

asphalt

applications

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Construction and surfacing
of parking areas for medium
and heavyweight vehicles



Asphalt
Information
Service

Introduction



Nearly all roads in this country are surfaced with asphalt*. Asphalt in one or other of its various forms 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 Asphalt equally suitable as surfacings for other situations.

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 specifiers to choose appropriate specifications for parking areas for medium and heavyweight vehicles.

In addition to having a surface that is stable under use, and will resist the scuffing action of manoeuvring heavy vehicles, it is important that the remainder of the construction - base and sub-base - is adequate to distribute the stresses caused by standing and slow-moving loads over a sufficient area of the subgrade. It has been shown that this type of traffic produces greater stresses in the subgrade than similar traffic moving at normal road speeds and the construction should therefore be selected according to the heaviest loads for which the parking area is to be provided.

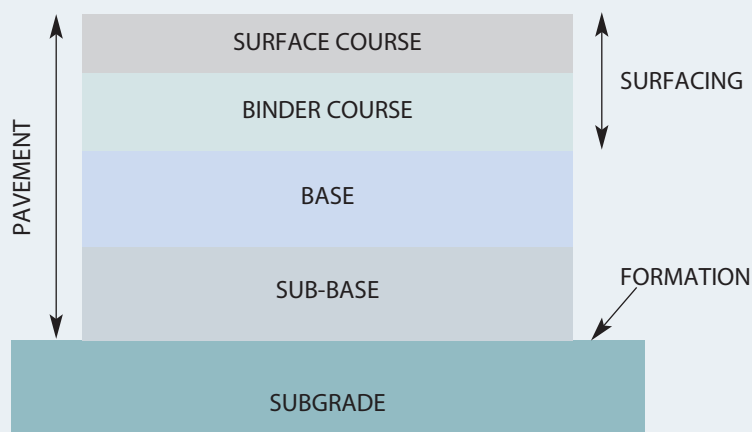
This information sheet deals with parking areas for two main categories of vehicles - medium weight lorries carrying up to about five tonnes payload or similar, and heavy lorries, articulated vehicles and the like. Separate Information Sheets in this series deal with the construction and surfacing of car parking areas and private drives¹ and with areas subjected to high stress usage such as heavy point loadings and fork lift trucks².

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 surface 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.

Overall thickness of construction

The overall thickness of construction should generally be determined by the method of design described in recognised design procedures for asphalt pavements, such as that contained in Volume 7 of the "Design Manual for Roads and Bridges"⁸ published by HMSO. An indication of the overall thickness of construction that is likely to be required, according to the subgrade, is given in Table 1. It might be found that overall construction thicknesses derived from use of recognised road pavement design procedures are less than those indicated in Table 1. However, it should be borne in mind that slow moving and manoeuvring heavy vehicles exert greater stresses on a pavement structure than similar vehicles travelling at speeds normal on highways and allowance should be made for this. The thicknesses indicated in Table 1 have been found by experience to be necessary and take these higher stresses into account. It should also be borne in mind that a minimum depth of 450mm of non-frost-susceptible material is normally recommended to reduce risk of frost-heave in the construction in severe winter conditions.

Sub-base

The thickness of sub-base will be the overall thickness as indicated in Table 1, less the combined thickness of base, binder course and surface course as selected from Table 2.

Suitable materials are Types 1 and 2 unbound mixtures⁹ 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.

Table 1

Approximate guide to overall thickness of construction (mm)

Type of vehicles	Nature of subgrade		
	Clay	Loam (or other cohesive soil)	Gravel (or other non-cohesive soil)
MEDIUM-WEIGHT	600 - 375	375 - 300	300 - 250
HEAVY	650 - 425	425 - 350	350 - 300

Base and surfacing construction

A selection of suitable asphalt materials for the construction of the base, binder course and surface course for the two different vehicle categories, together with recommended thicknesses, is given in Table 2.

Table 2
Standard asphalt construction

Construction Layer	Medium weight lorries carrying up to approx. 5 tonnes payload and similar weight vehicles			Heavy vehicles		
	Alternative materials	Binder Grade (preferred grade is highlighted)	Nominal thickness mm	Alternative materials	Binder Grade (preferred grade is highlighted)	Nominal thickness mm
SURFACE COURSE	HRA 30/14 surf ^A PD 6691 Annex C	40/60	40	HRA 55/10 surf PD 6691 Annex C	40/60 or PMB	40
	SMA 10 surf PD 6691 Annex D	100/150, 70/100 or 40/60	30	SMA 10 surf PD 6691 Annex D	40/60 or PMB	30
BINDER COURSE	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 base ^B PD 6691 Annex C	40/60	60	HRA 60/20 base ^B PD 6691 Annex C	40/60	60
BASE	AC 32 base PD 6691 Annex B	100/150 or 40/60	100	AC 32 base PD 6691 Annex B	100/150 or 40/60	150
	HRA 60/32 base ^B PD 6691 Annex C	40/60	100	HRA 60/32 base ^B PD 6691 Annex C	40/60	125

Notes to table 2

A A textured surface may be obtained by the application of coated chippings in accordance with BS 594987. This will be advisable in most situations to provide adequate skid resistance.

B Hot Rolled Asphalt when used as a base or particularly as a binder course is less resistant to rutting and static deformation under load when compared to Asphalt Concrete. For this reason its use is only recommended when added resistance to cracking and/or increased impermeability is required over concrete constructions, and paving materials which are susceptible to differential movement and the generation of reflective cracking in the layers above.

Notes

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 Council¹⁰.

Generally speaking, Hot Rolled Asphalt and Stone Mastic Asphalt surface courses are likely to be more durable than asphalt concrete, especially under tight turning vehicles, but are likely to be more expensive.

Bitumen-bound surfacings can cope quite satisfactorily with the occasional oil droppings from adequately maintained vehicles, but where abnormal oil contamination of the surfacing is likely use of proprietary oil-resistant binders in traditional asphalt mixes, or special types of proprietary surfacings may need to be considered. Similarly, special surfacing materials may need to be considered where there is a risk of excessive indenting loads. Further details are available from the Mineral Products Association.

The types of surfacing materials recommended for areas to be used by heavy vehicles are equally suitable, if required, on areas for use by lighter vehicles.

Laying

It is essential for the achievement of optimum performance of the construction that all layers are adequately laid and compacted. In the case of the asphalt layers it has been assumed in the above recommendations that a mechanical paver can and will be used to spread the materials. Compaction of all layers should be carried out by a deadweight roller of at least 8 tonnes or a vibratory roller of equivalent compactive performance. Smaller rollers should not be used on underlying layers than are used on subsequent layers.

Full recommendations for the preparation and laying of the various asphalt materials and of the surface finish required are given in British Standard BS 594987¹¹.

In view of the specialised nature of the materials and the skill needed for their satisfactory laying it is strongly advised that laying is entrusted only to specialist surfacing contractors having the appropriate plant and expertise. A list of such contractors operating in any particular area of the UK who are members of the Mineral Products Association is available from the address given on the last page of this document.



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 car parking areas including private drives**, Information Sheet 1, Mineral Products Association, London.
- 2 **Asphalt surfacings for high stress situations**, Information Sheet 6, Mineral Products Association, London.
- 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 7 **Pavement Design**, HMSO, London
www.standardsforhighways.co.uk/dmrb/index.htm
- 9 Design Manual for Roads and Bridges, Volume 1 **Specification for Highway Works Clause 803 Type 1 and Clause 804 Type 2 unbound mixtures**, HMSO, London
www.standardsforhighways.co.uk/mchw/index.htm
- 10 **Mastic Asphalt Council**, P.O. Box 77, Hastings, Kent, TN35 4WL. www.masticasphaltpcouncil.co.uk.
- 11 British Standard BS 594987 **Asphalt for roads and other paved areas - Specification for transport, laying and compaction and type testing protocols**, BSI, London
- 12 **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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