



PGXpand®

A Bitumen-Friendly Polymeric Additive

Guidelines for Producing PGXpand Based PMBs and Paving Hot Mixes Based on PGXpand Based PMBs



INTRODUCTION

PGXpand® is a unique bitumen-friendly polymer engineered to enhance the high temperature performance of bitumen without impacting low temperature properties. It delivers outstanding rutting resistance, fatigue properties, and durability on roadways. PGXpand interacts with the bitumen in a very unique fashion, imparting key performance benefits to PMB mixes while mitigating the processing difficulties and shortcomings typically associated with traditional polymers.

PGXpand is highly dosage efficient. It lowers the viscosity of bitumen and enhances the mix internal lubricity. PGXpand improves the workability of PMB hot mixes, mimicking the advantages of a warm mix additive. It results in lower production temperatures for the manufacture of both PMB and hot mix. Further, it reduces the paving temperatures, making the mix much easier to compact. This may prompt the need to make minor adjustments to paving parameters to ensure that the mix is laid down to yield a high-quality roadway.

GUIDELINES FOR PGXpand BASED PMB PRODUCTION

PGXpand does not need high shear milling to dissolve into bitumen. On the other hand, the use of high shear milling does not degrade or adversely affect PGXpand, as is evidenced by numerous producers manufacturing hybrid PMBs such as “PGXpand & SBS” or “PGXpand & Crumb Rubber”.

When making PGXpand-based PMB, maintain the mix tank temperature between 150 to 163 °C (300 to 323 °F). The dissolution of PGXpand into bitumen is an endothermic process, so maintaining temperature in this range is important.

A reasonable vigorous level of mixing is recommended when producing PGXpand-based PMBs. Any paddle or mixer speed that achieves a good vortex and good mixing is recommended. It is suggested that PGXpand be added to the vortex in the tank. Recirculation is helpful and is recommended. With good mixing (tank content turnover once or twice), PGXpand PMB production can be completed within 1 to 3 hours, depending on temperature and mixing.

PGXpand does not need sulfur or crosslink additives to achieve desirable properties or stability. It inherently results in PMBs with a very high degree of storage stability since it does not degrade at commonly employed production and storage temperatures and it has no functionality for crosslink sites.

GUIDELINES FOR PGXpand HYBRID PMB PRODUCTION

PGXpand can readily be combined with SBS or crumb rubber (CR) to produce hybrid PMB Blends. Guidelines outlined in the above section for the dissolution of PGXpand in bitumen are also applicable in this section.

When manufacturing PGXpand-based hybrid PMB, maintain the mix tank temperature at the suggested temperature for SBS or CR PMB production but at least at the temperatures outlined in above section. PGXpand is unaffected by the typically higher temperatures employed in production of SBS or CR PMB.

While making Hybrid PMBs, PGXpand can be added before, during, or after the addition of SBS or CR. In general, adding PGXpand will have a modest lowering effect on viscosity of the PMB and will demonstrate a significant benefit during mix compaction.

Stability of the hybrid PMB is only controlled by the inherent stability of the SBS or CR PMB.

GUIDELINES FOR PAVING PGXpand® MODIFIED BITUMEN MIXES

This section provides guidelines for contractors to consider as they undertake paving a road with a hot mix produced using PGXpand-based PMBs.

- 1) Initial Testing:
 - Undertake lab testing to determine the Optimum Binder Content (OBC) and the target PGXpand dosage level. Dosing can be influenced by incoming bitumen properties, traffic, loading, and climatic conditions.
- 2) During Manufacture of PMB:
 - Establish a quality control system to routinely monitor PMB binder properties, aggregate gradation, uniformity of mix, and mix characteristics.
- 3) Prior to Paving:
 - Assess the existing pavement for distress and address any issues as per normal practice.

4) During Paving & Compaction:

- Since the viscosity of a mix dosed with PGXpand is lowered, it is advisable to reduce the compaction temperature to obtain the desired volumetrics after compaction.
- It may be necessary to also adjust the compaction pattern based on pavement structure to attain the desired volumetrics.

5) After Compaction:

- Recommend collecting field core samples after compaction and testing for volumetric properties.

FURTHER SUGGESTIONS AND GUIDELINES

The road conditions, equipment used, and property or performance requirements typically vary by job site. Please ensure adequate roadway evaluation, laboratory testing, and production pilot runs are undertaken before actual production of PGXpand-based PMBs and mixes for roadway paving.

While every attempt has been made to provide comprehensive instructions for PGXpand PMB and mix production and compaction, no list can be comprehensive to accommodate all of the variables encountered in a specific plant or on a specific roadway.



DISCLAIMER: Although all statements and information contained herein are believed to be accurate and reliable, they are presented without guarantee or warranty of any kind, express or implied. Information provided herein does not relieve the recipient or user from the responsibility of carrying out own tests, experiments, and validation. The recipient or user assumes all risks and liability for use of the information and results obtained. Statements or suggestions concerning the use of materials and processes are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that all toxicity data and safety measures are indicated herein or that other measures may not be required.