

asphalt

applications

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Construction and surfacing
of parking areas including
private drives



Asphalt
Information
Service

Introduction



Nearly all roads in this country are surfaced with asphalt*. Asphalt offers good strength, durability and weather-resistance, ease of maintenance and repair, and neat, low-glare appearance providing good contrast to road-marking paint. This makes Asphalts equally suitable as surfacings for private drives, hardstandings, car parks and parking areas for heavier vehicles.

There is a wide variety of asphalt specifications to meet the broad range of their use: airfields, motorways, general purpose roads, estate roads, parking areas, footpaths and other paving. This information sheet, used in conjunction with the relevant European Standards and supporting UK guidance, is aimed at helping specifiers to choose appropriate specifications for car parking areas and private drives.

If a parking area is used by heavier vehicles than it was designed for, damage to the construction is very likely to occur. It is therefore essential to ensure that the design is adequate for the potential use. For heavy vehicles a more substantial construction is required than is suggested here: a companion information sheet is available in this series dealing with the construction and surfacing of parking areas for medium and heavyweight vehicles¹.

Note 1 With effect from 1st October 2008 there has been a change to the permitted development rights applicable to householders wishing to pave their front garden and/or resurface existing hardstandings. The changes apply where more than 5 square metres in area is to be paved and are intended to reduce the contribution from rainfall to flooding and watercourse pollution from hardstandings. When this hardstanding is constructed using impermeable materials leading to potentially excessive rain water run off onto roads, planning permission is now required. However if this area is designed to be rendered permeable, planning permission will not be required.

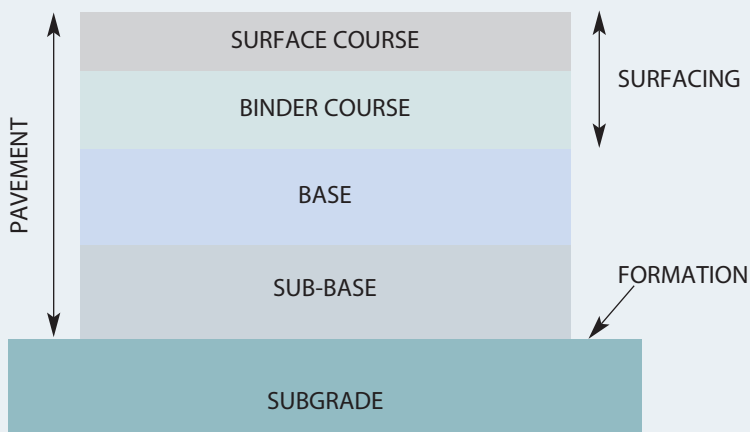
Note 2 Where the parking area also serves as the roof of a building or is a suspended deck or ramp conventional asphalt on its own is not sufficiently impermeable. Special waterproofing techniques will be required under the asphalt and it is recommended that specialist advice is sought from suppliers of waterproofing systems or the Mastic Asphalt Council².

General

The following guidelines relate to new construction. Guidance on resurfacing an existing paved area is given in another Information Sheet in this series³. In all cases reference should be made to the current editions of the appropriate British Standard National Guidance Document PD 6691⁴ and European Standards.

The terminology used in this guide for the structural elements of the pavement, as illustrated here, is that adopted for use in the European Standards for asphalt mixtures^{5,6,7}. Surface course was previously known as wearing course, binder course was known as basecourse and base was known as roadbase.

Where reference is being made to European Standards it is considered essential that initial reference should be made to the UK National Guidance Document⁴.



* The term 'asphalt' is used in this publication and unless accompanied by a descriptor for example "Asphalt Concrete" (AC), 'Hot Rolled Asphalt' (HRA) or 'Stone Mastic Asphalt' (SMA), is applied in its generic sense to refer to the range of mixtures used in the UK.

Drainage

The importance of the provision of adequate pavement and subsoil drainage cannot be overemphasised.

When the water table is high the provision of subsoil drainage should be considered. In general for surface water drainage purposes it is recommended that the paved area should have a minimum general fall of 1.7% (approximately 1 in 60) while external channels leading to gulleys should have a gradient of not less than 0.8% (approximately 1 in 120) for hand-laid work, or 0.7% (approximately 1 in 150) for machine-laid work. Any channels within the paved area should have a gradient not flatter than 1% (1 in 100).

Subgrade

The subgrade should be shaped to the falls required for the finished surfacing to ensure that the overall construction is of uniform thickness. Before final shaping, any weak areas of soft clay, peat or soil should be excavated and replaced with more suitable fill or sub-base material. If the subgrade is to be exposed for some time and particularly if it is clay, the question of protecting it against ingress of water should be considered. Failure to provide this protection can lead to a seriously weakened subgrade if wet weather is experienced during the work.

Sub-base

The sub-base has two functions, one to provide a working platform for construction traffic and the other to increase the intrinsic strength of the construction. For parking areas which will carry only light vehicles there will be many situations in which a sub-base may not be needed. On clayey soils which become sticky and soft when they are wet it is usual to provide a sub-base of a minimum thickness of 75mm. A greater thickness will be needed with subgrades susceptible to frost damage, where ground conditions are poor or where the parking area is to be used by heavier vehicles than private cars. In cases of doubt it is always worthwhile drawing on the knowledge of road engineers or contractors with experience of local conditions.

Suitable materials are Types 1 and 2 unbound mixtures⁸ or other locally available materials of known satisfactory quality such as crusher run, hardcore and quarry scalplings. The material should be spread, shaped and well compacted to provide an even surface to the required levels and falls.

Base and surfacing construction

A selection of suitable asphalt materials for the construction of the base, binder course and surface course, together with recommended compacted thicknesses, is given in the following two tables. Table 1 identifies a Standard asphalt construction and Table 2 the construction for a permeable surfacing.

Notes to table 1

1a Where asphalts are hand-spread in areas such as private drives and small car parks where the normal mechanical road paver is unable to operate more workable materials are necessary. If an appropriate binder is not used there is a serious risk of marking, particularly in early life, which will be aggravated by heavy braking, on-the-spot wheel-turning, and heavy point loadings especially in warm/hot weather. Some asphalt suppliers have specialist materials specifically designed to minimise this risk.

1b When AC 10 close surf and AC 6 dense surf asphalt concretes are to be used for heavy usage car parks, penetration grade bitumens are considered essential and consequently machine laying of these mixes will normally be required. In the case of the AC 6 dense surf used in these situations, while PD 6691 indicates 100/150 or 160/220 penetration grades of bitumen as preferred grades, increased resistance to surface scuffing may be afforded by use of the harder 70/100 penetration grade as long as full compaction of the asphalt can be ensured. Alternatively, consideration should be given to alternative, deformation-resistant materials such as SMA or proprietary surfacings.

1c Bitumen-bound surfacings possess adequate resistance to the occasional oil droppings from satisfactorily maintained vehicles but can be softened and damaged by abnormal oil spillage. Where such a risk is present, such as in areas regularly used for car maintenance, special measures may be required. For more detailed advice on this aspect consult a specialist surfacing contractor (see under 'Laying').

1d Hot rolled asphalt surface courses can provide a tough smooth finish. A light application of coated



Notes

chippings is recommended to enhance skid resistance and visual appearance in general accordance with the recommendations in BS 594987⁹.

1e It should be borne in mind that off-road vehicles and the heavier types of car, e.g. people-carriers, may involve higher stresses on the surfacing than normal private cars. The types of materials given in the 'heavier usage' column of the adjacent table would be more appropriate for these.

1f As a general rule either asphalt concrete or Hot Rolled Asphalt binder course should be used under Hot Rolled Asphalt, close graded and dense Asphalt Concrete or Stone Mastic Asphalt surface course.

1g Hardcore should consist of hard, crushed concrete and masonry, crushed rock, crushed highway arisings, slag or other local material known to be satisfactory. It should be spread to as even a profile as possible and compacted by a deadweight roller weighing not less than 6 tonnes or a vibrating roller of similar compactive effort.

Table 1
Standard asphalt construction

Construction Layer	Light usage eg. private drives, small office car parks			Heavier usage eg. public car parks or areas where risks of indentation, tight turning or on-the-spot power assisted manoeuvring, or stray use by heavier vehicles are present		
	Alternative materials	Binder Grade (preferred grade is highlighted)	Nominal thickness mm	Alternative materials	Binder Grade (preferred grade is highlighted)	Nominal thickness mm
SURFACE COURSE (see notes 1a - 1e)	SMA 6 surf PD 6691 Annex D	100/150, 70/100 or 40/60	25	HRA 30/14 surf PD 6691 Annex C (see note 1d)	40/60	40
	AC 6 med surf PD 6691 Annex B	160/220	25	AC 10 close surf PD 6691 Annex B (see note 1b)	100/150	30
	AC 6 dense surf PD 6691 Annex B	160/220 or 100/150	25	AC 6 dense surf PD 6691 Annex B (see note 1b)	100/150	25
	AC 10 close surf PD 6691 Annex B	160/220 or 100/150	30	SMA 10 surf PD 6691 Annex D	40/60 or PMB	30
				SMA 6 surf PD 6691 Annex D	40/60 or PMB	30
BINDER COURSE (see note 1f)	AC 20 open bin PD 6691 Annex B	160/220	60	AC 20 dense bin PD 6691 Annex B	100/150 or 40/60	60
	AC 20 dense bin PD 6691 Annex B	100/150 or 40/60	60	HRA 60/20 bin PD 6691 Annex C	40/60	60
BASE	Hardcore (see note 1g)	-	150	Hardcore (see note 1g)	-	200
	AC 32 base PD 6691 Annex B	100/150 or 40/60	75	AC 32 base PD 6691 Annex B	100/150 or 40/60	100

A range of brand-named proprietary asphalt mixes is also available for car-parking uses - details are available from individual asphalt producers or contractors.

Special considerations for permeable pavements

Permeable paving is a relatively new technique and it is recommended that advice is sought from specialists. A number of asphalt suppliers and contractors have proprietary systems, often known as Sustainable Urban Drainage Systems (SUDS) further guidance can be found in the Environment Agency document titled "Guidance on the permeable surfacing of front gardens"¹⁰.

The principle of a permeable pavement is that water drains through the surface into designed voids space in a sub-layer. This water can either be retained as "grey water" for domestic use, or be allowed to soak away gradually.

Cross falls

It may be possible to reduce the gradients from those previously recommended for standard pavements.

Sub-layer

For the sub-layer a suitably open graded mixture or other system is required to act as a reservoir for storm rainfall allowing it then to permeate slowly through the layer to a soakaway or "border rain garden". The sub-layer has to be designed with an adequate capacity for specific storm events.

If using a granular material, care should be taken to ensure that a correctly graded sub-base is used. One recognised permeable material is specified within the Highways Agency Specification for Highway Works and is designated as a Clause 805 Type 3 (open graded) unbound mixture⁸.

Surface course

A porous surface course will always be more susceptible to marking and damage in hot weather than a conventional dense material. If there is particular concern over the risk of surface damage, the use of a proprietary material or system incorporating a polymer modified binder should be considered.

Table 2
Permeable asphalt construction

Construction Layer	Light usage private drives and hardstandings		
	Alternative materials	Binder Grade (preferred grade is highlighted)	Nominal thickness mm
SURFACE COURSE (see notes 2a - 2c)	PA 6 or 10 surf BS EN 13108 - 7 ¹¹	70/100 or PMB	35
BINDER COURSE	AC 20 open bin PD 6691 Annex B	160/220 or 100/150	60
BASE	Permeable sub-layer (see note 2d)	-	Dictated by proprietary system and/or hydraulic requirements

Notes to table 2

2a Porous Asphalts are manufactured using either a penetration grade binder or for more onerous applications a Polymer Modified Bitumen. When hand laid, the resultant mixture requires suitable weather conditions and laying expertise to ensure it is spread and compacted to provide a resilient and durable surfacing.

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2b Where a Porous Asphalt is to be used for larger areas and/or heavier usage car parks, advice on suitable mixtures should be sought from the asphalt supplier

2c It should be borne in mind that off-road vehicles and the heavier types of car, e.g. people-carriers, may impose higher stresses on the surfacing than normal private cars as will on the spot turning using of power steering. therefore the use of more specialist materials is required and advice should be sought from a professional contractor or direct from an asphalt supplier.

2d If a granular unbound mixture is used it should consist of a permeable aggregate mixture with properties similar to a Clause 805 Type 3 (open graded) unbound mixture⁸. It should be spread to as even a profile as possible and compacted by a deadweight roller weighing not less than 6 tonnes or a vibrating roller of similar compactive effort. The roller should have a similar character to that used for the hardcore.

Decorative finishes

Surface course materials are available to give a coloured finish where required. Further details of these processes are given in another Information Sheet in this series¹².

Laying

Satisfactory performance of the construction will be obtained only if all layers are adequately compacted. Compaction should be undertaken with a minimum six-tonne deadweight roller or an equivalent vibrating roller. The asphalt layers must be compacted while the material is at an appropriate temperature. Recommendations for temperatures and for laying and accuracy of finish for asphalt construction materials are given in BS 594987⁹. For Porous Asphalt recommended temperatures for laying and compaction should be obtained from the material supplier.

In view of the skill needed in laying asphalt materials, particularly those required for the permeable surfacing option, it is strongly advised that laying be entrusted to experienced specialist surfacing contractors for example members of Mineral Products Association or their sub-contractors. It is also advised that competitive quotations and specifications for work be obtained and compared. A list of specialist surfacing contractors in any area who are members of the Mineral Products Association is available free on application to the address on this publication. It is strongly recommended that work is not entrusted to itinerant or casual callers offering a speedy 'cheap' job, particularly to private householders, for cash. The risk of dissatisfaction is high with little prospect of redress.



References

Important: When referring to any of the documents listed it is essential to check that it is the latest/current edition of that document. This can be readily confirmed by checking the currency of the document on the appropriate website.

- 1 **Construction and surfacing of parking areas for medium and heavyweight vehicles**, Information Sheet 2, Mineral Products Association, London.
- 2 **Mastic Asphalt Council**, P.O. Box 77, Hastings, Kent, TN35 4WL. www.masticasphaltpcouncil.co.uk.
- 3 **Resurfacing of roads and other paved areas**, Information Sheet 3, Mineral Products Association, London.
- 4 PD 6691 - **Guidance on the use of BS EN 13108 Bituminous Mixtures - Material specifications**. BSI, London.
- 5 British (European) Standard BS EN 13108-1 **Bituminous mixtures - Material specifications - Part 1: Asphalt Concrete**, BSI, London
- 6 British (European) Standard BS EN 13108-4 **Bituminous mixtures - Material specifications - Part 4: Hot Rolled Asphalt**, BSI, London.
- 7 British (European) Standard BS EN 13108-5 **Bituminous mixtures - Material specifications - Part 5: Stone Mastic Asphalt**, BSI, London
- 8 Design Manual for Roads and Bridges, Volume 1 **Specification for Highway Works Clause 803 Type 1 and Clause 804 Type 2 unbound mixtures, and Clause 805 Type 3 (open graded) unbound mixture**, www.standardsforhighways.co.uk/mchw/vol1/index.htm
- 9 British Standard BS 594987 **Asphalt for roads and other paved areas - Specification for transport, laying and compaction and type testing protocols**, BSI, London
- 10 **Guidance on the permeable surfacing of front gardens**. Department for Communities and Local Government and Environment Agency. www.communities.gov.uk/documents/planningandbuilding/pdf/pavingfrontgardens.pdf
- 11 European Standard BS EN 13108-7 **Bituminous mixtures - Material specifications - Part 7: Porous Asphalt**, BSI, London.
- 12 **Decorative and coloured finishes for asphalt surfacings**, Information Sheet 4, Mineral Products Association, London
- 13 **BSI website for the purchase of European and British Standards and Public Documents**. www.bsiglobal.com/upload/Standards%20&%20Publications/shop.html

Information sheets in this series

- 1 The construction and surfacing of car parking areas including private drives and permeable hardstandings
- 2 The construction and surfacing of parking areas for medium and heavyweight vehicles
- 3 Resurfacing of roads and other paved areas using asphalt
- 4 Decorative and coloured finishes for asphalt surfacings
- 5 Choosing a surfacing contractor
- 6 Asphalt surfacings for high stress areas
- 7 Use of asphalt in the construction of games and sports areas
- 8 Farming applications of asphalt
- 9 Miscellaneous uses of asphalt
- 10 Airfield uses of asphalt
- 11 Construction and surfacing of footways and cycleways using asphalt
- 12 European Asphalt Standards and their application in the UK.

Booklet

'What's in a Road?'

A general review of pavement construction and the different materials that are used for the construction and maintenance of asphalt roads.

Enquiries for orders for 'What's in a Road?' should be addressed to the Mineral Products Association, details on next page.

Topics in Asphalt

- Asphalt - Road materials with quality
- Roads are 'green' with asphalt

Publications

Apart from this and the other information sheets and booklet dealing with uses of asphalt and pavement construction, a range of other publications is available from the Mineral Products Association covering aggregate production and processing, lime, ready-mixed concrete, sand and gravel and slag. A full list of these publications may be obtained from the address shown on the next page.

Further advice

General advice on the use of asphalts may be obtained from the Mineral Products Association at the address given on this information sheet. For detailed guidance on any site-specific matter, advice should be sought from local specialist surfacing contractor members of the Mineral Products Association.



The Mineral Products Association is the trade association for the aggregates, asphalt, cement, concrete, lime, mortar and silica sand industries.

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