



# 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 & 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, PGXpand® addition 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 a few guidelines for contractors to consider as they undertake paving a road with a Hot Mix produced using PGXpand® Based PMBs.

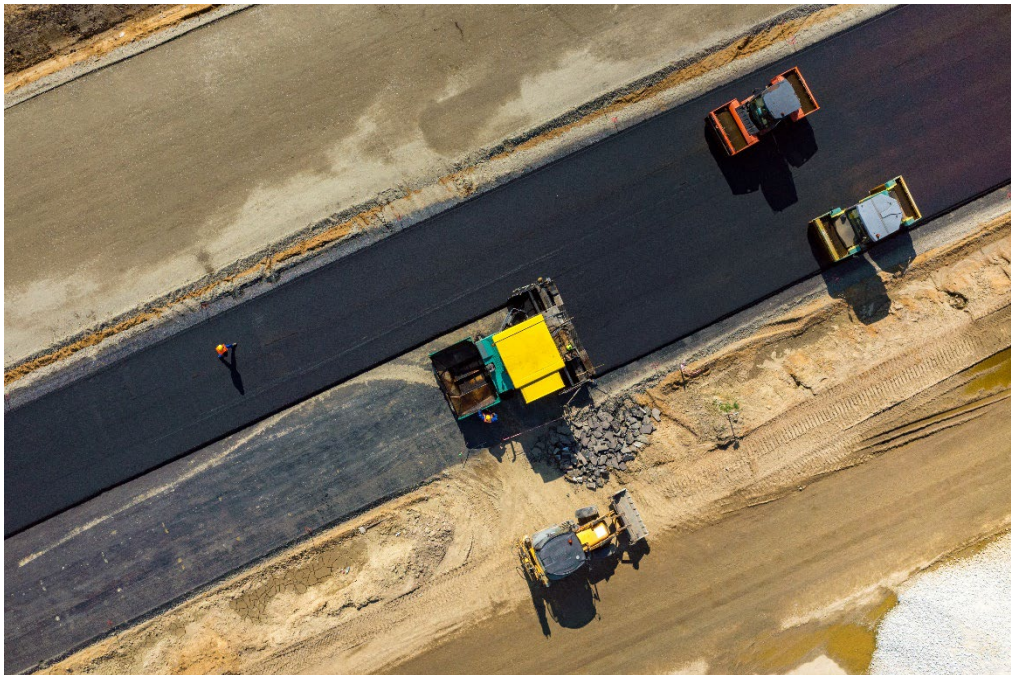
- 1) Initial Testing:
  - Undertake lab testing to determine the Optimum Binder Content (“OBC”) and the target PGXpand® dosage level. Dosing can be influenced by incoming bitumen properties, traffic, loading, and climatic conditions.
- 2) During Manufacture of PMB:
  - Establish a Quality Control system 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 & GUIDELINES

The road conditions, equipment used and property/performance requirements typically vary from job site to job site. Please ensure that adequate roadway evaluation, laboratory testing and production pilot runs are undertaken before actual production of PGXpand® based PMBs and Mixes for paving of roadways.

While every attempt has been made to provide comprehensive instructions for PGXpand® PMB & Mix production & compaction, no list can be comprehensive to accommodate all the variable encountered in a specific Plant or on a specific roadway.



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