

## Technical Advisory

# Frequently Asked Questions for PG Binders

PG stands for performance grade. The performance relates to climate and the binder's distress resistance in that climate.

## What is PG?

A PG binder is identified using a nomenclature of PGXXYY. The XX is the high pavement temperature (in °C) in which the binder should resist rutting. The YY (in °C and a negative number) is the low pavement temperature in which the binder should resist cracking. An example of a PG binder grade is PG64-22. The binder should resist rutting to a pavement temperature of 64°C and cracking to a pavement temperature of -22°C.

## How do I select the PG grade?

Select the basic PG grade based on climate (usually a PG64-22 for most of Texas) and then adjust to account for heavy or slow-moving traffic conditions. Contact the Materials and Tests Division, Asphalt Laboratory (MTD-AL), for additional assistance with PG grade selection. MTD-AL uses an Excel program to select the initial climate grade.

## When do I need to upgrade or adjust the PG grade?

The PG grade of a binder may be adjusted in a couple of ways. The most common is to “bump” the high temperature portion of the grade to increase a mixture's resistance to rutting.

The guidelines for changing the base climate grade are:

- Traffic
  - Consider increasing the high temperature portion of the PG designation one grade if the projected ESALs are greater than 10 million.
  - Increase the high temperature portion of the PG designation one grade if the projected ESALs are greater than 30 million. (Note: This is not an increase of two grades.)

- Speed
  - Consider increasing the high temperature portion of the PG designation one grade for slow moving traffic.
  - Consider increasing the high temperature portion of the PG designation one grade for standing traffic.

If both traffic and speed conditions exist, you may consider a two-grade PG increase. Rarely would an increase in the high temperature portion of the PG designation of more than two grades be justified.

Less commonly, the PG grade may be adjusted to compensate for known areas where cracking problems have been observed, or a perceived susceptibility to cracking. Decreasing the low temperature portion of the PG grade by one designation is a good policy to increase the cracking resistance of the binder.

Use the above guidelines and your engineering judgment to determine the PG binder you want to specify. Remember, however, that in general, the larger the “grade span” – the difference in the high and low temperature portions of the grade – the higher the cost.

## What are the PG modifiers?

The PG modifiers are polymers added to the binders to improve overall properties. There are different types of polymers that can be added, such as styrene butadiene styrene block copolymer (SBS), styrene butadiene rubber (SBR, also called latex), tire rubber (TR) and reactive elastomeric terpolymer (RET, brand name Elvaloy®).

## Which modifier gives the best performance?

The most popular modifier is SBS, because it gives the biggest increase in the high end of the grade. Most of the time, preferences for a particular modifier are based on familiarity and experience; many people disagree. The best modifier for a given application depends on price and availability, experience of the contractor with the type of material, and the specific requirements of the pavement.

## Do I need to specify a modifier (SBS, SBR, TR or RET)?

The current PG system is written so that it is very difficult for a binder to meet a premium grade without some type of modifier. This is done using elastic recovery as a requirement. Unmodified binders, even air-blown and acid-modified ones, have little or no elastic recovery. Some districts may prefer to specify one particular modifier because of their experience with that type of material; aside from this, it is generally unnecessary to specify a modifier.

## What is the elastic recovery?

Elastic recovery is the ability of the material to return to its original shape after it has been deformed. It is measured by stretching a ductility sample, a specified amount, cutting it, and measuring the percentage that it recovers in a specific period. Elastic recovery is related to performance, but in the department specifications, it is commonly used to ensure that certain grades of material are polymer modified.

## What is the mixing and compaction temperature for the PG binder?

The recommended application temperature range for PG binders is 275°F to 350°F; the specific temperatures for mixing and compaction depend on the individual binder. Since our old models for predicting mixing and compaction temperatures don't work well on highly modified binders, the best temperatures to use are the ones recommended by the manufacturer.

## Can I select PG76-22 on all mixes?

PG76-22 is a very stiff binder that will help improve the rutting resistance of the mix and may be the best binder to use for rutting-intensive pavements; however, this type of stiff binder may not always be necessary or appropriate. On lower-volume roads, the added expense of PG76-22 may not be necessary to prevent rutting, and on pavements with unusually compliant or flexible structure, the stiffer binder may be more susceptible to cracking.

## Do I need to collect samples for every subplot?

No. The 2014 Specification book requires the contractor to obtain a 1-qt. sample of the asphalt binder for each lot of the mixture produced.

## Do I need to test PG binders during the project?

PG binders are required to be tested and pre-qualified by the MTD. The 2014 Standard Specifications require that the asphalt binder be tested at least once during a project. Once may be enough for PG 64- 22 (typically not polymer modified). For PG 70-22 and PG 76-22 (typically polymer modified), it would be advisable to test more than the minimum number of samples. It is not the intent of the specification to test the asphalt binder from each lot.

## Where can I find the list of approved PG binder sources?

MTD maintains a list of prequalified asphalt binder suppliers, which is available from the TxDOT web site. Note that suppliers on the prequalified list have satisfied the basic quality requirements to supply material to TxDOT projects, but individual projects must still be approved on an ongoing basis.

Binders received on the jobsite are required to have a TxDOT laboratory number on the shipping ticket. The shipping ticket indicates the material has been tested and approved by MTD. It is advisable to verify the laboratory number by looking it up in SiteManager upon receipt of the material. Any binder arriving without a lab number on the shipping ticket should be rejected. Until tested and approved, the binder is used at the contractor's risk.

## Contact Information

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