

# Asphalt Cooling Rates

pavement work tips — no. 46

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## INTRODUCTION

Charts showing typical rates of asphalt cooling have been prepared to supplement advice on asphalt compaction provided in Pavement Work Tip No.12.

Knowledge of the likely time available before asphalt will cool below the temperature for effective compaction can assist in determining the type and number of rollers required, temperature for ordering of asphalt delivery and monitoring of compaction procedures.

Factors affecting cooling of asphalt include laydown or delivery temperature, pavement temperature and wind speed as described in Pavement Work Tip No.12.

The minimum temperature at which asphalt remains sufficiently workable depends on the type of binder. Table 1 provides a guide to the minimum temperature generally required for a range of binder types.

Ability to effectively compact asphalt will also vary with mix type and the particular equipment. Charts provided in this work tip can only be considered a general guide and may require adjustment for particular ambient conditions, mix type and layer thickness.

Shorter adjustment times for increase or decrease in delivery temperature apply to cool base conditions. Longer adjustment times apply to warmer base conditions. Adjustments to base temperature for overcast conditions and wind speed are cumulative, for example, heavy overcast conditions, wind speed 30 km/h, reduce base temperature by 15°C. Charts may be interpolated to obtain intermediate values.

### Key Summary

This issue of 'pavement work tips' provides a practical guide to the rate of cooling of asphalt as an aid to effective compaction while the asphalt remains in a workable state.

*continued on reverse*

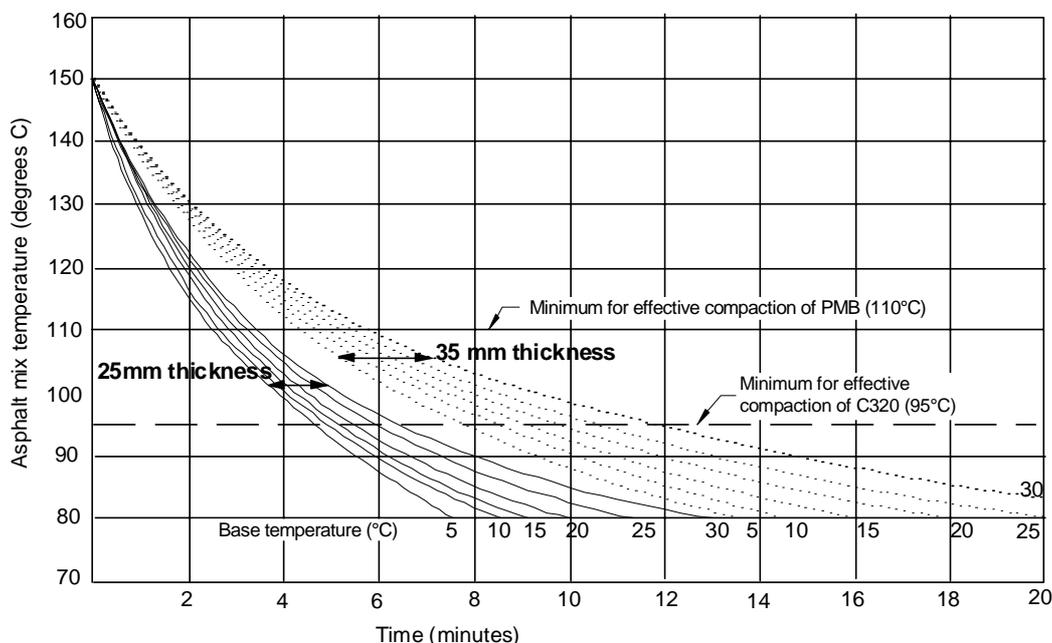


Figure 1 Typical Asphalt Cooling Rates, 25 mm and 35 mm Compacted Thickness

Notes:

- 1 Chart is based on a delivery temperature of 150°C, fine conditions and light wind (<8 km/h).
- 2 For delivery temperature of 160°C add 1-2 minutes (25 mm) or 2-3 minutes (35 mm).
- 3 For delivery temperature of 140°C subtract 1-2 minutes (25 mm) or 2-3 minutes (35 mm).
- 4 For cloudy overcast conditions reduce base temperature by 5°C.
- 5 For wind speeds over 8 km/h and up to 15 km/h reduce base temperature by 5°C.
- 6 For wind speeds over 15 km/h and up to 30 km/h reduce base temperature by 10°C.



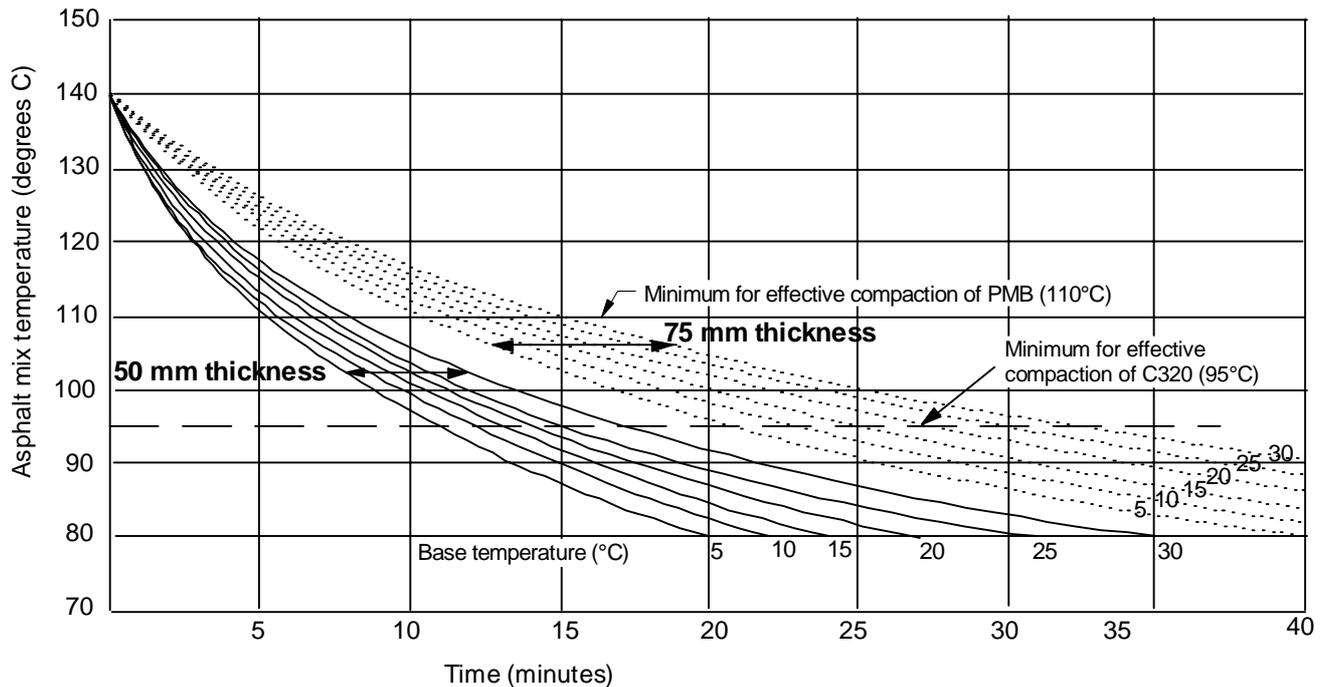


Figure 2 Typical Asphalt Cooling Rates, 50 mm and 75 mm Compacted Thickness

Notes:

- 1 Chart is based on a delivery temperature of 140°C, fine conditions and light wind (<8 km/h).
- 2 For delivery temperature of 150°C add 4-5 minutes (50 mm) or 7-10 minutes (75 mm).
- 3 For delivery temperature of 130°C subtract 4-5 minutes (50 mm) or 7-10 minutes (75 mm).
- 4 For cloudy overcast conditions reduce base temperature by 5°C.
- 5 For wind speeds over 8 km/h and up to 15 km/h reduce base temperature by 5°C.
- 6 For wind speeds over 15 km/h and up to 30 km/h reduce base temperature by 10°C.

Binder		Minimum Temperature (°C)
Conventional Bitumen	Class 170	90
	Class 320	95
	Class 600	100
Multigrade		100
Polymer Modified Binder	A10E	110
	A20E	105
	A35P	100

Table 1 Typical minimum effective compaction temperatures

**EXAMPLE**

50 mm thickness, C320 binder laydown temperature 150°C, base temperature 20°C, overcast, wind 12 km/h.

For wind speed and overcast conditions use base temperature of 10°C. From Fig 2, time to cool from 140°C to 95°C = 12 minutes. For delivery temperature of 150°C, add 4 minutes, total time available = 16 minutes.

**REFERENCES**

- Pavement Work Tip No. 12 - Asphalt compaction
- Pavement Work Tip No. 13 - Temperature characteristics of binders in asphalt

For more information on any of the construction practices discussed in "pavement work tips", please contact either your local Austroads representative or AAPA: tel (03) 9853 3595; fax (03) 9853 3484; e-mail: info@aapa.asn.au

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This edition was prepared by John Rebbechi in consultation with members of the Austroads Asphalt Research Reference Group.

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