

asphalt

applications

8



Farming applications of asphalt



Asphalt
Information
Service

Introduction

The excellent performance and durability of asphalt* mixes has been proven over decades of use in surfacing most of the world's paved roads. The benefits of adopting these mixtures for a number of farming applications - farm roads, animal-house floors and bases for some storage areas - have become increasingly recognised over the years.

This information sheet outlines the principal areas of use of asphalt materials in farming. It does not set out to provide detailed specifications, as this would require specific knowledge of individual sites, but it does give background information on the various applications and contains a number of useful references and addresses from which further detailed guidance might be obtained.

In the notes that follow the principal areas of use are considered under their separate headings.

Reference within this information sheet is made to Hot Rolled Asphalt and Asphalt Concrete (formerly known as macadam) mixtures for which guidance on their specification will be found in PD 6691¹ which in turn refers to the European Standards BS EN 13108-1² for Asphalt Concrete and BS EN 13108-4³ for Hot Rolled Asphalt.

Farm roads

Many farm roads have been constructed in a piecemeal fashion over a long period of time from hardcore, gravel or crushed stone, or even simply compacted earth. Whilst this form of construction gave adequate performance under light farm vehicles and pedestrian use, it is often inadequate to resist the high stresses of modern heavy delivery/collection lorries, resulting in an increasing need for regular maintenance of potholes and damaged areas. Potholes left unattended not only present a safety hazard but are also likely to give rise to increased costs of maintenance of farm vehicles bumping over them. Also, where delicate produce such as fruit, is being transported, a potholed road can damage the produce and thus reduce income.

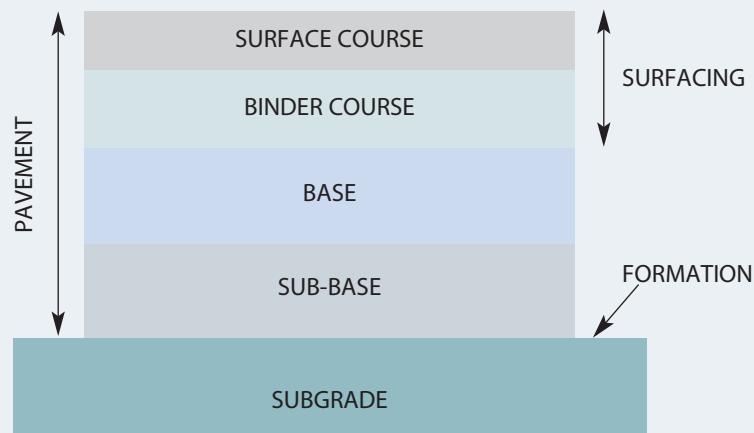
These problems highlight some of the benefits of an asphalt paved farm road, which will provide a low-maintenance, durable and even surface finish. In addition, this type of road can be constructed in stages, with the final surface course being applied, if necessary, a year or more after the base/binder course layers, thus helping to spread construction costs. Also, unlike a concrete road, asphalt construction does not require a curing period before use, as most asphalt mixes can be trafficked soon after laying; and there are no expansion joints that need to be maintained to prevent deterioration.

Two particular points concerning asphalt materials should, however, be appreciated. Firstly, to obtain the best performance from them, they should be laid using specialist plant and labour and therefore only experienced surfacing contractors should be employed. Secondly, the good long-term durability of the surfacings can be reduced by abnormal mechanical abrasion and point loadings and also by allowing accumulations of mud or animal droppings to dry out on the surface. Where such conditions prevail, the stronger, denser, Hot Rolled Asphalt mixes to PD 6691¹ and BS EN 13108-4³ will provide the better resistance, but where heavy usage by tracked vehicles, spade-lugged or cleated wheels or sharp or scraping farm implements is likely or where accumulations of mud or muck are unavoidable, specialised mixes (see Proprietary surfacings) or alternative forms of construction (e.g. concrete) will be advisable. The various layers of an asphalt road are shown in the figure on the next page.

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^{2,3}. 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 Document¹.





** 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.*

The materials to be used and the thickness of each layer will depend on anticipated vehicle use, ground conditions, required surface finish and similar factors. It is not within the scope of this publication to provide detailed specifications, as this requires knowledge of the individual site circumstances. Specialist surfacing contractors should be consulted for detailed advice (see below). If the area to be surfaced is a hardstanding and interfaces with a public road resulting in rainwater running onto the road, guidance should be sought from Information Sheet number 1⁵ and the Environment Agency guidance note⁶. However, the following general guidelines will be helpful:

- a Good site preparation is essential. In the case of a new road construction, topsoil and vegetation should be removed down to a firm sub-soil and any soft spots replaced by firm and well compacted material. Where necessary, sub-soil drainage should be provided to remove any water entering the construction. Cut-off drains should be provided at the side of the road if there is a risk of water entering the construction from adjacent higher ground.
- b A combined sub-base/base can be adopted for farm roads, comprising either hardcore or crushed stone. The thickness of this will depend on the strength of the sub-soil and the anticipated vehicle use, but will normally be in the range of 200 to 400mm. The softer the ground and the heavier the vehicle usage the thicker this layer will need to be. On very unstable ground thicknesses in excess of this range may be required and in extreme cases it may be advantageous to employ a geogrid to strengthen the sub-base.
- c The surfacing should consist of an asphalt binder course either sealed by a surface dressing (bitumen spray with an overall coverage of chippings rolled in) or topped with an asphalt surface course. Of the two, the latter will give a more even surface finish and a stronger more durable road construction.
- d It is preferable that the stiffer, stronger asphalt mixtures - dense or close-graded Asphalt Concrete or Hot Rolled Asphalt - are used in farm road construction as the softer materials (open-graded, medium-graded and fine-graded Asphalt Concretes) are unlikely to be sufficiently durable under farm vehicle use.

Where an existing well compacted stone road is to be used as a base for an asphalt surfacing, potholes and depressions should be filled and the existing road shaped to provide adequate drainage gradients. A two layer asphalt surfacing (binder course plus surface course) should then be applied. Further guidance on the resurfacing of an existing road is given in another Information Sheet in this series⁴.



Farm yards

Yards on farms are used for a wide range of purposes, from very light use, such as car parking, to very heavy or aggressive use, for storage of heavy mechanical plant or as holding areas for livestock. As indicated in the above notes on farm roads, the durability of asphalt surfacings can be affected by mechanical damage and heavy point loadings and by accumulations of mud or animal droppings. The materials can also be damaged by abnormal spillages of petroleum oils such as diesel and lubricating oil (e.g. spillages at fuel storage/refuelling points or vehicle maintenance areas).

Where such conditions exist, special types of surfacing or alternative types of construction may need to be employed. Further advice on these should be sought from specialist surfacing contractors.

For yards where these conditions are not likely to be experienced, the type of construction mentioned above for farm roads should provide a satisfactory and durable finish.

Note Separate Information Sheets in this series deal with construction and surfacing of car parking and heavy vehicle parking areas^{5,7}.

Animal-house floors



The main use of asphalts in the surfacing of animal house floors in the UK has been on cow cubicle beds, on which there has been growing use of the materials over the last twenty years or so. Advantages claimed for these surfacings in this application include:

- reduced usage of bedding material;
- increased animal comfort as a result of good insulation;
- increased floor durability;
- improved hygiene;
- good slip-resistance;
- ease of maintenance.

A minimum specification would normally comprise a well compacted hardcore or crushed stone base 150 to 200mm thick surfaced with a 50mm layer of 6mm dense Asphalt Concrete surface course (AC 6 dense surf). A more substantial and durable finish would be obtained over the same base with a surfacing comprising 50 to 75mm of 20mm dense Asphalt Concrete binder course (AC 20 dense bin) and a 20 or 25mm thickness of 6mm Asphalt Concrete surface course (AC 6 dense surf).

Laying the macadam to a gradient towards the heelstone is recommended to prevent retention of urine on or in the surfacing. The gradient should be introduced in the base layers to ensure that a uniform thickness of asphalt surfacing can be laid.

Whatever base and surfacing are used, the most important contributory factor to the success of the surfacing is the achievement of full compaction of all layers by employing the most efficient type of compaction plant that can be accommodated by the site location and the application.

Storage bases

A fairly recent development in the use of asphalt surfacings on farms has been in the construction of bases for silage storage. This development has arisen as a result of the poor durability of traditional forms of construction due to the aggressive nature of some of the fermentation products from silage. Asphalt mixes, being bound with bitumen, which has reasonable resistance to many chemicals, appear to offer increased durability in these applications

A typical construction will comprise a base of well-compacted hardcore or crushed stone 150 to 200mm thick, overlaid with a dense Asphalt Concrete binder course 75mm thick and a surface course of Hot Rolled Asphalt 40 to 50mm thick, incorporating a coarse aggregate with good resistance to acid attack.

Further guidance on the use of Hot Rolled Asphalt for constructing silage storage bases is contained in CIRIA Report 126⁸.

Proprietary surfacings

Apart from European Standard asphalts, several proprietary forms of asphalt surfacing are promoted for farming uses. In some cases these proprietary materials may provide better resistance to mechanical damage and oil and muck contamination than the European Standard materials. Further details of sources of these materials may be obtained from the Mineral Products Association.

Getting the job done

As previously indicated, the laying of asphalt is a specialised business and requires specialised plant and expertise. Professional contractors will use the British Standard BS 594987⁹ which covers the transportation, site preparation, laying and compaction of hot asphalt mixtures as the UK best practice document and therefore it is strongly recommended that laying of these materials be entrusted to surfacing contractors experienced particularly in this type of work. A list of surfacing contractors in any area who are members of the Mineral Products Association can be obtained from the address given on this information sheet.

Further information and advice

General advice on asphalt is available from the Mineral Products Association from the address on this publication or from surfacing contractor members of the Mineral Products Association.

ADAS at their head office at: Woodthorne, Wergs Road, Wolverhampton WV6 8TQ, website: www.adas.co.uk may also be able to offer advice on farm constructions.

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 PD 6691 - **Guidance on the use of BS EN 13108 Bituminous Mixtures - Material specifications**. BSI, London.
- 2 British (European) Standard BS EN 13108-1 **Bituminous mixtures - Material specifications - Part 1: Asphalt Concrete**, BSI, London
- 3 British (European) Standard BS EN 13108-4 **Bituminous mixtures - Material specifications - Part 4: Hot Rolled Asphalt**, BSI, London.
- 4 **Resurfacing of roads and other paved areas**, Information Sheet 3, Mineral Products Association, London.
- 5 **Construction and surfacing of car parking areas including private drives**, Information Sheet 1, Mineral Products Association, London.
- 6 **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
- 7 **Construction and surfacing of parking areas for medium and heavyweight vehicles**, Information Sheet 2, Mineral Products Association, London.
- 8 **Farm Waste Storage - Guidelines for Construction**, CIRIA Report 126, CIRIA, Classic House, 174 - 180 Old Street, London EC1V 9BP. www.ciria.org
- 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 **BSI website for the purchase of European and British Standards and Public Documents**.
www.bsiglobal.com/upload/Standards%20&%20Publications/shop.html

Publications

ADAS Construction Guidance Note 12 - **The Use of Hot Rolled Asphalt (HRA) Surfacing for Agricultural Forage Silos**. Acorus Rural Property Services, Exeter, EX6 8HD.
www.acorus.co.uk/about/index.php

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.

Mineral Products Association

Gillingham House
38 - 44 Gillingham Street
London SW1V 1HU
Tel +44 (0)20 7963 8000
Fax +44 (0)20 7963 8001
mpaasphalt@mineralproducts.org
www.mineralproducts.org



**Asphalt
Information
Service**

The Asphalt Information Service has been established to provide information and guidance on UK issues, products and applications of those products.

Whilst every care is taken to ensure the accuracy of the general advice offered herein or given by staff of the Mineral Products Association, no liability or responsibility of any kind can be accepted by the Association or its staff.

© Mineral Products Association November 2009