

# MnDOT PG Binder Guidelines

<b>Type of Construction</b>	<b>Recommended Asphalt Binder for &lt; 3 Million ESALs (20 yr)</b>	<b>Recommended Asphalt Binder for 3 - 10 Million ESALs (20 yr)</b>	<b>Recommended Asphalt Binder for &gt; 10 Million ESALs (20 yr)</b>
Overlay -- Fast Traffic <sup>2</sup>	Top 100mm (4"): PG 58-28 Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 58-28/ PG 64-28 <sup>1</sup> Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 64-28/ PG 70-28 <sup>1</sup> Below 100mm (4"): PG 58-28
Overlay -- Slow Traffic <sup>2</sup>	Top 100mm (4"): PG 58-28/ PG 64-28 <sup>1</sup> Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 64-28 Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 64-28/ PG 70-28 <sup>1</sup> Below 100mm (4"): PG 58-28
Overlay -- Standing Traffic <sup>2</sup>	Top 100mm (4"): PG 64-28 Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 70-28 Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 70-28 Below 100mm (4"): PG 58-28
New Construction -- Fast Traffic <sup>2</sup>	Top 100mm (4"): PG 58-34 Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 58-34/ PG 64-34 <sup>1</sup> Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 64-34/ PG 70-34 <sup>1</sup> Below 100mm (4"): PG 58-28
New Construction -- Slow Traffic <sup>2</sup>	Top 100mm (4"): PG 58-34/ PG 64-34 <sup>1</sup> Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 64-34 Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 64-34/ PG 70-34 <sup>1</sup> Below 100mm (4"): PG 58-28
New Construction -- Standing Traffic <sup>2</sup>	Top 100mm (4"): PG 64-34 Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 70-34 Below 100mm (4"): PG 58-28	Top 100mm (4"): PG 70-34 Below 100mm (4"): PG 58-28

<b>Recommended Binder Grade for Shoulders With Traffic</b>	<b>Recommended Binder Grade for Shoulders With No Traffic</b>
Generally, use the same binder grade as the mainline, but, not to exceed PG 64-xx.	PG 58-28 or PG 52-34 (match the mainline low PG number)

**NOTES:** These guidelines are intended for bituminous highway paving projects. When varying from these guidelines or for further clarification, consult the Mn/DOT Bituminous Office.

1. Selecting the higher PG grade, for higher ESALs within the category, will provide better resistance to rutting. See note 4.
2. Traffic levels are defined as:
  - fast traffic -- average speeds of greater than 70 km/h (45 mph), rural TH and interstate with sustained speeds;
  - slow traffic -- average speeds of between 20 km/h (15 mph) and 70 km/h (45 mph), metro and urban TH and interstate, stop and go traffic conditions;
  - standing traffic -- average speeds of less than 20 km/h (15 mph) and intersections.
3. New construction includes: reconstruction, rubbilization, CIR, reclaiming (FDR)
4. See specifications for binder adjustment in recycled mixtures. No adjustment required when < 20% RAP in mixture.

5. To determine reliability for PG Binders at the nearest weather station to your location download LTPPBind software and instructions at: [www.tfrc.gov/pavement/ltp/bind/download.htm](http://www.tfrc.gov/pavement/ltp/bind/download.htm).

## **Rules of Thumb**

- Minimize the number of PG grades on any one project .
- The top 100mm (4”) should be the same PG grade.
- Below 100mm (4”) from the surface should be the same PG grade, typically, specify PG 58-28.

## **Considerations**

- For traffic levels < 3 million ESAL, consider modifying the 100mm (4”) criteria described under “Rules of Thumb” to 75mm (3”) criteria.
- For temporary construction (2 years or less) consider using PG 64-22 when PG 64-28 or PG 64-34 is otherwise recommended.
- For special or unique design considerations contact the Bituminous Office.

## **Goals for Asphalt Binder Reliability**

	<b>High Temp Reliability (Rutting)</b>	<b>Low Temp Reliability (Thermal Cracking)</b>
<b>Overlay</b>	98% minimum	50% minimum
<b>Shoulder</b>	98% Minimum	50% minimum
<b>New Construction (Wear)</b>	98% minimum	79% minimum
<b>New Construction (Non-Wear)</b>	98% minimum	50% minimum

## Asphalt Binder Reliability for Selected Grades

New Construction (Wear)	High Temperature Reliability (Rutting)		Low Temperature Reliability (Thermal Cracking)
PG 58-34 ≤ 1 Million ESAL's 1 – 3 Million ESAL's 3 – 10 Million ESAL's > 10 Million ESAL's	<u>Fast Traffic</u>	<u>Slow Traffic</u>	79% <sup>1</sup> , 98% <sup>2</sup>
	98%	50%	
	50%	<50%	
	50%	<50%	
	<50%	<50%	
PG 64-34 ≤ 1 Million ESAL's 1 – 3 Million ESAL's 3 – 10 Million ESAL's > 10 Million ESAL's	<u>Fast Traffic</u>	<u>Slow Traffic</u>	79% <sup>1</sup> , 98% <sup>2</sup>
	98%	98%	
	98%	50%	
	98%	50%	
	50%	<50%	
PG 70-34 ≤ 1 Million ESAL's 1 – 3 Million ESAL's 3 – 10 Million ESAL's > 10 Million ESAL's	<u>Fast Traffic</u>	<u>Slow Traffic</u>	79% <sup>1</sup> , 98% <sup>2</sup>
	98%	98%	
	98%	98%	
	98%	98%	
	98%	50%	
PG 76-34 ≤ 1 Million ESAL's 1 – 3 Million ESAL's 3 – 10 Million ESAL's > 10 Million ESAL's	<u>Fast Traffic</u>	<u>Slow Traffic</u>	79% <sup>1</sup> , 98% <sup>2</sup>
	98%	98%	
	98%	98%	
	98%	98%	
	98%	98%	

**Note:** This reliability data is from **Ltppbind software (1999)**, software and instructions at:  
[www.tfhr.gov/pavement/ltp/bind/download.htm](http://www.tfhr.gov/pavement/ltp/bind/download.htm).

Wear is considered the mixture in the top 100mm (4") from the surface.

Non-wear is considered mixture below 100mm (4") from the surface.

<sup>1</sup>Districts 1 and 2

<sup>2</sup>Districts 3 through 8

## Asphalt Binder Reliability for Selected Grades

Overlay and Shoulder	High Temperature Reliability (Rutting)		Low Temperature Reliability (Thermal Cracking)
PG 58-28 ≤ 1 Million ESAL's 1 – 3 Million ESAL's 3 – 10 Million ESAL's > 10 Million ESAL's	<u>Fast Traffic</u>	<u>Slow Traffic</u>	<50%
	98%	50%	
	50%	<50%	
	50%	<50%	
	<50%	<50%	
PG 64-28 ≤ 1 Million ESAL's 1 – 3 Million ESAL's 3 – 10 Million ESAL's > 10 Million ESAL's	<u>Fast Traffic</u>	<u>Slow Traffic</u>	<50%
	98%	98%	
	98%	50%	
	98%	50%	
	50%	<50%	
PG 70-28 ≤ 1 Million ESAL's 1 – 3 Million ESAL's 3 – 10 Million ESAL's > 10 Million ESAL's	<u>Fast Traffic</u>	<u>Slow Traffic</u>	<50%
	98%	98%	
	98%	98%	
	98%	98%	
	98%	50%	
PG 76-28 ≤ 1 Million ESAL's 1 – 3 Million ESAL's 3 – 10 Million ESAL's > 10 Million ESAL's	<u>Fast Traffic</u>	<u>Slow Traffic</u>	<50%
	98%	98%	
	98%	98%	
	98%	98%	
	98%	98%	

**Note:** This reliability data is from **Ltppbind software (1999)**, software and instructions at:  
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Wear is considered the mixture in the top 100mm (4") from the surface.

Non-wear is considered mixture below 100mm (4") from the surface.

## Asphalt Binder Reliability for Selected Grades

New Construction (Non-Wear)	High Temperature Reliability (Rutting)	Low Temperature Reliability (Thermal Cracking)						
PG 58-28  < 10 Million ESAL's > 10 Million ESAL's	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Fast Traffic</u></td> <td style="text-align: center;"><u>Slow Traffic</u></td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">50%</td> </tr> <tr> <td style="text-align: center;">50%</td> <td style="text-align: center;">&lt;50%</td> </tr> </table>	<u>Fast Traffic</u>	<u>Slow Traffic</u>	98%	50%	50%	<50%	58% <sup>1</sup> , 87% <sup>2</sup>
<u>Fast Traffic</u>	<u>Slow Traffic</u>							
98%	50%							
50%	<50%							
PG 58-34  < 10 Million ESAL's > 10 Million ESAL's	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Fast Traffic</u></td> <td style="text-align: center;"><u>Slow Traffic</u></td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">50%</td> </tr> <tr> <td style="text-align: center;">50%</td> <td style="text-align: center;">&lt;50%</td> </tr> </table>	<u>Fast Traffic</u>	<u>Slow Traffic</u>	98%	50%	50%	<50%	98%
<u>Fast Traffic</u>	<u>Slow Traffic</u>							
98%	50%							
50%	<50%							
PG 64-28  < 10 Million ESAL's > 10 Million ESAL's	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Fast Traffic</u></td> <td style="text-align: center;"><u>Slow Traffic</u></td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">50%</td> </tr> </table>	<u>Fast Traffic</u>	<u>Slow Traffic</u>	98%	98%	98%	50%	58% <sup>1</sup> , 87% <sup>2</sup>
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98%	50%							
PG 64-34  < 10 Million ESAL's > 10 Million ESAL's	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Fast Traffic</u></td> <td style="text-align: center;"><u>Slow Traffic</u></td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">50%</td> </tr> </table>	<u>Fast Traffic</u>	<u>Slow Traffic</u>	98%	98%	98%	50%	98%
<u>Fast Traffic</u>	<u>Slow Traffic</u>							
98%	98%							
98%	50%							
PG 70-28  < 10 Million ESAL's > 10 Million ESAL's	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Fast Traffic</u></td> <td style="text-align: center;"><u>Slow Traffic</u></td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> </table>	<u>Fast Traffic</u>	<u>Slow Traffic</u>	98%	98%	98%	98%	58% <sup>1</sup> , 87% <sup>2</sup>
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98%	98%							
98%	98%							
PG 70-34  < 10 Million ESAL's > 10 Million ESAL's	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Fast Traffic</u></td> <td style="text-align: center;"><u>Slow Traffic</u></td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> </table>	<u>Fast Traffic</u>	<u>Slow Traffic</u>	98%	98%	98%	98%	98%
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98%	98%							
98%	98%							
PG 76-28  < 10 Million ESAL's > 10 Million ESAL's	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Fast Traffic</u></td> <td style="text-align: center;"><u>Slow Traffic</u></td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> </table>	<u>Fast Traffic</u>	<u>Slow Traffic</u>	98%	98%	98%	98%	58% <sup>1</sup> , 87% <sup>2</sup>
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98%	98%							
98%	98%							
PG 76-34  < 10 Million ESAL's > 10 Million ESAL's	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><u>Fast Traffic</u></td> <td style="text-align: center;"><u>Slow Traffic</u></td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> <tr> <td style="text-align: center;">98%</td> <td style="text-align: center;">98%</td> </tr> </table>	<u>Fast Traffic</u>	<u>Slow Traffic</u>	98%	98%	98%	98%	98%
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Wear is considered the mixture in the top 100mm (4") from the surface.

Non-wear is considered mixture below 100mm (4") from the surface.

<sup>1</sup>Districts 1 and 2

**Asphalt Binder Grade Designation**

The PG Binder Grade letters should be used in all bituminous mixture designations, regardless of the specification number. These letters and PG Grade are listed below:

<b><u>Mixture Designation Letter</u></b>		<b><u>Asphalt Binder Grade</u></b>
<b>A</b>	<b>=</b>	<b>PG 52-34</b>
<b>B</b>	<b>=</b>	<b>PG 58-28</b>
<b>C</b>	<b>=</b>	<b>PG 58-34</b>
<b>D</b>	<b>=</b>	<b>PG 58-40</b>
<b>E</b>	<b>=</b>	<b>PG 64-28</b>
<b>F</b>	<b>=</b>	<b>PG 64-34</b>
<b>G</b>	<b>=</b>	<b>PG 64-40</b>
<b>H</b>	<b>=</b>	<b>PG 70-28</b>
<b>I</b>	<b>=</b>	<b>PG 70-34</b>
<b>L</b>	<b>=</b>	<b>PG 64-22</b>