

GUIDE TO BITUMINOUS BINDERS IN ASPHALT AND SPRAYED SEALING APPLICATIONS



2017 Edition

GOING *Further*
FOR *Better-Performing*
— **ROADS**





Bitumen

Locations

Head Office - Brisbane

Puma Energy Australia

Street: 365 Macarthur Avenue, Hamilton QLD 4007

Postal: PO Box 95, Fortitude Valley QLD 4006

Brisbane

Street: 398 Tingira Street, Pinkenba QLD 4008

Postal: PO Box 202, Pinkenba QLD 4008

Sydney

Street: Port Botany Bitumen Terminal, Gate B56,
11 Simblist Road, Port Botany NSW 2036

Postal: 2/10 247 Coward Street, Mascot NSW 2020

Melbourne

Street: 55 Toll Drive, Altona North VIC 3025

Postal: PO Box 495, Altona North VIC 3025

Townsville

Street: 1 Benwell Road, Townsville QLD 4810

Postal: PO Box 2267, Townsville QLD 4810

Hobart

Street: 22 Sels Point Road, Newtown TAS 7008

Postal: PO Box 282, Moonah TAS 7009

Kwinana

Street: C/- CBI Constructors Pty Ltd,
Lot 58 Old Thomas Road, Kwinana WA 6167

Postal: PO Box 5191, Rockingham Beach WA 6969

W pumabitumen.com.au

E bitumen.au@pumaenergy.com

Technical Helpline 1800 24 88 66

Description	Page
-------------	------

Introduction	
---------------------	--

The Puma Bitumen Range.	3
---------------------------------	---

Sprayed Seals	
----------------------	--

Introduction to Sprayed Seals	8
---	---

Priming.	9
------------------	---

Initial Sealing	10
---------------------------	----

Standard Seals.	11
-------------------------	----

High Stress Seals.	11
----------------------------	----

Strain Alleviating Membranes.	12
---------------------------------------	----

Strain Alleviating Membrane Interlayers	12
---	----

Multiple Application Seals	13
--------------------------------------	----

Geotextile Reinforced Seals.	14
--------------------------------------	----

Description	Page
-------------	------

Asphalt	
----------------	--

Dense-Graded Asphalt	16
--------------------------------	----

Open-Graded Asphalt.	19
------------------------------	----

Stone Mastic Asphalt.	20
-------------------------------	----

Thin Asphalt Surfacing	21
----------------------------------	----

Cold Asphalt Mixes.	22
-----------------------------	----

Health & Safety	24
----------------------------	----

References	26
-------------------	----

Contact us	29
-------------------	----



Bitumen

Introduction

Bituminous binders for asphalt and sprayed sealing include paving grade bitumens and a range of polymer modified binders for enhanced performance in particular applications.

Further bituminous material types include cutback bitumens and aggregate precoating materials.

This booklet provides a guide to the selection of the most appropriate bituminous materials for sprayed sealing and asphalt applications. Potential users of bitumen products should apply their own skill and judgement to their particular circumstances. Puma Bitumen is not liable for any costs, losses or damages, whether direct or indirect, arising from any reliance upon this document.

In terms of scope, other applications such as stabilising or other materials such as bitumen emulsions are not included.



Puma Bitumen Product Range

Puma Bitumen provides conventional and speciality bituminous binder solutions to meet a wide range of road pavement needs.

Paving Grade Bitumen

Class 170 and Class 240 are widely used in sprayed sealing and light asphalt applications to provide durability and fatigue resistance. They are also used in the manufacture of modified binders and Class 170 is used in the manufacture of cutback bitumens and bitumen emulsions.

Class 320 and Class 450 are most commonly used in the manufacture of asphalt mixtures. Due to their higher viscosity, stiffer asphalt mixtures can be produced to improve resistance to shoving and other problems associated with higher temperatures and traffic loads.

Class 600 is primarily used to manufacture extra heavy-duty asphalt pavements that need to endure substantial traffic loadings.



Polymer Modified Binders

Asphalt Binders

OLEXOBIT® AOG is a PMB that is designed for use in open-graded and thin-surfacing asphalt applications to provide increased cohesive strength, durability and resistance to abrasion.

OLEXOBIT® SMA+ is a PMB formulated specifically for use in stone mastic asphalt applications and thin-surfacing asphalt to provide enhanced cohesive strength and resistance to rutting and fatigue.

OLEXOBIT® AB4 is a PMB that is designed for use in asphalt applications to provide increased cohesive strength and durability in open-graded asphalt. When used in dense-graded asphalt, OLEXOBIT® AB4 delivers medium levels of resistance to rutting and fatigue.

OLEXOBIT® AB5 is a PMB that is designed for use in dense-graded asphalt to minimise permanent deformation and fatigue cracking. When used in open-graded asphalt,

OLEXOBIT® AB5 provides increased cohesive strength and durability.

OLEXOBIT® AB6 is a PMB that is designed for use in dense-graded asphalt to minimise permanent deformation and fatigue cracking on major roads and freeways and in heavy-duty asphalt applications, such as container terminals.

OLEXOBIT® A35P is a PMB that is designed for use in dense-grade asphalt where increased asphalt modulus is required to enhance pavement stiffness, or to provide resistance to high surface shear forces.

Sprayed Seal Binders

OLEXOBIT® MAX is a PMB that is designed for use in sprayed sealing applications to minimise the risk of reflection cracking on existing cracked surfaces where the cracks are active, or where the potential for cracking exists. It is also suitable for use in severe high stress seal applications and as a holding treatment on high traffic roads.
(Austrads AG:PT/T190 S15E grade)

OLEXOBIT® SAM is a PMB that is designed for use in sprayed sealing applications to achieve excellent long term aggregate retention where the seal is exposed to high traffic-induced stress. It is also used to improve the resistance of reflective cracking with slow to medium rate of movement and as a holding treatment on low traffic roads.
(Austrads AG:PT/T190 S35E grade)

OLEXOBIT® HSS is a PMB that is designed for use in sprayed sealing applications to achieve improved aggregate retention over conventional bitumen, where the seal is under medium to high traffic-induced stress. OLEXOBIT® HSS is also suitable for use as a holding treatment on low traffic roads.

OLEXOBIT® SP is a PMB that is designed for use in sprayed sealing applications to provide both improved aggregate retention and resistance to bleeding in situations where conventional Class 170 bitumen is unlikely to provide adequate service.

OLEXOBIT® S45 is a PMB that is designed for use in sprayed sealing applications to alleviate the reflection of cracks on existing cracked surfaces where the cracks are active and a SBS-modified binder is preferred.
(Austrads AG:PT/T190 S20E grade)

OLEXOBIT® S60 is a PMB that is designed for use in sprayed seal strain alleviating membrane interlayer (SAMI) applications prior to the placement of an asphalt overlay.
(Austrads AG:PT/T190 S25E grade)

OLEXOBIT® CR45 is a binder modified by the addition of crumb rubber derived from used vehicle tyres, which can be used in sprayed sealing applications to alleviate the reflection of cracks.

In addition to the products mentioned here, Puma Bitumen supplies a range of conventional paving grade bitumens, cutback bitumens and aggregate precoating fluids.

Puma Bitumen Product Range

Puma Bitumen Product	Grade & Specification See Notes	Key Application
Paving Grade Bitumen		
Class 170 Bitumen	Class 170 in AS 2008	Sprayed seal and light hot mix asphalt applications, emulsions and cutbacks
Class 240 Bitumen	Class 240 in AS 2008	Sprayed seal and light hot mix asphalt applications
Class 320 Bitumen	Class 320 in AS 2008	Hot mix asphalt
Class 450 Bitumen	Class 450 in AS 2008	Hot mix asphalt
Class 600 Bitumen	Class 600 in AS 2008	Extra heavy-duty asphalt
Polymer Modified Binders		
Asphalt Applications		
OLEXOBIT AB6	A10E in AG:PT/T190	Dense-graded and heavy-duty asphalt applications
OLEXOBIT AB5	A15E in AG:PT/T190	Dense-graded asphalt applications
OLEXOBIT AB4	A20E in AG:PT/T190	Dense-graded asphalt applications
OLEXOBIT AOG	A25E in AG:PT/T190	Open-graded and thin surfacing asphalt applications
OLEXOBIT SMA+	Puma Bitumen proprietary product	Stone mastic asphalt and thin surfacing applications
OLEXOBIT A35P	A35P in AG:PT/T190	Dense-graded and high modulus asphalt applications
Sprayed Seal Applications		
OLEXOBIT MAX	S15E in AG:PT/T190	Sprayed seal applications for excellent resistance to crack reflection
OLEXOBIT SAM	S35E in AG:PT/T190	Sprayed seal strain alleviating membrane and high stress seal applications
OLEXOBIT HSS	Puma Bitumen proprietary product	Sprayed seal high stress applications for improved aggregate retention
OLEXOBIT SP	Puma Bitumen proprietary product	Sprayed seal applications for improved aggregate retention
OLEXOBIT S30	S10E in AG:PT/T190	Sprayed seal applications
OLEXOBIT S45	S20E in AG:PT/T190	Sprayed seal applications for improved resistance to crack reflection
OLEXOBIT S60	S25E in AG:PT/T190	Sprayed seal strain alleviating membrane applications
OLEXOBIT CR45	S45R in AG:PT/T190	Sprayed seal applications for improved resistance to crack reflection

Puma Bitumen Product	Grade & Specification See Notes	Key Application
-----------------------------	---	------------------------

Cutback Bitumens

Puma Bitumen Cutback AMC00	AMC00 in AS 2157	Priming of low porosity surfaces and tack coating
Puma Bitumen Cutback AMC0	AMC0 in AS 2157	Priming of medium porosity surfaces and tack coating
Puma Bitumen Cutback AMC1	AMC1 in AS 2157	Priming of high porosity surfaces and tack coating
Puma Bitumen Cutback AMC2	AMC2 in AS 2157	Primer for sealing and manufacture of premix
Puma Bitumen Cutback AMC3	AMC3 in AS 2157	Primer for sealing and manufacture of premix
Puma Bitumen Cutback AMC4	AMC4 in AS 2157	Primer for sealing and manufacture of premix
Puma Bitumen Cutback AMC5	AMC5 in AS 2157	Sprayed seal applications, particularly in cooler weather to improve initial stone retention
Puma Bitumen Cutback AMC6	AMC6 in AS 2157	Sprayed seal applications, particularly in cooler weather to improve initial stone retention
Puma Bitumen Cutback AMC7	AMC7 in AS 2157	Sprayed seal applications, particularly in cooler weather to improve initial stone retention

Precoat

Puma Precoat APT2		Enhanced bonding of bitumen to aggregate
-------------------	--	--

Notes

AS 2008 is the Australian Standard specification for bitumen for pavements

AG:PT/T190 is the Austroads specification framework for polymer modified binders

AS 2157 is the Australian Standard specification for cutback bitumens

Version 7.0 August 2017. OLEXOBIT is a registered trademark of Puma Energy (Australia) Pty Ltd

Sprayed Seals

A basic sprayed seal comprises a thin layer of bituminous binder with a single layer of aggregate. Sprayed seals may be placed on an existing pavement surface (reseal) or on a primed or initial-sealed granular pavement. Sprayed seals may also incorporate multiple applications of binder and aggregate or be reinforced with geotextile fabric.

For roads carrying light to moderate traffic, typical of the majority of rural roads in Australia, Class 170 bitumen is generally used. For more demanding performance conditions (such as higher traffic volumes, turning traffic and high pavement temperatures) polymer modified binders are used. These seals are usually designated as high stress seals (HSS).

Where additional waterproofing or resistance to reflection cracking is required, sprayed seals incorporating polymer modified binders are used as either a strain alleviating membrane (SAM) or strain alleviating membrane interlayer (SAMI).



Priming

A prime is an application of a primer to a prepared base, without cover aggregate, to provide penetration of the surface, temporary waterproofing and to obtain a bond between the pavement and the subsequent seal or asphalt. Cutback bitumens are commonly used as primers. Puma Bitumen provides a range of standard priming grades of cutback bitumen complying with AS 2157, as listed below.

Surface	Recommended Primer	Typical Rates of Application
Tightly bonded (low porosity) crushed rock and gravel pavements	Puma Bitumen Cutback AMC00	0.6 - 1.1 L/m ²
Medium porosity pavements	Puma Bitumen Cutback AMC0	0.8 - 1.1 L/m ²
High porosity pavements	Puma Bitumen Cutback AMC1	0.9 - 1.3 L/m ²
Limestone and sandstone pavements of high porosity	Puma Bitumen Cutback AMC1	Two applications of primer may be required
Stabilised pavements	Puma Bitumen Cutback AMC00	0.5 - 0.8 L/m ²
Concrete surfaces	Puma Bitumen Cutback AMC00	0.2 - 0.4 L/m ²

Sprayed Seals

Initial Seals

An initial seal is an application of a primer binder with a fine cover aggregate to a prepared base to provide penetration of the surface and retain a light cover of aggregate. It is used as a preliminary treatment to a more permanent bituminous surfacing.

Primer binders may be a cutback bitumen or bitumen emulsion. Puma Bitumen provides a range of standard initial sealing grades of cutback bitumen complying with AS 2157 as listed below.

Pavement Type and Conditions	Recommended Primer Binder	Notes
Lightly trafficked tightly bonded pavements Cool and/or damp conditions	Puma Bitumen Cutback AMC3	Only used with small size aggregates (7mm or less)
Tightly bonded or medium porosity type pavements Cool and/or damp conditions	Puma Bitumen Cutback AMC4	1.0 - 1.4 L/m ²
Porous type pavements Warmer and/or dry conditions	Puma Bitumen Cutback AMC5	1.0 - 1.4 L/m ²

Standard and High Stress Seals

Standard seals and high stress seals (HSS) usually comprise a single application of binder and single application of aggregate (a single/single seal). Selection of binder type is a function of traffic, climate and availability. Handling properties of binders (storage stability, spraying characteristics, etc.) and aggregate adhesion can also be important factors in the choice of binder.

Performance Conditions	Recommended Binder	Notes
Light or medium traffic Mainly straight alignment (low traffic stress)	Class 170 bitumen (Class 170 in AS 2008)	Class 170 bitumen is the basic binder for standard sprayed seals.
Low to medium traffic stress, high pavement temperatures	OLEXOBIT SP (Puma Bitumen proprietary product)	Provides improved aggregate retention for low to medium traffic stress and increased resistance to bleeding at high pavement temperatures.
Medium traffic	OLEXOBIT HSS (Puma Bitumen proprietary product)	Provides improved aggregate retention for medium traffic and increased traffic induced stress from steep grades, tight curves and intersections.
	OLEXOBIT S30 (S10E in AG:PT/T190)	Alternative binder for increased aggregate retention for use in applications where a SBS-modified binder is preferred.
Heavy traffic, cracked pavements	OLEXOBIT SAM (S35E in AG:PT/T190)	Proven all-round performer for both increased aggregate retention under high traffic induced stresses and resistance to reflection cracking.

Sprayed Seals

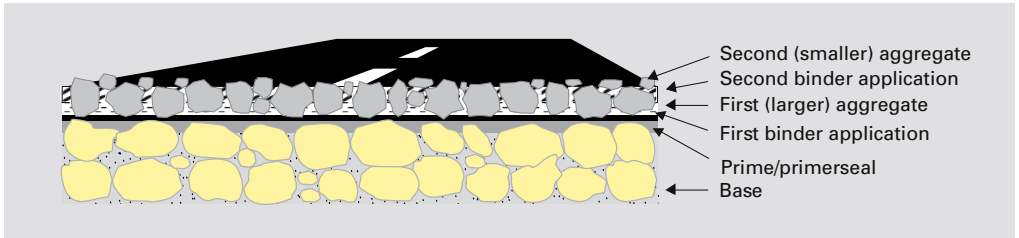
SAM and SAMI Seals

A SAM (strain alleviating membrane) seal is a sprayed seal utilising a polymer modified binder that is used to reduce reflection cracking and provide a higher degree of waterproofing to the underlying pavement. A SAMI (strain alleviating membrane interlayer) is similar to a SAM seal but is used as an interlayer prior to placing an asphalt overlay. The binder in a SAMI is usually heavier in application rate and more heavily modified than a SAM binder.

Performance Conditions	Recommended Binder	Notes
Heavy traffic loading with slow traffic movement	OLEXOBIT SAM (S35E in AG:PT/T190)	Superior early life adhesion and excellent long-term aggregate retention with good resistance to reflection cracking.
Heavy traffic loading, cracked pavements with active crack movement	OLEXOBIT MAX (S15E in AG:PT/T190)	Excellent resistance to reflection cracking in SAM seals with superior early life adhesion and excellent long-term aggregate retention.
	OLEXOBIT S45 (S20E in AG:PT/T190)	Excellent resistance to reflection cracking in SAM seals where a SBS-modified binder is preferred.
Extensively cracked pavements to be overlaid with asphalt	OLEXOBIT S60 (S25E in AG:PT/T190)	For use as strain alleviating membrane interlayer to reduce reflection cracking and increased waterproofing under an asphalt overlay.

Multiple Application Seals

Multiple application seals provide robust, heavy duty sprayed seal surfacings. A double/double seal is constructed by spraying a layer of binder, spreading the larger sized aggregate and, after trafficking and/or suitable rolling, spraying another application of binder followed by a second layer of smaller aggregate. The smaller aggregate fits into the spaces between the larger aggregate and locks it into place.



A double/double seal

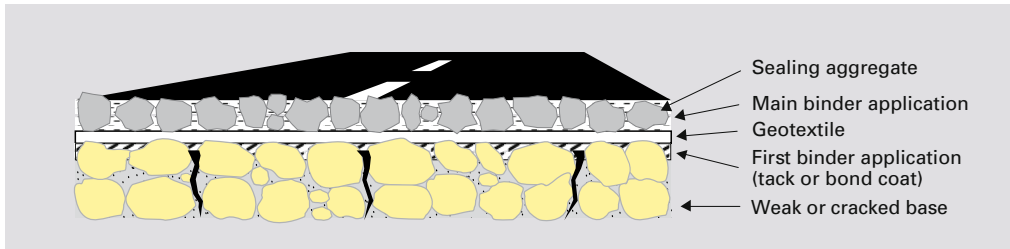
Double/double seals provide good resistance to high traffic stress in HSS applications without the use of PMBs. In SAM applications, where additional waterproofing and resistance to reflection cracking is required, a PMB may be used in the first application of binder, selected on the same basis as a SAM seal. PMBs are not, however, recommended for the second application of a double/double seal.

Sprayed Seals

Geotextile Reinforced Seals

Geotextile reinforced seals (GRS) are produced by spraying a layer of bitumen onto a pavement (bond coat), covering this bitumen with a layer of geotextile fabric and lightly rolling. A single/single or double/double seal is then applied over the geotextile. Double/double seals are preferred in SAM treatments as they provide greater resistance to high traffic stresses, but single/single seals are generally used in SAMI applications.

Class 170 bitumen can be used in all layers. PMBs such as OLEXOBIT SAM are also often used, based on the same relevant selection criteria applicable to HSS, SAM or SAMI applications. However, Class 170 bitumen is preferred for the bond coat.



A single/single geotextile reinforced seal



10mm OLEXOBIT SP reseal sprayed at 1.2 to 1.4 L/m² on the Calder Highway near the 52km post on the Melbourne outbound lanes (near Gisborne) in Victoria.

Asphalt

Dense-Graded Asphalt

Dense-graded asphalt consists of continuously graded aggregates, filler and binder providing a versatile mixture for a wide range of asphalt wearing course and structural applications. Binder type is selected on the basis of traffic levels, performance and environment.

Asphalt Wearing Course

In wearing course applications, deformation (rutting) resistance becomes increasingly important with increasing traffic. Fatigue resistance may also be a factor where a wearing course is subjected to high deflections.



Performance Conditions	Recommended Binder	Notes
Light to medium traffic	Class 170 bitumen (Class 170 in AS 2008)	May be used for light traffic in cool climates.
	Class 240 bitumen (Class 240 in AS 2008)	
	Class 320 bitumen (Class 320 in AS 2008)	Used in most general asphalt applications.
Heavy traffic	Class 320 bitumen (Class 320 in AS 2008)	Suitable for free flowing heavy traffic.
	Class 450 bitumen (Class 450 in AS 2008)	
Heavy to very heavy traffic	OLEXOBIT AB5 (A15E in AG:PT/T 190)	Provides increased resistance to deformation on heavily trafficked pavements and increased resistance to fatigue cracking.
	OLEXOBIT AB6 (A10E in AG:PT/T 190)	Provides superior resistance to deformation and fatigue in heavy duty and very heavy duty pavement applications.
	OLEXOBIT A355 (A35P in AG:PT/T 190)	Provides resistance to high surface shear forces and increases asphalt modulus to enhance pavement stiffness.

Asphalt

Dense-Graded Asphalt Intermediate and Base Courses

In asphalt intermediate and base course applications, flexural stiffness is an important parameter and is influenced by traffic levels and the function of the pavement layer. In heavy duty pavements, high stiffness may be used to improve structural capacity. Alternatively, high binder contents may be used to improve fatigue resistance of the lower layer in full depth and deep strength asphalt pavements.

Performance Conditions	Recommended Binder	Notes
Light to medium traffic	Class 170 bitumen (Class 170 in AS 2008)	May be used for light traffic in cool climates.
	Class 240 bitumen (Class 240 in AS 2008)	
Light, medium to heavy traffic	Class 320 bitumen (Class 320 in AS 2008)	Used in most intermediate and base course asphalt applications except where high stiffness modulus base materials are required.
	Class 450 bitumen (Class 450 in AS 2008)	
Heavy to very heavy traffic	Class 600 bitumen (Class 600 in AS 2008)	May be used where a high stiffness modulus asphalt base is required.
	OLEXOBIT A35P (A35P in AG:PT/T 190)	May be used in very heavy duty applications to increase stiffness modulus and to provide superior resistance to rutting.

Open-Graded Asphalt

Open-graded asphalt is manufactured with a large proportion of coarse aggregate and only a small amount of fine aggregate, resulting in a high air void content.

The porous nature of open-graded asphalt allows the rapid drainage of water from the surface to improve safety and provides reduced road noise.

Being porous, a thick film of a durable binder is required to provide durability and resistance to early onset of ravelling. These properties are best provided through the use of polymer modified binders.

Performance Conditions	Recommended Binder	Notes
Medium to heavy traffic	OLEXOBIT AOG (A25E in AG:PT/T190)	Provides increased cohesive strength and durability and resistance to abrasion in open-graded asphalt.
	OLEXOBIT AB4 (A20E in AG:PT/T190)	Provides increased cohesive strength and durability in open-graded asphalt with medium levels of resistance to rutting and fatigue.
Very heavy traffic	OLEXOBIT AB5 (A15E in AG:PT/T190)	Provides superior performance in open-graded asphalt under very heavy traffic conditions or high pavement service temperatures.

Asphalt

Stone Mastic Asphalt

Stone mastic asphalt (SMA) is designed to have a large proportion of coarse aggregate which interlocks to form a skeletal structure to resist permanent deformation. High binder contents are used to provide durability and cohesion.

Performance Conditions	Recommended Binder	Notes
Light to medium traffic	Class 320 bitumen (Class 320 in AS 2008)	Used in most general asphalt applications.
Medium to heavy traffic	OLEXOBIT SMA ⁺ (Puma Bitumen proprietary product)	Provides increased cohesive strength and durability in SMA with medium levels of resistance to rutting and fatigue.
Heavy to very heavy traffic	OLEXOBIT AB5 (A15E in AG:PT/T190)	Provides superior performance under very heavy traffic conditions or high pavement service temperatures.

Thin Asphalt Surfacing

Thin asphalt surfacings are generally designed to provide improved surface texture, low noise and good skid resistance relative to dense-graded asphalt. Binders used in thin surfacing applications require similar performance characteristics to binders used in open-graded asphalt and stone mastic asphalt.

Performance Conditions	Recommended Binder	Notes
Medium to heavy traffic	OLEXOBIT AOG (A25E in AG:PT/T190)	Provides enhanced cohesive strength and durability and resistance to abrasion in thin asphalt surfacings subjected to medium to heavy traffic volumes.
Heavy to very heavy traffic	OLEXOBIT SMA ⁺ (Puma Bitumen proprietary product)	Provides superior cohesive strength, rutting and fatigue resistance in thin asphalt surfacings used on heavily trafficked roads.



Asphalt

Cold Asphalt Mixtures

Cold asphalt mixtures are manufactured with a cutback bitumen binder to enable transport, storage and placement at ambient temperatures. All cutback bitumens manufactured by Puma Bitumen comply with AS 2157, as listed below.

Performance Conditions	Recommended Binder	Notes
Cold ambient temperatures Longer term storage	Puma Bitumen Cutback AMC2	Provides good workability but longer curing times. Generally only suitable for light traffic.
Medium ambient temperatures	Puma Bitumen Cutback AMC3	General purpose cold mix for average conditions.
High ambient temperatures	Puma Bitumen Cutback AMC4	Reduced workability, generally only suitable for placing at higher ambient temperatures, but provides increased stiffness for more rapid curing and higher traffic levels.

GOING *Further*
FOR *Better-Performing*
— ROADS



Health and Safety

To ensure hot bitumen is used in a safe and efficient manner, the following safety precautions must be followed:

- **Wear suitable personal protective equipment (PPE) at all times.** Full skin protection is required to avoid accidental burns when transferring or handling hot bitumen.
- **Always prevent contact between water and hot bitumen** by checking the contents of the previous load before loading bituminous products into tankers and by following procedures to avoid violent boil-over of tanks.
- **Avoid exposure to fumes** by standing back on the gantry or upwind until the vapours have dispersed.
- **Minimise bitumen fume** by heating bitumen and asphalt products to the recommended temperatures.
- **Minimise the use of diesel** when cleaning equipment as this contributes to the bitumen fume.

Safe Handling of SBS-modified PMBs

Polymer modified binders incorporating SBS polymer require close attention to their handling and application to avoid degradation of the binder and exposure to irritant fumes.

When handling SBS based binders it is important to remember the following points:

- **Know the product being handled.**
- **Know the recommended storage and handling temperatures.**
- **SBS-based PMBs have their own unique odour, however, they are safe to use when stored and handled according to recommendations.**

For a full description of hazards associated with the use of bituminous binders, refer to the appropriate safety data sheet (SDS), available on the Puma Bitumen website.

References

- AS 1160 Bituminous emulsions for the construction and maintenance of pavements
- AS 2008 Bitumen for pavements
- AS 2157 Cutback bitumen
- AS 3568 Oils for reducing the viscosity of residual bitumen for pavements

Austrroads Technology Series – Guide to Pavement Technology

- Part 3: Pavement Surfacing
- Part 4: Pavement Materials
 - Part 4B: Asphalt
 - Part 4F: Bituminous Binders
 - Part 4H: Test Methods
 - Part 4K: Seals
- Part 8: Pavement Construction
- Part 9: Pavement Work Practices

Austrroads Technical Report

- AG:PT/T190: Specification Framework for Polymer Modified Binders

Links to further information

Austrroads Technical Publications

Home: austrroads.com.au

Guide to Pavement Technology: austrroads.com.au/road-construction/pavements/resources/guide-to-pavement-technology

Pavement Technology Guides: onlinepublications.austrroads.com.au/collections/agpt/guides

Pavement Research and Technology Reports: onlinepublications.austrroads.com.au/collections/agpt/research-technical

Pavement Technical Notes: onlinepublications.austrroads.com.au/collections/agpt/technical-notes

Pavement Test Methods: austrroads.com.au/road-construction/pavements/resources/pavement-test-methods

Pavement Work Tips: onlinepublications.austrroads.com.au/collections/agpt/work-tips

Bituminous Materials Sealing Safety Guide: onlinepublications.austrroads.com.au/items/AP-G41-15

Australian Asphalt Pavement Association

Home: aapa.asn.au

Advisory Notes: aapa.asn.au/technology-publications/advisory-notes

National Model Specifications: aapa.asn.au/aapa-national-model-specifications

Work Tips: aapa.asn.au/technology-publications/work-tips

Bitumen Burns Cards: aapa.asn.au/technology-publications/bitumen-burns-cards

Australian Road Research Board

Home: arrb.com.au

Knowledge Base: arrb.com.au/Information-services/ARRB-Knowledge-Base.aspx

Publications: arrb.com.au/Information-services/Publications.aspx

Road Research Register: arrb.com.au/Information-services/Road-Research-Register.aspx



Bitumen

Quality

We don't simply rely on our accreditation to AS/NZS ISO 9001 Quality Management Systems to demonstrate our commitment to quality. We go beyond this by maintaining a dedicated Product Steward to ensure our products comply to your specifications, are fit for purpose, are safe to use and don't harm the environment.

Production

Nothing is left to chance in our production plants. We maintain computer-controlled blending facilities that ensure consistent quality - products that comply first time, every time. Even down to the simple things, like sampling from stirred tanks to ensure fully representative samples, our highly skilled production team deliver to you an assurance that our products will work to your requirements.

R&D

The Puma Bitumen National Technical Centre focuses on research and development - from the assessment and approval of imported bitumen through to its performance in asphalt and sprayed seals. Our skilled team of industry-recognised development technologists understands what is important to you - product technology that is robust, cost effective and fit for purpose.

Expertise

We don't just manage the quality performance of our products - we back them up with the right people, with the right skills and experience, who understand your business needs. Our staff are seasoned professionals who have extensive experience in the road industry, covering all aspects of working with bituminous products; from production, testing and quality control through to logistics, product application and support.

GOING *Further*
FOR *Better-Performing*
— **ROADS**



For advice on which product to use to meet your specific job requirements, please call the Puma Bitumen Technical Helpline

FREECALL 1800 24 88 66

or contact the Puma Bitumen Sales Manager in your region.

The information provided in this guide is of a general nature and should only be used as a guide. Please contact Puma Bitumen staff to ensure you have access to the most current information and for advice relating to any particular circumstances. Puma Energy (Australia) Bitumen Pty Ltd makes no warranty as to the completeness or accuracy of the information provided and, to the fullest extent permitted by applicable law, Puma Energy and its subsidiaries are not liable for any costs, loss or damage incurred in connection with use of the information provided in this guide. The material contained in this guide is protected by copyright. Puma Energy and OLEXOBIT are registered trade marks of Puma Energy.

© 2017 Puma Energy (Australia) Bitumen Pty Ltd ABN 78 147 981 020
365 Macarthur Avenue, Hamilton QLD 4007.

This edition published August 2017

For advice on which product to use to meet your specific job requirements, please call the Puma Bitumen Technical Helpline

FREECALL 1800 24 88 66

or contact the Puma Bitumen Sales Manager in your region.

GOING *Further*
FOR *Better-Performing*
ROADS

