to an accuracy of 0.1 g/g, at a temperature of 23 ± 1 °C and a relative humidity of 50 ± 5 %. This will be the powder/liquid ratio used for testing purposes.

Table 1 — Physical and chemical properties

Type	Consistency		Film thickness	Setting time	Working time	Compressive strength	Diametral tensile strength	Water-leachable content	Opacity		Acid-soluble arsenic content	Lead content
	mm		µm	minutes	minutes	MPa	MPa	% by mass	$C_{0.70}$ value		mg/kg (p.p.m.)	mg/kg (p.p.m.)
	min.	max.	max.	max.	min.	min.	min.	max.	min.	max.	max.	max.
1	28	32	25	7.5	3.0	65	6	1.0	—	—	2.0	40
2	28	32	—	5	2.75	125	10	0.7	0.35	0.90	2.0	40