BRITISH STANDARD

BS 6925:1988

Incorporating Amendments Nos. 1 and 2

Specification for

Mastic asphalt for building and civil engineering (limestone aggregate)

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Committees responsible for this British Standard

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Association of Consulting Scientists
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Institution of Civil Engineers
Low Temperature Coal Distillers' Association of Great Britain
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Mastic Asphalt Producers' Association
Royal institute of British Architects
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Foreword

This revision of BS 988, BS 1076, BS 1097 and BS 1451 has been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Committee. It supersedes BS 988, BS 1076, BS 1097, BS 1451:1973, which is withdrawn.

This standard has been revised under a new BS number, however the original BS numbers, preceded by a letter, are retained to classify the types of mastic asphalt.

In revising this standard all requirements relating to flux oils have been deleted as they are no longer used. Appendix A gives guidance on the grades and thicknesses of mastic asphalt flooring recommended for a variety of applications. The recommendations relating to the on-site remelting of mastic asphalt, the addition of coarse aggregate to the heavy duty grade of flooring during remelting and the hardness numbers to be obtained on material at the time of laying, are given in Appendix B. Information on the mass per unit area of mastic asphalt is given in Appendix C. The opportunity has been taken to update terminology, to adjust certain specification limits to take account of current practices, and to cross-refer to BS 5284 in respect of sampling and testing procedures for mastic asphalt.

Information regarding the methods of application is given in the relevant British Standard Codes of Practice, viz: CP 102, CP 144-4 and CP 204-2.

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 may 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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, 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.

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1 Scope

This British Standard specifies requirements for roofing, tanking and flooring grades of mastic asphalt for building and civil engineering purposes, composed of ground limestone, coarse aggregate and pigment if required, incorporated with asphaltic cements.

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

2 Definitions

For the purposes of this British Standard the following definitions apply.

2.1
bitumen

a viscous liquid, or a solid, consisting essentially of hydrocarbons and their derivatives, which is soluble in carbon disulphide[1)]; and is substantially non-volatile and softens gradually when heated. It is black or brown in colour and possesses waterproofing and adhesive properties. It is obtained by refinery processes from petroleum, and is also found as a natural deposit or as a component of naturally occurring asphalt in which it is associated with mineral matter

2.2
asphaltite

a naturally occurring substance allied to bitumen, substantially soluble in carbon disulphide[1)] and characterized by a high softening point

2.3
asphalt

a mixture of bitumen with a substantial proportion of inert mineral matter

NOTE This term is normally qualified by the indication of the origin, e.g. natural rock asphalt, Trinidad Lake asphalt; or type, e.g. mastic asphalt, rolled asphalt.

2.4
refined lake asphalt

a naturally occurring mixture of bitumen and finely divided mineral matter, which is found in well-defined surface deposits, and from which unwanted components such as water and vegetable matter have been removed

2.5
lake asphalt-bitumen mixture

a homogeneous mixture of refined lake asphalt and bitumen, with or without the addition of flux oil, used in the manufacture of asphalts and other coated materials

2.6
asphaltic cement

bitumen or a mixture of refined lake asphalt with bitumen and/or asphaltite having adhesive qualities suitable for the manufacture of mastic asphalt

2.7
limestone

a naturally occurring consolidated stratified calcareous rock

NOTE The term is used here in a restricted geological sense.

2.8
pigment

finely ground metallic oxide

2.9
mastic asphalt

a type of asphalt composed of suitably graded mineral matter and asphaltic cement in such proportions as to form a coherent, voidless, impermeable mass, solid or semi-solid under normal temperature conditions, but sufficiently fluid when brought to a suitable temperature to be spread by means of a hand float, or by mechanical means

3 Classification

The types of mastic asphalt are classified as follows:

R988: mastic asphalt for roofing (limestone aggregate);

F1076: mastic asphalt for flooring (limestone aggregate);

T1097: mastic asphalt for tanking and damp-proof courses (limestone aggregate);

F1451: coloured mastic asphalt for flooring (limestone aggregate).

Types F1076 and F1451 mastic asphalt for flooring are graded according to usage as follows:

grade I: special hard flooring;

grade II: light duty flooring;

grade III: medium duty flooring;

grade IV: heavy duty flooring.

NOTE 1 Types F1076 and F1451 do not cover grades of mastic asphalt for special applications such as chemical resistant, oil resistant or spark free flooring, for which purposes proprietary variants are available, nor are they suitable for external applications such as loading bays, balconies and rooftop car parks for which paving grade mastic asphalt is specified in BS 1446 and BS 1447.

NOTE 2 A guide to the selection of the appropriate grade of flooring is given in Appendix A.

[1)] The internationally agreed definition of bitumen relates to its solubility in carbon disulphide but in the UK trichloroethylene is used as the test solvent as it is safer than carbon disulphide and has the same solvent power for all practical purposes.

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4 Asphaltic cement

The asphaltic cement for type R988 shall consist of bitumen or a mixture containing bitumen and either 25 ± 5 % or 50 ± 5 % refined lake asphalt according to the grade specified and its properties shall be as given in Table 1.

The asphaltic cement for type T1097 shall consist of bitumen or a mixture containing bitumen and 25 ± 5 % of refined lake asphalt according to the grade specified and its properties shall be as given in Table 1.

The asphaltic cement for grade I of types F1076 and F1451 shall consist of a mixture containing bitumen and 15 ± 5 % refined lake asphalt; and its properties shall be as given in Table 2.

The asphaltic cement for grades II, III and IV of types F1076 and F1451 shall consist of bitumen or a mixture containing bitumen and 25 ± 5 % refined lake asphalt according to the grade specified; and its properties shall be as given in Table 2.

NOTE The refined lake asphalt content is controlled and determined by the solubility in trichloroethylene and ash content tolerances specified for the asphaltic cement.

Table 1 — Properties of asphaltic cement: type R988 and type T1097

Property	Test method	Identical with	Type of asphaltic cement		
			B (bitumen)	T25 (25 ± 5 % refined lake asphalt)	T50 (R988 only) (50 ± 5 % refined lake asphalt)
Penetration at 25 °C	BS 2000-49	ASTM D5 IP 49	40 ± 10	40 ± 10	40 ± 10
Softening point °C	BS 2000-58	IP 58	60 ± 10	60 ± 10	60 ± 10
Loss on heating for 5 h at 163 °C (% by mass)	BS 2000-45	IP 45	max. 2.0	2.0	2.0
Solubility in trichloroethylene	BS 2000-47	IP 47			
(% by mass) min.			95[a]	86	75
max.			—	91	79
Ash (mineral matter) content (% by mass)	BS 2000-223	IP 223			
min.			—	7.5	16.5
max.			4.0[a]	11.0	20.0

[a] This allows for the presence of any small residual amount of Trinidad lake asphalt in the tank.

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Table 2 — Properties of asphaltic cement: type F1076 and type F1451

Property	Test method	Identical with	F1076 and F1451 grade I	F1076 and F1451 grades II and III		F1076 and F1451 grade IV	
				B (bitumen)	T25 (25 ± 5 % refined lake asphalt)	B (bitumen)	T25 (25 ± 5 % refined lake asphalt)
Penetration at 25 °C	BS 2000-49	ASTM D5 IP 49	—	8 ± 4	8 ± 4	10 ± 5	10 ± 5
Penetration at 35 °C	BS 2000-49	ASTM D5 IP 49	10 ± 5	—	—	—	—
Softening point, (°C)	BS 2000-58	IP 58	max. 105	100	100	100	100
Loss on heating for 5 h at 163 °C (% by mass)	BS 2000-45	IP 45	max. 2.0	2.0	2.0	2.0	2.0
Solubility in trichloroethylene	BS 2000-47	IP 47					
(% by mass) min.			60	95	86	95	86
max.			—	—	91	—	91
Ash (mineral content)	BS 2000:	IP 223					
(% by mass) min.			—	—	7.5	—	7.5
max.			30	4	11	4	11

5 Aggregate

5.1 General

The total aggregate shall consist of fine aggregate complying with **5.2** and coarse aggregate complying with **5.3**.

5.2 Fine aggregate

The fine aggregate shall consist of naturally occurring limestone rock ground to a grading within the limits given in Table 3, when determined by the wet sieving method described in Part 103 of BS 812; and shall have a calcium carbonate content of not less than 80 % by mass, when determined by the method of BS 6463-2.

5.3 Coarse aggregate

The coarse aggregate shall consist of clean igneous or calcareous rock or siliceous material obtained from natural deposits either directly or by screening, crushing or other mechanical process.

If limestone is used as the coarse aggregate for flooring, the aggregate crushing value, when determined as described in BS 812-3, on chippings passing a 14 mm BS 410 test sieve and retained on a 10 mm BS 410 test sieve shall be not greater than 28.

6 Manufacture of the mastic asphalt

The fine aggregate, as specified in **5.2** and pigment if required, shall be thoroughly incorporated at a temperature between 175 °C and 230 °C with the requisite proportion of asphaltic cement.

Table 3 — Grading of limestone fine aggregate

Grading using BS 410 test sieves	% by mass	
	min.	max.
Retained on 2.36 mm mesh	—	3.0
Passing 2.36 mm mesh and retained on 600 µm mesh	5	25
Passing 600 µm mesh and retained on 212 µm mesh	10	30
Passing 212 µm mesh and retained on 75 µm mesh	10	30
Passing 75 µm mesh	45	55

Except for grade IV of type F1076 and grade IV of type F1451 the proportion of coarse aggregate incorporated shall be such that the composition of the mastic asphalt is as given in Table 4 or Table 5 and Table 6 as appropriate. If the material is required for immediate use it shall be transported hot to the point of laying; if it is not required for immediate use it shall be cast into blocks.

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In the case of grade IV of type F1076 and grade IV of type F1451, if the material is required for immediate use the proportion of coarse aggregate incorporated shall be such that the composition of the mastic asphalt is as given in Table 5 and Table 6, and the material transported hot to the point of laying. If the material is not required for immediate use the coarse aggregate shall not be incorporated and the ungritted material shall be cast into blocks.

NOTE 1 The manufacturer should provide guidance on the suitability of the various grades and thicknesses of type F1076 and type F1451 mastic asphalt for flooring applications, as given in Appendix A.

NOTE 2 The manufacturer should provide guidance on the remelting of mastic asphalt and in the case of grade IV of type F1076 and grade IV of type F1451, the addition of coarse aggregate, as given in Appendix B.

Table 4 — Composition by analysis of mastic asphalt: type R988 and type T1097

Property	% by mass of mastic asphalt			
	R988		T1097	
Grading of mineral aggregate using BS 410 test sieves	min.	max.	min.	max.
Retained on 3.35 mm mesh	0	3.0	0	2.0
Passing 3.35 mm mesh retained on 600 µm mesh	12.0	23.0	4.0	17.0
Passing 600 µm mesh and retained on 212 µm mesh	8.0	22.0	8.0	26.0
Passing 212 µm mesh and retained on 75 µm mesh	8.0	22.0	8.0	26.0
Passing 75 µm mesh	35.0	45.0	38.0	50.0
Soluble bitumen	11.0	13.5	12.0	15.0

Table 5 — Grading and coarse aggregate content for type F1076 and type F1451

Grade	Grading of added coarse aggregate		Coarse aggregate content
			% by mass of the total mix Grades I, II and III — aggregate retained on a 600 µm sieve. Grade IV — aggregate retained on a 2.36 mm sieve.
		%	
I and II	Passing 5.0 mm mesh	100	15 – 25
	Retained on 600 µm mesh	85 min.	
III	Passing 5.0 mm mesh	100	25 – 35
	Retained on 600 µm mesh	85 min.	
IV[a]	Passing 100 mm mesh	100	30 – 50
	Passing 6.3 mm mesh	85 min.	
	Retained on 2.36 mm mesh	90 min.	

[a] Grading complies with BS 63-1 for 6 mm nominal size.

Table 6 — Composition by analysis of ungritted mastic asphalt after excluding coarse aggregate type F1076 and type F1451

Property	% by mass of mastic asphalt	
	min.	max.
Grading of aggregate using BS test sieves		
Passing 2.36 mm mesh retained on 600 µm mesh	0	21.0
Passing 600 µm mesh retained on 212 µm mesh	8.0	32.0
Passing 212 µm mesh retained on 75 µm mesh	8.0	25.0
Passing 75 µm mesh	40.0	56.0
Soluble bitumen	12.0	18.0[a]

[a] If the fine aggregate is Irish or Scottish limestone, a maximum soluble bitumen content of 19 % be permitted.

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7 Specific requirements

7.1 Type R988: mastic asphalt for roofing (limestone aggregate) and type T1097: mastic asphalt for tanking (limestone aggregate)

7.1.1 *Asphaltic cement.* The properties of the asphaltic cement shall be as given in Table 1.

7.1.2 *Fine aggregate.* The fine aggregate shall comply with **5.2**.

7.1.3 *Coarse aggregate.* The added coarse aggregate, if any, shall consist of material complying with **5.3** and, when tested as described in BS 812-103, its size shall be within the limits given in Table 7.

7.1.4 *Composition.* When tested as described in BS 5284 the composition of the mastic asphalt shall fall within the limits given in Table 4.

7.1.5 *Hardness number.* The hardness number of the mastic asphalt at the time of manufacture when determined as described in BS 5284 shall be as follows:

type R988: not less than 45 and not more than 90 at 25 °C;

type T1097: not less than 55 and not more than 120 at 25 °C.

NOTE For hardness numbers at the time of laying see **B.2**.

7.2 Type F1076: mastic asphalt for flooring (limestone aggregate) and type F1451: coloured mastic asphalt for flooring (limestone aggregate)

7.2.1 *Asphaltic cement.* The properties of the asphaltic cement shall be as given in Table 2.

7.2.2 *Fine aggregate.* The fine aggregate shall comply with **5.2**.

7.2.3 *Coarse aggregate.* The coarse aggregate shall comply with **5.3**; and when tested as described in BS 812-103 its grading shall comply with the appropriate requirements given in column 2 of Table 5.

In the case of grades I, II and III and in the case of grade IV required for immediate use, the coarse aggregate shall be added at the time of manufacture. In the case of grade IV intended for subsequent remelting, the blocks shall be supplied ungritted and the coarse aggregate shall be added at the time of remelting.

The quantity of coarse aggregate shall on analysis comply with the appropriate limits given in column 3 of Table 5 when expressed as a percentage of the mass of the mastic asphalt.

7.2.4 *Composition.* The composition of the mastic asphalt shall be determined by analysis in accordance with the methods described in BS 5284.

With the exception of grade IV ungritted material in block form, the mass of coarse aggregate in the mastic asphalt shall comply with the limits given in column 3 of Table 5. The composition of the remaining material shall then be calculated as a percentage by mass of the mastic asphalt remaining after excluding the coarse aggregate. This composition shall comply with Table 6.

The composition of grade IV ungritted material in block form, after the exclusion of any aggregate retained on a 2.36 mm BS test sieve, shall comply with Table 6.

7.2.5 *Hardness number.* The hardness number of the mastic asphalt at the time of manufacture, when tested as described in BS 5284 shall be as follows:

grade I: not more than 15 at 45 °C;

grades II and III: not more than 12 at 35 °C;

grade IV: not more than 40 at 35 °C before the addition of the specified coarse aggregate.

NOTE For hardness numbers applicable to grades I, II and III at the time of laying see **B.2**.

Table 7 — Grading of coarse aggregate for type R988 and type T1097

Grading using BS 410 test sieves	% by mass of coarse aggregate	
	min.	max.
Passing 5.0 mm mesh	100	—
Passing 5.0 mm mesh and retained on 3.35 mm mesh	0	15
Passing 3.35 mm mesh and retained on 600 μm mesh	70	100
Passing 600 μm mesh	0	15
If coarse aggregate is incorporated, the quantity added shall be such that the mass of the combined coarse and fine aggregate retained on a 600 μm test sieve, expressed as a percentage by mass of mastic asphalt on analysis, shall comply with the limits given in Table 4.		

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8 Sampling

When samples, whether of the asphaltic cement, the aggregate or the mastic asphalt, are required for testing, the procedure adopted shall be in accordance with BS 5284. The samples shall be taken by the manufacturer or the supplier, as appropriate. The samples so taken shall be identified by the supplier and one half retained by the purchaser for the purpose of making such tests as he may require. Material supplied hot charge to site shall be sampled as described in **4.2** of BS 5284:1976.

Samples for the determination of hardness number which is to be reported as that at the time of laying shall be taken within 24 h of laying and tested within 5 days.

9 Marking

Mastic asphalt manufactured in compliance with this British Standard shall be legibly marked with the following:

a) the registered name or trade mark of the manufacturer;

b) the number and date of this British Standard, i.e. BS 6925:1988[2)];

c) the type number, i.e. R988, F1076, T1097 or F1451;

d) in the case of flooring material, the grade.

Marking shall be by a suitable labelling system or by the application of a suitable paint or by branding. Marking systems shall not impair the efficiency of the mastic asphalt when laid.

Material delivered as hot charge to site shall be accompanied by a certificate giving the information stated above.

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[2)] Marking BS 6925:1988 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 therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

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Appendix A Guide to the selection of grades and thicknesses of mastic asphalt for flooring

Grade	I	II	III	IV
Recommended thickness (and see CP 204-2)	**15 mm to 20 mm**	**15 mm to 20 mm**	**20 mm to 30 mm**	**30 mm to 50 mm**
Underlays for other floor coverings	X	X		
Hospital wards	X			
Hospital corridors (according to traffic)		X	X	
Schools	X			
Shops (floors to take movable racks)	X			
Shops (floors to take fixed racks)		X		
Offices	X			
Factory floors: light		X		
Factory floors: medium			X	
Factory floors: heavy				X
Loading sheds				X
Breweries				X
Railway platforms (covered: see note 1 to clause **3**)				X
Domestic floors (either as a finished floor or as an underlay)	X	X		
Floors or passageways subject to heavy foot traffic			X	

NOTE 1 This table is by no means comprehensive and is intended to give only an approximate guide to the selection of the appropriate grade for specific purposes.

NOTE 2 For special requirements such as suspended floors where wet processes are used, two coats are normally necessary, the bottom coat should be a waterproofing grade of type R988 or T1097 and the wearing coat should be in accordance with this table.

NOTE 3 Mastic asphalt as an underlay to receive other floorings such as rubber, linoleum, thermoplastic tiles and wood blocks should be not less than 15 mm thick in one coat.

NOTE 4 As varying conditions of humidity frequently affect cork, close collaboration between the cork supplier and the mastic asphalt contractor should be established when cork is used as a floor covering.

NOTE 5 Grade I flooring should not be laid at temperatures below 10 °C nor be subjected to ambient temperatures below 5 °C. If these conditions cannot be met, consideration should be given to using grade II.

NOTE 6 In the case of grade IV material the percentage of coarse aggregate to be added may be varied within the limits given in Table 5, in proportion to the thickness to be laid.

Appendix B Remelting and hardness numbers at time of laying

B.1 Remelting on site

The mastic asphalt blocks should be broken into pieces of convenient size and then carefully remelted, preferably in mechanical mixers. At no time during remelting should the temperature of the molten asphalt exceed 230 °C.

At this stage, in the case of grade IV of type F1076 or F1451, the requisite proportion of coarse aggregate[3)], see Table 5, should be fed in successive portions until the complete charge is thoroughly incorporated. The coarse aggregate should as far as is practicable be added in a dry state.

Whether the material is transported to the site in a molten condition or remelted on site, the total duration of heating and the type of plant used should be such that the properties of the mastic asphalt will not be impaired such that its hardness number is no longer in accordance with **B.2**.

[3)] The coarse aggregate content is expressed as a percentage by mass of the as-laid material, e.g. to achieve a 40 % coarse aggregate content, 667 kg of coarse aggregate is required to be added to each 1 tonne of ungritted material.

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B.2 Hardness numbers at time of laying

The hardness numbers of the mastic asphalt after remelting and at the time of laying, when tested as described in BS 5284, should be as follows:

R988: not less than 30 at 25 °C;

T1097: not less than 40 at 25 °C;

F1076 grade I: not less than 2 nor more than 12 at 45 °C;

F1076 grades II and III: not less than 2 nor more than 12 at 35 °C;

F1076 grade IV: to be agreed, dependent on the percentage and size of coarse aggregate added.

Appendix C Mass per unit area of mastic asphalt

The mass per unit area of mastic asphalt varies due to a number of factors such as the differing proportions of constituents utilized in its manufacture and the relative density and quantity of coarse aggregate incorporated. For practical and load calculation purposes, however, its mass per unit area can be taken to be 2.4 kg/m^2 per millimetre of thickness.

The mass per unit area for a range of thicknesses is given in Table 8.

Table 8 — Mass per unit area for a range of thicknesses

Asphalt thickness	Mass per unit area
mm	kg/m^2
10	24
13	31
20	48
25	60

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Publications referred to

BS 63, *Specification for single sized roadstone and chippings.*

BS 63-2, *Metric units.*

BS 410, *Specification for test sieves.*

BS 812, *Testing aggregates.*

BS 812-3, *Methods for determination of mechanical properties.*

BS 812-103, *Methods for determination of particle size distribution.*

BS 1446, *Specification for mastic asphalt (natural rock asphalt fine aggregate) for roads and footways.*

BS 1447, *Specification for mastic asphalt (limestone fine aggregate) for roads, footways and pavings in buildings.*

BS 2000, *Methods of test for petroleum and its products.*

BS 2000-45, *Loss on heating of bitumen and flux oil.*

BS 2000-47, *Solubility of bituminous binders.*

BS 2000-49, *Penetration of bituminous materials.*

BS 2000-58, *Softening point of bitumen (ring and ball).*

BS 2000-223, *Ash from petroleum products containing mineral matter.*

BS 5284, *Methods. Sampling and testing mastic asphalt and pitchmastic used in building.*

BS 5750, *Quality systems*[4)].

BS 6463, *Quicklime, hydrated lime and natural calcium carbonate.*

BS 6463-2, *Methods of chemical analysis.*

CP 102, *Code of practice for protection of buildings against water from the ground*[4)].

CP 144, *Roof coverings*[4)].

CP 144-4, *Mastic asphalt. Metric units.*

CP 204, *In-situ floor finishes.*

CP 204-2, *Metric units.*

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[4)] Referred to in the foreword only.

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