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Specification for
**Hot applied
joint sealants for
concrete pavements**

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The following BSI references relate to the work on this standard:
Committee reference RDE/10 Draft for comment 70/38243

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Federation of Civil Engineering Contractors	Sand and Gravel Association Limited
Federation of Manufacturers of Construction Equipment and Cranes	Society of Chemical Industry
	Individual experts

The Government Department and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Association of British Roofing Felt Manufacturers
British Rubber Manufacturers' Association
Coal Tar Research Association
Sealant Manufacturers' Conference
Individual experts



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British Standards Institution · 2 Park Street · London W1A 2BS
Telephone 01-629 9000
Telex 266933

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Foreword

This British Standard has been prepared under the authority of the Road Engineering Industry Standards Committee, using metric dimensions as part of the national policy to change to the metric system. Metric values are expressed in terms of SI units: for further information on SI units, reference should be made to BS 3763, 'The International System of units (SI)' and to PD 5686, 'The use of SI units'. This standard was first published in 1954, revised in 1966 and, as a result of subsequent experience, it has been further revised to bring it up-to-date.

Joints are required in concrete roads, etc., to prevent excessive stresses being developed in the slabs as a result of expansion and contraction due to temperature and moisture changes. A joint sealant is poured into the joint to seal it against water and grit and to maintain an even riding surface: it has to, therefore, fill the joint completely, adhere strongly to the concrete, remain in position, and retain its extensibility and other properties under the extremes of climate on the site concerned.

It is difficult for a single material to combine a number of properties which are mutually contradictory; for example, a soft material will usually be more extensible than a hard one, particularly at lower temperatures, but may be less effective in keeping out grit and more liable to flow in warm weather.

No material can, as yet, give the best results on every test, and the more that is demanded the higher the cost is likely to be. The purchaser should, therefore, weigh carefully the relative importance of each property in relation to the particular job, and select a product having an appropriately balanced specification from within the ranges permitted by this standard. Factors to be considered should include compatibility with bituminous surfacing materials, i.e. whether any constituent of the sealant is likely to have any deleterious effects when in contact with them, and the necessity to use primers. In this connection the manufacturer's recommendations should be sought but should a sealant be approved on the basis of tests made using a primer then a similar system should be employed on site.

The aim of the committee has been, as far as possible to relate the tests to practical conditions. For practical reasons, concrete test blocks are specified for the extension test in place of mortar blocks. Because of the many variables and the limited data available on the effects on adhesion of using different aggregates, a single coarse aggregate (quartzite) is specified for the blocks; this does not imply that other aggregates are inferior in practice.

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British Standard Specification for

Hot applied joint sealants for concrete pavements

1. General

1.1 Scope

This standard covers two main types of hot applied joint sealant, ordinary and fuel-resistant. It indicates the properties required of each, and lays down methods of test and permissible limits of performance in each respect. Requirements and responsibilities for sampling and certification are also specified.

Where the manufacturer of the sealant recommends the use of a particular primer system, this is required in the preparation of the test specimens for the extension test. No separate tests of the primer are included in this standard.

NOTE 1. Particular attention is drawn to Appendices G and H. Information to be given with the enquiry or order is listed in Appendix J.

NOTE 2. The titles of British Standards referred to in this standard are listed on the inside back cover.

1.2 Definitions

For the purposes of this British Standard, the following definitions apply:

(1) *Joint*. A discontinuity in any of the layers forming a pavement occurring between the adjacent faces of the blocks or units, or incidentally to the processes of construction.

NOTE. Typical joints are illustrated in Fig. 1.

(2) *Joint filler*. A strip of compressible material used to fill a joint space.

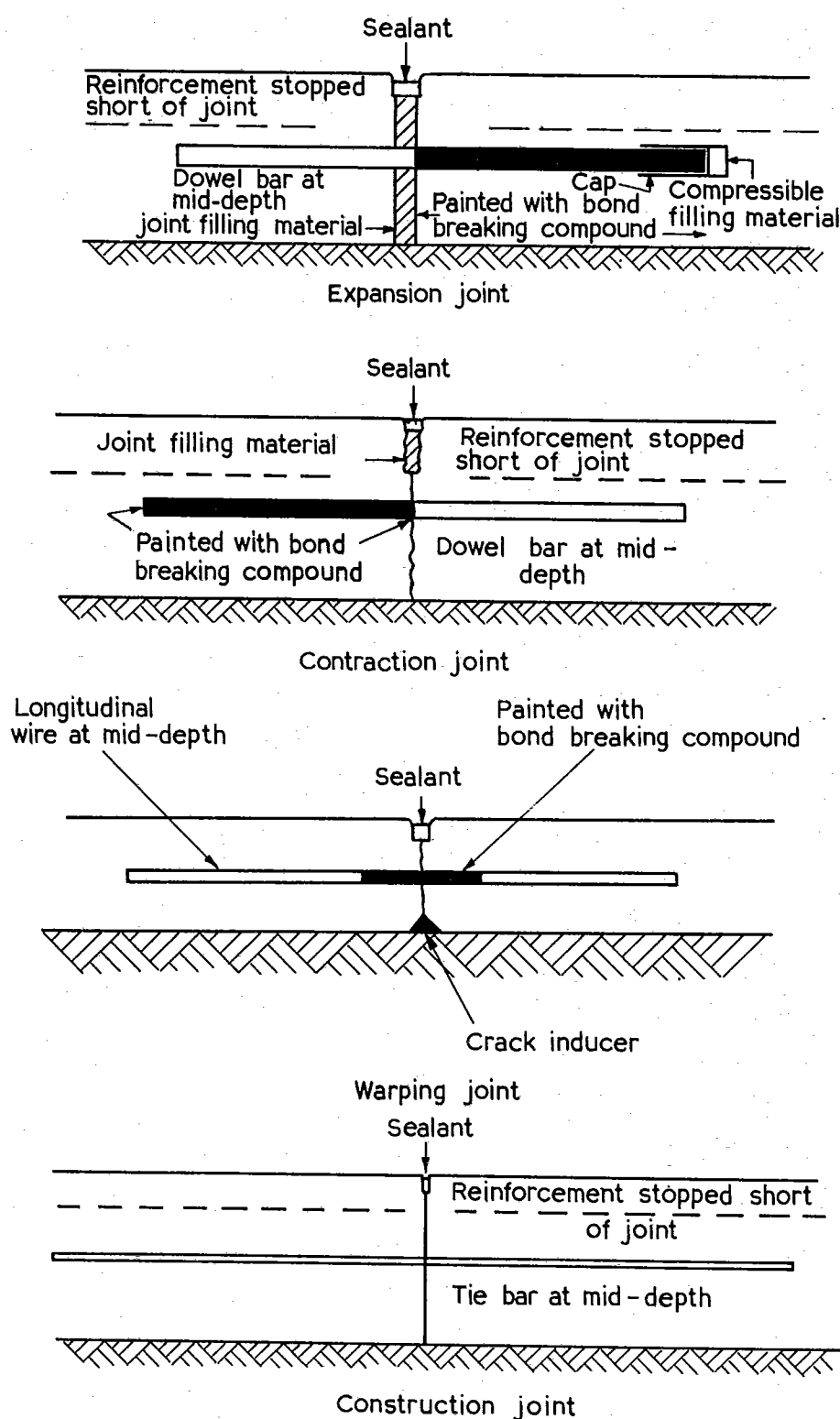
(3) *Joint sealant*. A material used to seal the exposed surfaces of joints for the purpose of preventing the entry of water, grit, etc.

(4) *Primer*. A substance applied to the surface of the joint before the sealant is applied in order to assist its adhesion.

(5) *Increment*. One of several portions of material, as nearly equal in amount as is conveniently possible, which are combined to give a representative sample of the material.

(6) *Sub-sample*. A representative portion of a sample used to prepare a test specimen or specimens.

(7) *Maximum safe heating temperature*. The maximum temperature to which the sealant can be subjected for the stated length of time and still comply with the requirements of this standard.



NOTE. The inclusion of reinforcement dowel bars and tie-bars depends upon the requirement of the road; the sealing slots may be formed in the plastic concrete or by sawing the hardened concrete.
The sealant is finished below the slab level in all the joints.

Fig. 1. Typical examples of joints in concrete roads

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1.3 Classification

Hot applied joint sealants shall be one of the types satisfying the requirements given in Table 1.

Table 1. Types of hot applied joint sealants and requirements

Material	High extension	Low extension	Appropriate clauses
Ordinary	Type A1	Type A2	2.1 to 2.4
Fuel-resistant	Type B1	Type B2	2.1 to 2.5

1.4 Primer

The manufacturer shall state whether or not a particular primer system is required, and if one is required shall give full directions for its use. These instructions shall be followed as closely as possible when carrying out the extension tests. No other primer shall be used.

1.5 Sampling and testing

Provision shall be made for sampling at three stages:

(1) *At the factory* to determine the quality of the material as manufactured. Sub-samples may be tested by the manufacturer to enable him to provide a certificate of quality both before and after prolonged heating; the remainder of each increment shall be stored separately and made available for testing under Note 2 if required by the purchaser, and for reference in case of dispute concerning the quality or variability of the compound.

(2) *From the packages or containers* to determine the quality of the material as delivered.

(3) *On site* to determine the quality of the material as poured into the joint.

NOTE 1. Whereas samples taken under (1) and (2) are intended to enable the purchaser to check that a satisfactory material has been supplied, those taken on site are intended primarily to verify that it has been properly mixed and heated on site.

NOTE 2. The purchaser may require not more than 1 kg of each increment to be set aside in accordance with A.1.1 (2) for testing in accordance with this British Standard, and if so should state his requirements at the time of enquiry and/or order.

NOTE 3. The purchaser may require samples to be obtained in accordance with A.1.2 for retesting, and if so should state his requirements at the time of enquiry or order. Testing of these samples should always be carried out if the test under A.1.4 is required.

NOTE 4. The purchaser may require samples to be taken in accordance with A.1.3, and if so should notify the vendor so that he or his representatives may be present at the sampling and preparation of test specimens.

Tests under A.1.1 (2) to A.1.3 shall be made on material heated only once after manufacture and shall include any or all of the tests laid down in this standard.

When a particular primer is specified or recommended by the manufacturer of the joint sealant, a single sample of one litre shall be taken at random from the manufacturer's stock or from the bulk supplies on site, as appropriate, and used in the extension test (see Appendix B) in accordance with the manufacturer's printed directions or failing these, the method given in Appendix B. Care shall be taken to avoid contamination of the primer which shall be placed in a clean sealed metal container.

Any batch or part of a batch of material which, when sampled and tested in accordance with the relevant provisions of this standard, does not satisfy the whole of the specified requirements shall be deemed not to comply with this standard.

1.6 Manufacturer's certificate

The manufacturer shall satisfy himself that the material at the time of its delivery complies with this standard, and shall supply with each batch or part of a batch in each consignment a certificate to that effect. A typical certificate is shown in Appendix H and at least the details shown thereon shall always be given.

1.7 Containers

Joint sealant and primer shall be delivered in containers which are sealed and which do not detrimentally affect the contents.

Each container of sealant shall be clearly and indelibly marked with the manufacturer's name; type, grade and batch number of the compound; the date of manufacture; recommended pouring temperature (or range); maximum safe heating temperature and period; and whether or not a primer is required.

Each container of primer shall be clearly and indelibly marked with the manufacturer's name; designation and batch number; date of manufacture; type of sealant with which it is to be used; and directions for use.

2. Test requirements

2.1 Extension

2.1.1 General. The material, tested in accordance with Appendix B at -20°C for Types A1 and B1 and 0°C for Types A2 and B2 shall meet the requirements given in 2.1.2 to 2.1.4.

2.1.2 Maximum force. The extension specified in B.6.2 shall be achieved with a force not exceeding 2700 N.

For Types B1 and B2 compounds the extension specified in F.4 shall be achieved with a force not exceeding 2700 N.

2.1.3 Adhesion. The total area of the faces of the block from which the sealant becomes completely separated during the test shall not exceed 50 mm^2 . The depth of separation shall nowhere exceed 3 mm from the surfaces of the test block.

2.1.4 Cohesion. The total superficial area of any ruptures on the face of the sealant shall not exceed 20 mm^2 and no cavity shall have a depth greater than 3 mm measured normally to the surface of the specimen.

NOTE. It is important to distinguish between cavities which are due to cohesion failure of the material and those due to air bubbles, which may be caused by faulty laboratory techniques. The former are sharp-edged; the latter are round-edged and should be disregarded in computing the extent of cohesion failure.

2.2 Flow

The flow, tested in accordance with Appendix C, shall not exceed 15 % for Types A2 and B2 nor 5 % for Types A1 and B1.

2.3 Penetration

The penetration, tested in accordance with Appendix D, shall be reported in millimetres and shall be not more than 10 mm.

2.4 Degradation

The material, tested for degradation after prolonged heating in accordance with Appendix E, shall still comply with the requirements of 2.1 to 2.3.