BRITISH STANDARD

BS 2499 :
Part 1 : 1993

Hot-applied joint sealant systems for concrete pavements

Part 1. Specification for joint sealants

UDC 625 84.083 691 58

BSI
STANDARDS

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee B/510, Road Materials, to subcommittee B/510/3, Materials for concrete roads, upon which the following bodies were represented:

BAA plc
British Adhesives' and Sealants' Association
British Aggregate Construction Materials' Industries
British Cement Association
Concrete Society
County Surveyors' Society
Department of the Environment (Property Services Agency)
Department of Transport
Federation of Civil Engineering Contractors
Hot Extruded Sealant Association
Institution of Civil Engineers
Institution of Highways and Transportation
Coopted members

This British Standard, having been prepared under the direction of Technical Committee B/510, was published under the authority of the Standards Board and comes into effect on 15 August 1993

First published in BS 2499 May 1954
Second edition November 1966
Third edition December 1973
Fourth edition as BS 2499 Part 1 August 1993

The following BSI references relate to the work on this standard:
Committee reference B 510 3
Draft for comment 92/18214 DC

ISBN 0 580 22075 3

Amendments issued since publication

Amd. No.	Date	
8666	26.7.95	C Donaghy

Contents

Foreword

This Part of BS 2499 has been prepared under the direction of Technical Committee B/510, Road Materials. Together with BS 2499 : Part 2 : 1992 and BS 2499 : Part 3 : 1993, it supersedes BS 2499 : 1973, which is withdrawn.

Methods of test are described in BS 2499 : Part 3 : 1993, and BS 2499 : Part 2 : 1992 is a code of practice for the application and use of joint sealants.

Information which should be given with an enquiry or order is shown in annex A. A typical form of manufacturer's certificate is shown in annex B.

Requirements for cold-applied joint sealants are specified in BS 5212.

It has been assumed in the drafting of this British Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

Product certification. Users of this British Standard are advised to consider the desirability of third party certification of product conformity with this British Standard based on testing and continuing surveillance which may be coupled with assessment of a supplier's quality systems against the appropriate Part of BS 5750.

Enquiries as to the availability of third party certification schemes will be forwarded by BSI to the Association of Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching an appropriate body from the list of Association members.

Compliance with a British Standard does not itself confer immunity from legal obligations.

Specification

1 Scope

This Part of BS 2499 specifies the requirements for hot-applied normal and fuel-resistant joint sealants for use in roads, airfields and other concrete pavements. The specification also applies to hot-applied normal joint sealants in bituminous surfacing and between bituminous surfacing and concrete pavements.

2 References

2.1 Normative references

This Part of BS 2499 incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on the inside back cover. Subsequent amendments to, or revisions of, any of these publications apply to this Part of BS 2499 only when incorporated in it by updating or revision.

2.2 Informative references

This Part of BS 2499 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this Part of BS 2499, the following definitions apply.

3.1 joint

A vertical discontinuity between the adjacent faces of slabs in the concrete layer of a pavement or between an adjacent bituminous layer and a pavement, formed for the purpose of providing some movement capability.

3.2 joint filler

A strip of compressible heat-resistant material used to fill a joint space.

3.3 joint sealant

A material that, when applied in a uniform state to a joint, seals it by adhering to appropriate surfaces within the joint to prevent the ingress of water and deleterious substances.

3.4 primer

A substance applied to the faces of the joint before the sealant is applied, in order to assist its adhesion.

3.5 increment

One of several portions of material, as equal in amount as is conveniently possible, which are combined to give a representative sample of the material.

3.6 subsample

A representative portion of a sample used to prepare a test specimen or specimens.

3.7 hot-applied sealant

A thermoplastic solid or thermosetting liquid material which is heated prior to placement in the joint to provide a suitably pourable consistency at the recommended application temperatures.

NOTE 1. Both material types form solids on cooling in the joint.

NOTE 2. Within the constraints of the manufacturers' instructions, it may be possible to reheat a thermoplastic solid from cold without detriment. The thermosetting materials tend to lose their elastomeric properties when reheated and such a procedure is not normally recommended.

3.8 maximum safe heating temperature

The maximum temperature to which the sealant can be subjected for the stated length of time.

3.9 maximum safe heating period

The maximum safe heating period as recommended by the manufacturer or 6 h, whichever is the lesser.

4 Sampling

4.1 Stage of sampling

Provision shall be made for sampling at three stages:

a) at the factory to determine the quality of the material as manufactured; subsamples may be tested by the manufacturer, to enable him to provide a certificate of quality if required by the purchaser (see annex A) both before and after prolonged heating, and the remainder of each increment shall be stored separately and shall be made available if required for further testing by the purchaser (see annex A) and for reference in the case of dispute concerning the quality or variability of the compound;

b) from the packages or containers to determine the quality of the material as delivered;

c) on site to determine the quality of the material as poured into the joint.

4.2 Quantity

Quantities for sampling and testing shall be as follows.

a) A minimum of 6 kg of sample shall be taken from the production batch or mix and shall be tested in accordance with BS 2499 : Part 3 : 1993.

b) A minimum of three increments of 2 kg each shall be taken at random from the packages or containers as delivered and shall be tested in accordance with BS 2499 : Part 3 : 1993.

c) A minimum of 6 kg of sample shall be taken from the melter/pourer after the material has reached the recommended application temperature and shall be tested in accordance with BS 2499 : Part 3 : 1993.

4.3 Primer

Where a particular primer is specified or recommended by the manufacturer of the joint sealant (see note to **5.2**), a single sample of 1 l in an unopened container shall be taken as appropriate from the manufacturer's stock, or from materials supplied to site, and shall be used in the relevant test procedures in accordance with BS 2499 : Part 3 : 1993.

5 Classification

5.1 Joint sealant

Hot-applied joint sealants shall be one of the types given in table 1.

NOTE. See annex A

Table 1. Types of hot-applied joint sealant

Material	Type
High extension normal	N1
Low extension normal	N2
High extension fuel-resistant	F1
Low extension fuel-resistant	F2

NOTE. See BS 2499 : Part 2 for guidance on type selection.

5.2 Primer

Where a primer system is recommended by the manufacturer of the joint sealant, the manufacturer's directions for its use shall be followed. Where a primer is part of the system recommended by the manufacturer, then specimens prepared for the appropriate performance tests shall include a primer.

NOTE. The manufacturer should always state whether or not a primer system is required

6 Performance

6.1 Shelf life

When stored in the original unopened containers and within the temperature range and expiry date recommended by the manufacturer, the sealant and primer (if required) shall be capable of being heated and applied to the joint and shall conform to this standard when tested in accordance with BS 2499 : Part 3 : 1993.

6.2 Safe heating period

When heated to the manufacturer's recommended safe heating temperature for a period of 6 h ± 15 min, the sealant shall conform to all the requirements of this standard when tested in accordance with BS 2499 : Part 3 : 1993.

6.3 Flow resistance

When tested in accordance with clause **6** of BS 2499 : Part 3 : 1993 the flow down an aluminium plate inclined at 75 ° shall not exceed the values in table 2.

1

Table 2. Flow resistance

Type of sealant	Limit of flow mm	Test temperature °C
N1	2	60
N2	10	60
F1	2	60
F2	10	60

1

6.4 Penetration

The penetration of the sealant, when tested in accordance with clause **8** of BS 2499 : Part 3 : 1993, shall conform to the values given in table 3.

6.5 Resistance to fuel immersion of types F1 and F2 sealant (solubility)

The resistance to fuel immersion (solubility) of types F1 and F2 sealant, as shown by the gain or loss in weight, when tested in accordance with clause **11** of BS 2499 : Part 3 : 1993, shall not exceed the values given in table 4. After fuel immersion, when tested in accordance with clause **15** of BS 2499 : Part 3 : 1992, and subjected

Table 3. Penetration values of hot-applied joint sealants

Material	Type of sealant	Initial penetration mm	Heat-degraded penetration mm	Fuel-immersed penetration mm
High extension normal	N1	7 to 13	7 to 13	N/A
Low extension normal	N2	4 to 10	4 to 10	N/A
High extension fuel-resistant	F1	7 to 13	7 to 13	7 to 13
Low extension fuel-resistant	F2	4 to 10	4 to 10	4 to 10

Table 4. Solubility of fuel-resistant hot-applied joint sealants

Material	Type of sealant	Change in weight	Test temperature
High extension fuel-resistant	F1	(± 2) %	50 °C
Low extension fuel-resistant	F2	(± 2) %	35 °C

to the cycles of extension and compression at the appropriate test temperature, the sealant shall meet the requirements of **6.7.2** and **6.7.3** of this standard.

6.6 Resilience

When tested in accordance with clause **12** of BS 2499 : Part 3 : 1992 the joint sealant material shall have a minimum recovery of 60 % for types N1 and F1 and 40 % for types N2 and F2.

6.7 Bond testing

6.7.1 *General*

When tested in accordance with clause **13** of BS 2499 : Part 3 : 1993, being subjected to three cycles of extension and compression at the appropriate test temperature, the sealant shall meet the requirements of **6.7.2** and **6.7.3**. If one of the three specimens tested fails, a further three specimens shall be tested, all of which shall pass.

6.7.2 *Forces on specimens*

6.7.2.1 The highest of the three maximum tensile The highest of the three maximum tensile forces on any sample on any of the three cycles shall not exceed 1200 N. The highest and lowest of the three maxmimum tensile forces recorded for the three samples on the first cycle of extension shall not differ from the average of the three maximum tensile forces by more than 80 N or 20 % of the average whichever is the lower.

6.7.2.2
The average force in extension after heat degradation shall not differ by more than 400 N from that measured in **6.7.2.1**.

6.7.2.3
The lowest maximum tensile force in extension of any sample on any of the three cycles shall be not less than 160 N.

6.7.3 *Adhesion and cohesion*

6.7.3.1 *Adhesion*

The total area of the faces of the block from which the sealant becomes totally 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.

6.7.3.2 *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 normal to the face of the specimen.

7 Bitumen compatibility

When tested in accordance with clauses **16** and **17** of BS 2499 : Part 3 : 1992, the type N sealant shall not show failure in adhesion nor formation of an oily exudate at the interface between the sealant and the bitumen or sealant when tested at 60 °C.

NOTE. This performance requirement does not apply to type F hot-applied sealants.

8 Containers

Hot-applied joint sealants and primers shall be supplied in sealed packages which allow the sealant to be stored without detriment for the full shelf life under the manufacturer's recommended conditions.

9 Marking

Each container of sealant or primer shall be clearly and indelibly marked, giving as a minimum requirement the following information:

Joint sealants

a) manufacturer's name and address;

b) type, grade and batch number of the compound;

c) expiry date or the date of manufacture;

d) maximum safe heating temperature;

e) maximum safe heating period;

f) type of primer to be used, if any;

g) the number and date of this British Standard, i.e. BS 2499 : Part 1 : 1993;

h) directions for storage and disposal.

Primer systems

i) manufacturer's name and address;

j) designation and batch number and date of manufacture;

k) expiry date;

l) type of sealant with which it is to be used;

m) directions for use;

n) directions for storage and disposal.

NOTE. Attention is drawn to the provisions of the Health and Safety at Work etc. Act 1974 [1] and related legislation.

10 Manufacturer's certificate

A certificate containing at least the information shown in annex B shall be supplied if requested by the purchaser (see annex A).

[1]Marking BS 2499 Part 1 . 1993 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Annexes

Annex A (informative)

Information to be given with enquiry or order

The purchaser should give the following information at the time of enquiry:

a) type of hot poured joint sealant required (see clause 5);

b) whether a factory sample is required (see clause 4);

c) whether a sample from containers is required (see clause 4);

d) whether samples from a melter/pourer are required (see clause 4);

e) whether a manufacturer's certificate is required (see clause 10).

Annex B (informative)

Typical manufacturer's certificate

A typical manufacturer's certificate should contain the following information:

a) name and address of manufacturer;

b) hot-applied sealant BS 2499 type N1-N2-F1-F2 as appropriate;

c) manufacturer's grade;

d) date of manufacture and batch number;

e) date of last full test on a production sample;

f) maximum safe heating temperature;

g) recommended pouring temperature;

h) primer requirement if any.

In addition, the manufacturer should supply the client with an independent statement of compliance not more than 12 months old or a certificate of conformity from a quality assurance system approved to BS 5750 : Part 2.

List of references (see clause 2)

Normative references

BSI standards publications

BRITISH STANDARDS INSTITUTION, London

BS 2499 :	*Hot-applied joint sealant systems for concrete pavements*
BS 2499 : Part 3 : 1993	*Methods of test*

Informative references

BSI standards publications

BRITISH STANDARDS INSTITUTION, London

BS 2499 :	*Hot-applied joint sealant systems for concrete pavements*
BS 2499 : Part 2 : 1992	[1]*Code of practice for the application and use of joint sealants*
BS 5212 :	[1]*Cold applied joint sealant systems for concrete pavements*
BS 5212 : Part 1 : 1990	*Specification for joint sealants*
BS 5212 : Part 2 : 1990	*Code of practice for the application and use of joint sealants*
BS 5212 : Part 3 : 1990	*Methods of test*
BS 5750	*Quality systems*
BS 5750 : Part 2 : 1987	*Specification for production and installation*

Other references

[1] GREAT BRITAIN. Health and Safety at Work etc. Act 1974. London : HMSO.

[1]Mentioned in the foreword only.

BS 2499 :
Part 1 : 1993

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9308—3—0.8k—B

ISBN 0 580 22075 3

B/510/3

AMD 8666

Amendment No. 1
published and effective from 15 July 1995
to BS 2499 : Part 1 : 1993

Hot applied joint sealant systems for concrete pavements
Part 1. Specification for joint sealants

Revised text

Clause 6.3 Flow resistance

Delete the existing text and substitute the following.

When tested in accordance with clause **6** of BS 2499 : Part 3 : 1993 the flow down an aluminium plate inclined at 75 ° shall not exceed the values in table 2.

Delete the existing table 2 and substitute the following.

Table 2. Flow resistance

Type of sealant	Limit of flow mm	Test temperature °C
N1	2	60
N2	10	60
F1	2	60
F2	10	60

AMD 8666/July 1995

Clause 6.7.1 General

In line 2 delete '1992' and substitute '1993' and delete 'the' and substitute 'three'.

AMD 8666/July 1995

Clause 6.7.2.1

Delete the existing text and substitute the following.

The highest of the three maximum tensile forces on any sample on any of the three cycles shall not exceed 1200 N. The highest and lowest of the three maxmimum tensile forces recorded for the three samples on the first cycle of extension shall not differ from the average of the three maximum tensile forces by more than 80 N or 20 % of the average whichever is the lower.

AMD 8666/July 1995

9507—1—0.5k— BIR

Clause 6.7.2.2

Delete the existing text and substitute the following.

The average force in extension after heat degradation shall not differ by more than 400 N from that measured in **6.7.2.1**.

AMD 8666/July 1995

Clause 6.7.2.3

Delete the existing text and substitute the following.

The lowest maximum tensile force in extension of any sample on any of the three cycles shall be not less than 160 N.

AMD 8666/July 1995