

A GUIDE TO THE SELECTION OF ASPHALT MIX SIZE

This Advisory Note provides a summary of asphalt mix sizes and layer thicknesses for a range of common applications. A more detailed guide to selection of asphalt types and mix sizes may be obtained from the references listed below. Note that not all mix types and/or sizes may be available in some locations and other selections are not necessarily excluded.

Selection of mix size and thickness includes consideration of:

- location in pavement (course)
- structural requirements
- surface characteristics, e.g. texture, rutting resistance, etc.

Pavement Course

Pavement courses include:

- wearing or surface course
- intermediate course
- base course
- regulation, levelling or corrective course.

A course may consist of more than one layer, although most wearing courses comprise only one layer.

A **wearing course** may:

- form part of the structural pavement (in conjunction with an asphalt base or intermediate course);
- form part of a structural overlay; or
- form a non-structural surfacing or overlay.

The term **intermediate course** is sometimes used to describe the layer immediately below the wearing course to distinguish it from other base course materials that may comprise a different size or type of asphalt, or other base material. In other respects the term is synonymous with base course.

Asphalt base courses are the elements of flexible pavements that provide structural strength to the pavement.

Regulation, levelling or corrective courses are used to correct irregularities in the surface of an existing sealed pavement prior to subsequent surfacing.

Nominal Mix Size

The nominal size of an asphalt mix is an indication of the maximum particle size present and is usually expressed as the largest sieve size to retain more than 0% and less than

10% of the aggregate material (sieve size being rounded up to the nearest convenient whole number).

The selected nominal size of mix will be determined by:

- location of asphalt course in pavement
- proposed compacted thickness of layer
- functional requirements of asphalt layer.

Table 1 (on reverse) indicates typical nominal mix sizes for different applications.

Layer Thickness

Generally, asphalt should be placed in layers with a compacted thickness of not less than 2.5 times the nominal size of mix in order to:

- prevent the mix tearing during laying
- assist the compaction process by allowing the aggregate particles to mechanically interlock.

The minimum thickness may need to be increased when placing thin layers in cool conditions or using less workable mixes.

Some ultra-thin asphalt surfacing types can be successfully laid with a layer thickness as little as 1.5 times the nominal mix size provided they are combined with a suitable seal coat or tack coat to effectively bond the asphalt to the underlying pavement.

In **wearing** and **intermediate course applications** the maximum compacted layer thickness is generally limited to around 4 times the nominal mix size. Greater thicknesses may be used to achieve practical placing thickness; for example a requirement for 50 mm of 10 mm asphalt is better achieved with one 50 mm layer than two 25 mm layers. Where the layer thickness exceeds 4 times the nominal size, it may be more cost effective to use a larger nominal size mix, although larger sized mixes are also more prone to segregation and may not necessarily provide the surface finish required.

Base course applications may involve multiple layers, with the maximum layer thickness being largely determined by practical placing considerations taking into account the total asphalt thickness and ability to achieve the required finished shape and riding qualities. For most applications, 20 mm is selected as the largest nominal sized mix. A guide to typical layer thickness is shown in Table 2.

continued

Table 1. Typical Mix Size and Type for Pavement Type and Application

Use	Nominal Mix Size (mm)
<i>Wearing Course Mixes</i>	
Dense graded asphalt wearing course	
Footpaths, playgrounds and recreational areas	5, 7
Residential driveways and small parking areas	7
Large parking areas for passenger cars	7, 10
Residential streets	7, 10
Urban feeder streets	10
Urban arterials, highway pavements	14
Industrial pavements	14, 20
Stone mastic asphalt wearing course	
Residential streets and other light traffic applications	7
Main roads and highways	10, 14
Fine gap graded asphalt wearing course	
Foot traffic and residential streets	7, 10
Open graded asphalt wearing course	
Highways and freeways	10, 14
Ultra thin asphalt (urban and rural arterials)	10
<i>Intermediate, Regulation and Base Course Mixes</i>	
Dense graded asphalt intermediate course	10, 14, 20
Dense graded asphalt regulating or levelling course	10, 14, 20
Dense graded asphalt base course	20, 28, 40

Table 2. Typical Asphalt Layer Thickness as a Function of Nominal Mix Size

Nominal Mix Size (mm)	Compacted Layer Thickness (mm)
5	15–20
7	20–30
10	25–40
14	35–55
20	50–80
28	70–110
40	100–160

Notes:

1. The minimum thickness may need to be increased when placing thin layers in cool conditions or using less workable mixes.
2. Minimum thickness may not apply to some ultra-thin asphalt applications.
3. Maximum thickness may be exceeded provided that asphalt surface shape requirements can be adequately achieved.

References:

Asphalt Guide, AP–G66/02, Austroads, 2002

Guide to the Selection of Road Surfacing, AP–G63/03, Austroads, 2003

Light Duty Asphalt Pavements – Design, Specification and Construction, Implementation Guide IG–6, AAPA, 2002

Selection and Design of Asphalt Mixes: Australian Provisional Guide, APRG Report No. 18, AP–T20/02, Austroads, 2002