

BRITISH STANDARD

Asphalt for roads and other paved areas – Specification for transport, laying and compaction and type testing protocols

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Foreword

Publishing information

This British Standard is published by BSI and comes into effect on 1 January 2008. It was prepared by Technical Committee B/510/1, *Coated macadam and hot asphalt*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 4987-2:2003 and BS 594-2:2003 which are withdrawn.

Information about this document

This standard takes account of the implementation in the UK from 1 January 2008 of the BS EN 13108 series (which does not deal with the laying procedures for the asphalt mixtures), as well as the European test methods for asphalt covered by the BS EN 12697 series. As not all of the test methods previously used in the UK have been replaced by equivalent European methods, reference is made where necessary to retained BS 598 test methods.

Requirements for transporting asphalt mixtures, for preparatory site work and for laying and compaction of asphalt mixtures, including the covering of concrete and sett paving, are given in this standard, which also contains in the Annexes protocols to be used for initial type testing of asphalt materials in accordance with BS EN 13108-20.

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

1 Scope

This British Standard specifies requirements for the transport, laying and compaction of those asphalt mixtures conforming to BS EN 13108-1, BS EN 13108-4 and BS EN 13108-5, described in PD 6691, from the time that they leave the mixing plant until they are placed on the road ready to receive a superimposed layer or traffic. It also includes requirements for preliminary work at the laying site needed to ensure that the substrate is fit to receive the asphalt and for the application of tack coats and bond coats.

While this standard does not include explicit requirements for asphalt materials covered in other parts of BS EN 13108 or other proprietary asphalt mixtures, the general requirements of this standard may be applied to those mixtures, in addition to special requirements for particular mixtures as laid down in individual quality plans and/or method statements.

NOTE 1 The term “asphalt” used in this standard is the generic term used to describe the wide range of mixtures of aggregate and bituminous binder individually known as asphalt concrete, coated macadam, hot rolled asphalt, stone mastic asphalt (SMA), porous asphalt or mastic asphalt and other proprietary materials which are available for use in constructing and maintaining roads and other paved areas that are on the market in the UK.

Protocols for the initial type testing of asphalt materials in accordance with BS EN 13108-20 *Type testing* are included in Annex C, Annex D, Annex E, Annex F and Annex G.

NOTE 2 BS EN 13108-20 Type testing details the way in which the conformity of a mix composition to the requirements of the specification is to be determined. This is similar to a mix design validation or job mix trial. BS EN 13108-20 offers some choice in the way in which specimens are to be prepared for the purposes of initial type testing. Since the results determined will depend on the method of specimen preparation, a set of protocols showing the recommended UK selection of such procedures, linked to the recommended specification levels and classes, is included in this standard.

In the case of hot rolled asphalt (HRA), requirements are specified for providing a rough-textured surface on the surface course for skid-resistance.

This standard does not include requirements for asphalt incorporating bitumen emulsion binders.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 598-108:2005, *Sampling and examination of bituminous mixtures for roads and other paved areas – Part 108: Methods for determination of the condition of the binder on coated chippings and for measurement of the rate of spread of coated chippings*

BS 598-109, *Sampling and examination of bituminous mixtures for roads and other paved areas – Part 109: Methods for the assessment of the compaction performance of a roller and recommended procedures for the measurement of the temperature of bituminous mixtures*

BS 2000-223, *Methods of test for petroleum and its products – Determination of ash of petroleum products containing mineral matter*

BS EN 58, BS 2000-474, *Bitumen and bituminous binders – Sampling bituminous binders*

BS EN 932-1, *Tests for general properties of aggregates – Part 1: Methods for sampling*

BS EN 932-2, *Tests for general properties of aggregates – Part 2: Methods for reducing laboratory samples*

BS EN 933-1, *Tests for geometrical properties of aggregates – Part 1: Determination of particle size distribution – Sieving method*

BS EN 1426:2000, BS 2000-49:2000, *Methods of tests for petroleum and its products – Bitumen and bituminous binders – Determination of needle penetration*

BS EN 1427:2000, BS 2000-58:2000, *Methods of test for petroleum and its products – Bitumen and bituminous binders – Determination of softening point – Ring and ball method*

BS EN 12697-1, *Bituminous mixtures – Test methods for hot mix asphalt – Part 1: Soluble binder content*

BS EN 12697-2, *Bituminous mixtures – Test methods for hot mix asphalt – Part 2: Determination of particle size distribution*

BS EN 12697-5:2002, *Bituminous mixtures – Test methods for hot mix asphalt – Part 5: Determination of the maximum density*

BS EN 12697-6:2003, *Bituminous mixtures – Test methods for hot mix asphalt – Part 6: Determination of bulk density of bituminous specimens*

BS EN 12697-8, *Bituminous mixtures – Test methods for hot mix asphalt – Part 8: Determination of void characteristics of bituminous specimens*

BS EN 12697-13:2000, *Bituminous mixtures – Test methods for hot mix asphalt – Part 13: Temperature measurement*

BS EN 12697-22:2003, *Bituminous mixtures – Test methods for hot mix asphalt – Part 22: Wheel tracking*

BS EN 12697-25:2005, *Bituminous mixtures – Test methods for hot mix asphalt – Part 25: Cyclic compression test*

BS EN 12697-26, *Bituminous mixtures – Test methods for hot mix asphalt – Part 26: Stiffness*

BS EN 12697-27:2001, *Bituminous mixtures – Test methods for hot mix asphalt – Part 27: Sampling*

BS EN 12697-30, *Bituminous mixtures – Test methods for hot mix asphalt – Part 30: Specimen preparation by impact compactor*

BS EN 12697-32, *Bituminous mixtures – Test methods for hot mix asphalt – Part 32: Laboratory compaction of bituminous mixtures by vibratory compactor*

BS EN 12697-34, *Bituminous mixtures – Test methods for hot mix asphalt – Part 34: Marshall test*

BS EN 12697-35, *Bituminous mixtures – Test methods for hot mix asphalt – Part 35: Laboratory mixing*

BS EN 13036-1, *Road and airfield surface characteristics – Test methods – Part 1: Measurement of pavement surface macrotexture depth using a volumetric patch technique*

BS EN 13036-7, *Road and airfield surface characteristics – Test methods – Part 7: Irregularity measurement of pavement courses – The straightedge test*

BS EN 13108-1, *Bituminous mixtures – Material specifications – Part 1: Asphalt concrete*

BS EN 13108-4:2006, *Bituminous mixtures – Material specifications – Part 4: Hot rolled asphalt*

BS EN 13108-5, *Bituminous mixtures – Material specifications – Part 5: Stone mastic asphalt*

BS EN 13108-20:2006, *Bituminous mixtures – Material specifications – Part 20: Type testing*

BS EN 13108-21:2006, *Bituminous mixtures – Material specifications – Part 21: Factory production control*

BS EN 13808:2005, *Bitumen and bituminous binders – Framework for specifying cationic bituminous emulsions*

BS EN ISO 3838:2004, BS 2000-189/190:2004, *Methods of test for petroleum and its products – Crude petroleum and liquid or solid petroleum products – Determination of density or relative density – Capillary-stoppered pycnometer and graduated bicapillary pycnometer methods*

3 Terms and definitions

For the purposes of this British Standard the terms and definitions given in BS EN 13108 apply.

4 Transport, delivery and discharge

4.1 Transport

Loading of asphalt shall be carried out such that segregation is minimized.

Asphalt shall be transported to the laying site in insulated and sheeted vehicles to prevent an excessive drop in temperature and to ensure its protection against adverse weather conditions.

Substances that are likely to cause softening or damage to the asphalt (e.g. diesel oil, kerosene) shall not be used on the floor of a vehicle to facilitate discharge of the asphalt.

NOTE 1 Sealing grit, sand, soap solution or a proprietary release agent may be used on the floor of the vehicle to facilitate discharge of the asphalt. The amount used should be kept to a minimum.

NOTE 2 In the case of porous asphalt, only soap solution, water or a proprietary release agent should be used.

NOTE 3 During transport of the asphalt, steps should be taken to avoid contamination, particularly when transporting more than one material in the same vehicle.

4.2 Delivery to the laying site

Deliveries of asphalt to the laying site shall be co-ordinated with the rate of laying to avoid interruption to the laying process.

Asphalt shall be delivered at a temperature that allows it to be compacted in accordance with the requirements of Clause 9.

NOTE For delivery temperatures see Annex A. Minimum delivery temperatures, taken within 30 min after arrival on site, are recommended to ensure adequate time is available for compaction. However, some variation in temperature might be necessary to suit specific site conditions and mixtures. Temperatures should be measured in accordance with BS EN 12697-13.

5 Preparatory works at the laying site

5.1 General

Asphalt shall only be laid on surfaces free from loose materials and foreign matter, e.g. mud, slurry or other deleterious material. Prior to commencement of laying, the underlying course shall be prepared to produce a stable surface of appropriate profile on which the asphalt is to be placed.

NOTE 1 The surface on which the asphalt is to be laid should be of adequate strength to bear the equipment and compactive effort to be used in the laying of the asphalt. It is desirable that some form of permanent lateral support should be given to the layer of asphalt.

NOTE 2 Trafficking prior to completion of the surface course should be, as far as possible, restricted to plant and equipment used for laying and compaction of the asphalt.

5.2 Surface level tolerances

The sum of the deviations in the level of different pavement layers shall not result in a reduction of the nominal surface course thickness by more than 12.5% from that specified.

For road sites or similar areas, the permitted deviation of the level of the finished surface at any point on the pavement layer from the true surface level shall not exceed the following values:

- a) sub-base to receive base: $\begin{smallmatrix} +10 \\ -30 \end{smallmatrix}$ mm;
- b) base to receive surface course: ± 8 mm;
- c) base to receive binder course: ± 15 mm;
- d) binder course to receive surface course on roads: ± 6 mm;
- e) binder course to receive surface course on areas other than roads, e.g. car parks, playgrounds: ± 10 mm.

5.3 Resurfacing

5.3.1 General

5.3.1.1 An existing surface shall only be used as a base or binder course where the maximum depression under a 3 m straightedge placed longitudinally or under a template placed transversely does not exceed:

- a) 25 mm when the resurfacing is to consist of two course work; or
- b) 13 mm when the resurfacing is to be a single surface course.

If improvement of the surface is required, it shall be carried out by planing and/or by the addition of a regulating course.

NOTE 1 Prior to the laying of the new asphalt, all weak areas to be surfaced should be strengthened, major inequalities of profile remedied and depressions filled and thoroughly compacted.

NOTE 2 Every effort should be made to prevent water standing at the level of the bottom of the newly laid asphalt.

5.3.1.2 If the existing surface exhibits an excess of binder, this excess shall be removed by planing, milling or other suitable methods.

NOTE Methods other than planing or milling should be agreed with the specifier.

5.3.2 Overlaying existing concrete

Where asphalt is to be laid on existing concrete pavements with defective joints, in addition to the measures specified in **5.3.1**, the joints shall be made good by cleaning out and refilling with a joint-filling material. This material shall be compacted flush with the surface. The jointing material used shall not be adversely affected by or itself adversely affect the surfacing.

NOTE 1 In some cases, special treatment of the joints and cracks might be necessary. It is particularly important to ensure that there is no relative movement between adjacent slabs.

NOTE 2 The thicker the layer of asphalt used, the longer the delay in the appearance of reflective cracking.

NOTE 3 See 5.5 for tack coats and bond coats.

5.3.3 Overlaying existing sett paving

When overlaying existing sett paving, the following special measures shall be taken in addition to those specified in **5.3.1**.

- a) All loose and weak areas of sett paving shall be removed and replaced with an equivalent thickness of either binder course or cement concrete.
- b) Excessive bitumen or pitch used to grout the sett joints shall be removed.
- c) To ensure the best possible key, all joints shall be cleaned of foreign matter to a depth of at least 15 mm.
- d) Bitumen emulsion conforming to Class C40B as specified in the National Foreword to BS EN 13808:2005 shall be applied at a uniform rate.

NOTE If necessary, the bitumen emulsion can be covered with 2.8/6 mm chippings at approximately 6 kg/m².

5.4 Adjustment or regulation of levels

When regulating the levels of the base or underlying surface, whether to provide super-elevation or for any other purpose, binder course mixtures of appropriate nominal aggregate size conforming to BS EN 13108-1, BS EN 13108-4 or BS EN 13108-5 shall be used. Layer thicknesses shall be in accordance with Table 6A to Table 6D as applicable.

NOTE 1 Further guidance can be found in PD 6691.

NOTE 2 For layer thicknesses greater than 100 mm, base mixtures may be used.

NOTE 3 If the total thickness of the regulating course is less than 40 mm, the use of regulating course HRA conforming to BS EN 13108-4 or SMA of appropriate aggregate size conforming to BS EN 13108-5 is recommended.

5.5 Tack coats and bond coats

5.5.1 General

NOTE Tack coats and bond coats are used to promote adhesion between layers of asphalt used in the construction of a paved area or used to bond a new surface course to an existing road surface when carrying out road maintenance. The choice of tack coat or bond coat depends on the condition of the substrate, the stiffness and binder content of the layers and type of site. Further guidance can be found in BS 434-2.

5.5.1.1 Tack coats

Tack coats used shall be bitumen emulsions conforming to Classes C40B4 or C60B3 as specified in the National Foreword to BS EN 13808:2005.

NOTE 1 Emulsions conforming to the National Foreword to BS EN 13808:2005, Classes C69B2, 3 or 4 or C69BF2, 3 or 4, might also be appropriate if they are formulated with bitumen having a maximum penetration value of 220 and less than 3% w/w of added volatile flux oil.

NOTE 2 Tack coats are conventional bitumen emulsions used to enhance the adhesion between layers of asphalt, which might otherwise be impaired due to minor dust problems or insufficient free bitumen on the surface of the layer being overlaid.

The use of tack coats shall be in accordance with 5.5.2.

5.5.1.2 Bond coats

Bond coats are proprietary materials and only bond coats with a BBA/HAPAS certificate¹⁾ detailing the performance claims made for the product shall be used.

NOTE 1 The BBA/HAPAS certificates include guidance on application rates for the benefit of designers and specifiers. Bond coats are generally formulated to enable application at heavier application rates than are possible with tack coats and to provide greater cohesion.

NOTE 2 For certificates stating claimed performance for bond coats see the BBA website: www.bbacerts.co.uk

¹⁾ British Board of Agrément, P.O. Box 195, Bucknalls Lane, Garston, Watford, Herts WD25 9BA. www.bbacerts.co.uk

NOTE 3 The provisions of this subclause are not applicable to thin surface course systems produced under BBA/HAPAS certification, in which the bond coats are an integral part of the system.

NOTE 4 Further general information on the specification of bond coats for motorways and trunk roads can be found in the Specification for Highway Works [1], published by the Highways Agency.

NOTE 5 Until such time that BBA/HAPAS certificates are available, producers of the bond coat should provide performance data for any claims made, detail the rates of spread required, which should be at least those included in Table 3, Table 4 and Table 5, and provide product identification in accordance with the BBA/HAPAS SG4 Guideline Document for bond coats.

5.5.2 Application

A tack coat or bond coat shall be applied prior to the laying of a new surface course.

A tack coat or bond coat shall also be applied, when specified, at other layer interfaces.

Tack coats shall be applied at the rates specified in Table 1 or Table 2.

*NOTE 1 If a tack coat or bond coat is **not** required under the surface course laid on fresh asphalt binder course or base then this should be specified.*

NOTE 2 Application rates in this standard are quoted in kg/m² of residual bitumen. This differs from previous editions, which quoted rates in l/m² of total emulsion. For example, the rate 0.15 kg/m² residual bitumen would approximately equate to 0.35 l/m² of C40B4 or 0.25 l/m² of C60B3 emulsion.

Bond coats shall be applied at the rates detailed in the BBA/HAPAS certificate, or, in the absence of such certificates, in accordance with Table 3, Table 4 and Table 5.

NOTE 3 The application of bond coat, in preference to tack coat, should be considered in the following circumstances:

- *Where the designer or specifier wishes to achieve greater confidence in the adhesion between layers, the use of a cohesive (intermediate or premium grade) bond coat at the rates recommended in Table 3 and Table 4 might be appropriate, for example between layers where bonding is likely to be difficult such as high stiffness modulus bases or aged and partly uncoated aggregate surfaces. This is likely to be particularly relevant in the case of heavily-trafficked or high stress roads and other paved areas.*
- *Where the designer or specifier wishes to improve the relative impermeability of the surface of a lower layer, the use of a cohesive (intermediate or premium grade) bond coat at the rates recommended in Table 5 might be appropriate. For maximized improvement, (for example that required for bridge structures between the installed bridge deck waterproofing membrane and a SMA overlay) special hot-applied bond coats could be applied at much higher rates of spread.*
- *Where the laying of the asphalt involves temporary trafficking by pedestrians or vehicles of the tack/bond coat, the use of "non-tack" bond coat might be appropriate. The rate of application should be as specified in Table 3, Table 4 or Table 5 as applicable.*
- *When overlaying concrete with 100 mm or less thickness of asphalt, rates of application should be in accordance with Table 4 or Table 5.*

Table 1 **Recommended target rates of application of tack coat in kg/m² of residual bitumen for newly laid asphalt – New construction**

Binder content upper layer	Binder content lower layer		
	≤ 4%	4.1–5.0%	≥ 5.1%
≥ 5.1%	0.15	0.15	0.15
4.1–5.0%	0.20	0.15	0.15
≤ 4%	0.25	0.20	0.15

Table 2 **Recommended target rates of application of tack coat in kg/m² of residual bitumen for existing surfaces – Maintenance**

Binder content upper layer	Nature of lower layer/existing surface		
	Fretted/binder lean (see Note 4)	Planed asphalt	Binder rich
≥ 5.1%	0.20	0.15	0.15
4.1–5.0%	0.25	0.20	0.15
≤ 4%	0.25	0.25	0.20

Table 3 **Recommended target rates of application of bond coat in kg/m² of residual binder for newly laid asphalt – New construction**

Binder content upper layer	Binder content lower layer		
	≤ 4%	4.1–5.0%	≥ 5.1%
≥ 5.1%	0.15	0.15	0.15
4.1–5.0%	0.30	0.25	0.25
≤ 4%	0.40	0.35	0.30

Table 4 **Recommended target rates of application of bond coat in kg/m² of residual binder for existing surfaces – Maintenance**

Binder content upper layer	Nature of lower layer/existing surface		
	Fretted/binder lean/concrete (see Note 4)	Planed asphalt	Binder rich
≥ 5.1%	0.50	0.40	0.25
4.1–5.0%	0.60	0.50	0.35
≤ 4%	0.60	0.60	0.40

Table 5 **Recommended target rates of application of bond coat in kg/m² of residual binder for improving the relative impermeability of the surface of a lower layer/existing surface**

Binder content upper layer	Nature of lower layer/existing surface (see Note 4)		
	Fretted/binder lean/concrete/ stiff bases	High stiffness modulus bases	Normal asphalt – slightly permeable
≥ 5.1%	0.60	0.60	0.50
4.1–5.0%	0.60	0.60	0.50
≤ 4%	0.80	0.70	0.60

NOTE 4 “Binder lean” (referred to in Table 2, Table 4 and Table 5) is regarded as an asphalt estimated to have less than 4% binder content or where a surface to be treated has partly coated exposed aggregate or where there is some evidence of cracking. “Stiff bases” are those where the recovered penetration is less than 20 pen. “Normal asphalts – slightly permeable” are those dense and close-textured materials judged to have less than 10% air voids.

Tack coats and bond coats shall be applied at a uniform rate.

NOTE 5 For continuous laying works, application by metered mechanical spraying equipment, a spray tanker or a spraying device integral with the paver should be used. For small scale works and inaccessible areas, application may be by hand held sprayer.

After application, the emulsion shall be allowed to “break” (i.e. turn from brown to black), before the asphalt is laid, unless it is applied by a paver with an integral spray bar. Any emulsion accumulating in hollows shall be dispersed by brushing and allowed to break before it is over-laid.

NOTE 6 Cold or humid weather conditions can delay breaking of the emulsion. Further guidance is given in BS 434-2.

NOTE 7 Further general guidance on the specification of the application of tack coats and bond coats on motorways and trunk roads, including application tolerances and accuracy of spread, can be found in the Specification for Highway Works [1]. Over-application or ponding should be avoided, as this might result in the slippage or instability of the uppermost layer.

6 Laying

6.1 General

Asphalt shall be machine laid by a self-propelled paver (see 6.3) except when hand laying is necessary (see 6.4).

The laying operation shall be controlled and carried out by trained and experienced personnel.

6.2 Laying in adverse conditions

6.2.1 Laying shall not be carried out if standing water is present on the surface to be covered.

NOTE Laying should be avoided as far as is practicable during heavy rain. If the wet weather threatens to be prolonged, laying should be suspended.

6.2.2 Laying shall be carried out with due regard to ambient weather conditions so that materials can be properly compacted. The asphalt shall not be laid on any surface which is frozen or covered with ice or snow. Laying shall cease when the air temperature reaches 0 °C on a falling thermometer, except in calm dry conditions, when laying shall cease if the air temperature reaches –3 °C on a falling thermometer.

NOTE 1 When the surface on which asphalt is to be laid is dry and free from ice, laying may proceed at air temperatures at or above –1 °C on a rising thermometer, and compaction can be substantially completed before the asphalt cools below the temperature given in Table 9 or Table A.1 as appropriate.

NOTE 2 The control of compaction time does not lend itself to simple rules. The following factors, which affect the rate of cooling of asphalt layers and hence the time available for compaction, should be taken into consideration and working practices adjusted accordingly.

Layer thickness. *Because thicker layers cool more slowly, binder course and base layers of 60 mm or more thickness provide adequate time for compaction under most weather conditions. Thinner layers need more care.*

Wind speed. *Wind speed has a greater effect on the rate of cooling than ambient temperature.*

Ambient temperature. *Ambient temperature should be taken into consideration but is of less significance than wind speed.*

Time available. *The time available for compaction is also dependent on the type of binder in the mixture and the temperature of the mixture as it is laid.*

NOTE 3 Further guidance is given in the Transport Research Laboratory publication, Research Report 4, (Daines 1985) [2] and in the Specification for Highway Works [1].

When laying chipped HRA surface courses (see Clause 7) in windy and/or cold conditions, the delivery vehicles and paving train shall be co-ordinated to minimize delays between discharging material into the paver, laying, application of chippings and initial rolling of chippings into the freshly laid surface course asphalt.

NOTE 4 The embedment and adhesion of coated chippings is affected by surface chilling of asphalt, which occurs quickly in windy conditions, particularly if it is also cold. The factors described and the guidance given in Note 2 should be taken into consideration.

NOTE 5 When chipped surface courses are to be laid in winter, some loss of chippings is likely, particularly when high rates of spread have been applied to achieve high levels of texture depth. The risk of loss of chippings increases if the surface course is first trafficked in cold weather.

NOTE 6 When laying in adverse conditions cannot be avoided, consideration should be given to using special binders or thicker layers which can extend the effective compaction time. Insulating the paver hoppers might also provide some benefit.

6.3 Machine laying

6.3.1 The paver used shall be capable of laying the asphalt continuously so as to produce an even and compact surface to the required widths, thicknesses, profiles, cambers and crossfalls without causing segregation, dragging, burning, surface defects or irregularities. It shall also be capable of operating at such a speed as to permit continuous laying as far as supply and site conditions allow.

NOTE 1 A means of imparting an initial compaction should be fitted to the paver, together with the necessary apparatus for supplying heat to the finishing screed.

NOTE 2 The finished surface should be continuously inspected as it is laid and any defects immediately rectified before any rolling takes place, but there should be no unnecessary scattering back by hand of the asphalt on machine-laid work.

NOTE 3 Supplies should be phased with due regard to the laying operation on the site. When machine laying, asphalt should be laid as soon as possible after delivery and should normally be supplied continuously to the paver.

6.3.2 Narrow strips remaining alongside machine-laid work, if laid by hand, shall be rolled at the same time as the machine-laid work, with allowance being made for extra surcharge to and compaction of hand-laid strips.

Immediately after asphalt in any course is laid, and before it is rolled, the surface shall be inspected and all defects and irregularities in alignment, grade or texture corrected by the addition or removal of material.

6.3.3 Asphalt remaining in hoppers, conveying and spreading mechanisms, tampers and screeds shall be cleaned off at the end of each working day. On no account shall cleaning solvent be allowed to come into contact with any bituminous layer.

6.4 Hand laying

Hand laying shall be used only when site conditions make machine laying impractical or when small quantities of asphalt are being laid.

On delivery to the site the asphalt shall be protected to reduce heat loss and from adverse weather conditions. Asphalt shall be taken directly from the delivery vehicle, which should be kept sheeted wherever possible. Alternatively it shall be protected in a portable hot box. If these means of protection are not available, it should be deposited in heaps, on a clean hard surface and sheeted to protect it from loss of heat and adverse weather.

Asphalt shall be spread in a loose layer of uniform thickness and even texture and thoroughly compacted immediately.

NOTE Every precaution should be taken to minimize segregation and to avoid contamination.

6.5 Sampling during laying

Asphalt required for testing shall be sampled in accordance with the appropriate clause(s) of BS EN 12697-27.

6.6 Thickness

The nominal thickness of a layer and the minimum thickness of a layer at any point shall conform to the thicknesses given in Table 6A to Table 6D as applicable.

*NOTE 1 Materials shown in **bold** are preferred mixtures as previously denoted in BS 4987 or BS 594.*

NOTE 2 Thicknesses in excess of those given in the tables can provide better compaction if adequate equipment is used but could lead to problems with surface irregularity and level control.

NOTE 3 A guide to the rates of spread likely to be obtained from different asphalt mixtures at different compacted thicknesses is given in Annex B.