



Nypol 103

HOT AND WARM MIX ASPHALT APPLICATIONS

v. 4.0, Nov 2014

Nypol 103 is highly modified elastomeric asphalt binder with exceptional resistance to permanent deformation and cracking. It is a versatile binder suitable for most types of asphalt mixture and a wide range of paving applications.

Performance Attributes

Polymer modification of bitumen reduces temperature susceptibility, creating binders with higher elasticity at in-service temperature while improving resistance to cracking at very low temperatures. The degree to which temperature susceptibility and other properties of the binder are modified is determined by both the type and concentration of the polymer employed.

RESISTANCE TO DEFORMATION

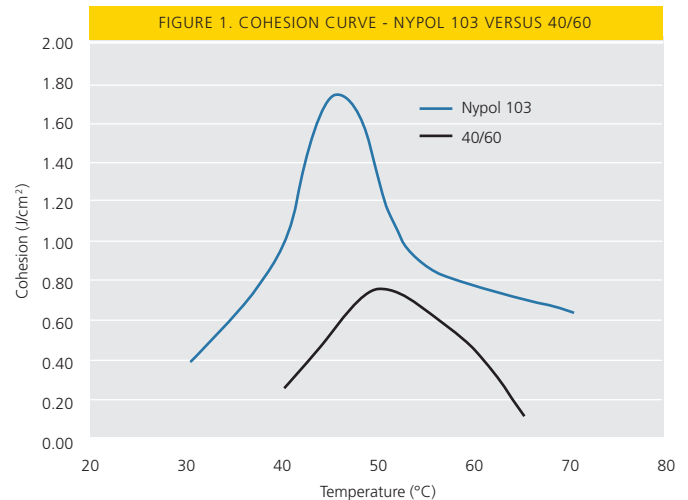
Nypol 103 uses a well established modified binder technology, which has been specifically developed to offer the optimum balance between deformation resistance and flexibility.

Hot Rolled Asphalt (HRA) designed in accordance with Specification for Highway Works, Clause 943 and using Nypol 103 has demonstrated up to 10 times lower wheel tracking rate¹ compared to equivalent HRA using a 40/60 paving grade binder.

TABLE 1. WHEELTRACKING PERFORMANCE		
	WHEELTRACKING RATE (MM/H)	TOTAL RUT DEPTH (MM)
40/60	11	14
NYPOL 103	1	2

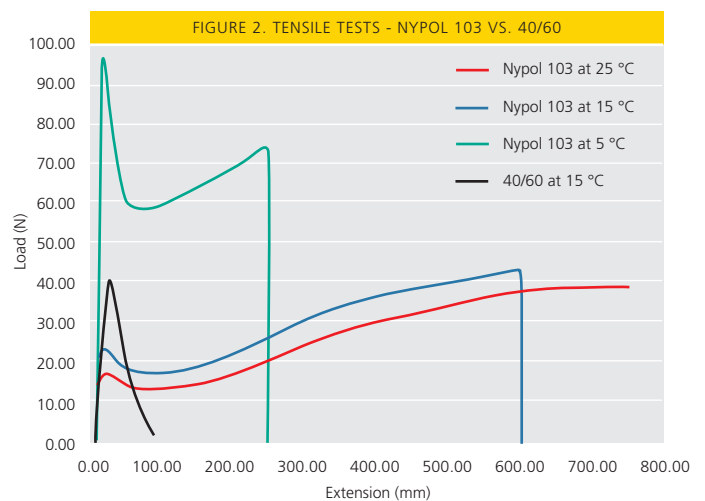
RESISTANCE TO SHEARING FORCES

Cohesive strength is an indication of a binder's ability to withstand the shearing forces induced by turning and braking traffic, particularly during hot weather. Nypol 103 has a very high cohesive strength, with values up to 3 times greater than a paving grade binder, see Figure 1.



FLEXIBILITY AND CRACK RESISTANCE

At low temperatures Nypol 103 exhibits high ductility and exceptional elastic recovery characteristics compared to a 40/60 paving grade bitumen. These properties significantly enhance the flexibility of asphalt, improving resistance against brittle failure and cracking, see Figure 2.



¹ Rutting test at 60 °C



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Technical Information

TABLE 2. TECHNICAL DATA				
PROPERTY	UNIT	TEST METHOD	SPECIFICATION	EN CLASS
Penetration @ 25 °C	0.1 mm	EN 1426	75 - 130	7
Softening point	°C	EN 1427	> 75	3

Nypol 103 is a Polymer Modified Binder (PMB) and complies with EN 14023.

Please refer to the Nypol 103 Product Data Sheet for a full product technical specification.

Applications

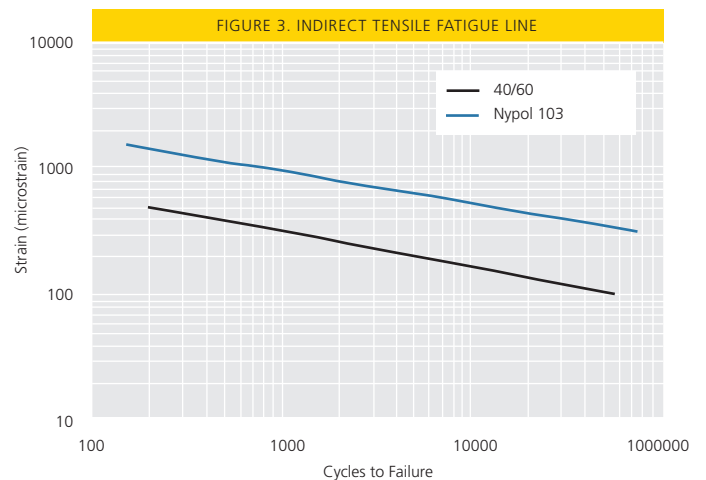
Nypol 103 has been developed for use in heavily trafficked situations, especially where rutting due to slow moving commercial vehicles can be expected. Coupled with significantly enhanced flexibility Nypol 103 offers optimum performance for demanding applications where classical failure mechanisms are predicted. Nypol 103 has been successfully used on the slow lanes of the busiest motorways, on approaches to junctions, bus lanes and airports.



Asphalt Mix Types

Nypol 103 is suitable for use in all types of asphalt mixes. The use of Nypol 103 will enhance the rutting resistance of any well designed asphalt mixture where susceptibility to deformation is a concern; it is particularly suitable for use in Hot Rolled Asphalt (HRA).

Typically asphalt mixtures have a relatively low tensile strength. In situations where excessive movement due to traffic loading, environmental conditions or underlying faults can be expected the high cohesive strength of Nypol 103 offers enhanced resistance to crack initiation and propagation in all types of asphalt mixes.



Optimum performance in any application can only be achieved through appropriate mixture design and best practice construction techniques.

Binder Handling and Asphalt Manufacture

TABLE 3. TEMPERATURE GUIDANCE - ASPHALT PRODUCTION		
ASPHALT PRODUCTION	BINDER TEMPERATURE (°C)	TYPICAL VISCOSITY (Pa.s)
Flash point (EN ISO 2592)	≥ 235	Not applicable
Maximum handling temperature	190	0.2
Typical mixing temperature	165 - 190	0.3
Minimum pumping temperature	140	2

TABLE 4. TEMPERATURE GUIDANCE - SURFACING OPERATION	
SURFACING OPERATION	ASPHALT TEMPERATURE (°C)
Ideal compaction range	160 - 120
Substantial completion of compaction	120

Please refer to the Nypol 103 Safety Data Sheet (SDS), for advice on safe handling.

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Binder Storage

Nypol 103 is a specialist modified binder. Advice should be sought from Nynas Product Support before allowing the product to come into contact with other modified binders.

Nypol 103 is storage stable providing it is stored according to the following guidelines.

SHORT TERM HOT STORAGE (UP TO 2 WEEKS)

The recommended short term storage temperature for Nypol 103 is 165 - 180 °C. The binder should not be heated above 190 °C at any time.

Reducing storage temperature to 150 °C during periods when no asphalt production is taking place will minimise any potential for thermal degradation.

The product should be circulated prior to use and daily during routine asphalt production. In common with other hot asphalt binders excessive circulation should be avoided.

PROLONGED HOT STORAGE (BEYOND TWO WEEKS)

We do not recommend prolonged storage at 165 - 180 °C. However if this is unavoidable the tank should be sampled and tested for suitability every 7 days - contact Nynas Product support for specific advice / guidance on assessing product suitability.

If long term storage is unavoidable, the temperature should be reduced to approximately 110 °C. This will minimise thermal/oxidative degradation and reduce energy costs.

When bringing the product back to its normal storage temperature intermittent heating should be used, to prevent localised overheating. When the binder is at a suitable pumping viscosity it should be circulated for 2 hours before being sampled and tested to evaluate fitness for purpose. For advice on a specific situation please contact Product Support.

Best practice suggests that when bituminous binders are stored at elevated temperatures oxidative ageing can be reduced if the headspace above the binder is kept to a minimum and re-circulation is fed through the bulk material at the base of the tank rather than splash fed from the top.

Please refer to the Nypol 103 Safety Data Sheet (SDS) for advice on safe handling.

Asphalt Production

Nypol 103 is a modified binder that should be handled in accordance with normal industry best practice. During mixing Nypol 103 will behave like an equivalent paving grade bitumen and does not require any special attention or conditions, see also binder storage recommendations above.

The recommended mixing temperature for Nypol 103 is 165 - 190 °C.

The mixed asphalt should be laid as soon as practical after production. Due to the potential for oxidative ageing, prolonged hot storage prior to discharge is not recommended and where practical should not exceed three hours.

Asphalt Testing and Quality Control

Due to the tenacity of the modifier used in Nypol 103 some minor difficulties may be encountered when attempting to extract the binder using solvents. Binder ignition is therefore recommended as the most accurate method for accurate determination of binder content.

Loading and Transportation

It is recommended that asphalt mixtures incorporating Nypol 103 are loaded and dispatched to site within 3 hours of manufacture. Truck beds should be lightly sprayed with a non-solvent based release agent. Diesel or oil should not be used.

As with any hot mix asphalt, the material should be protected against temperature loss. In all situations best practice relative to the working environment and risk of temperature loss should be adopted. The use of fully double sheeted insulated trucks is recommended regardless of ambient weather conditions. On discharge at site the asphalt should be sufficiently hot to allow time for effective compaction. As a guide a target paver-out temperature of 160 °C is recommended.

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Paving and Compaction Operations

Nypol 103 is a modified binder designed to produce optimum in-situ performance in the working environments for which it has been designed. This can only be achieved if the asphalt mixture is properly designed and manufactured and a uniform pavement is constructed to best practice standards. Effective compaction and joint formation are key to the performance of any asphalt. Particular care should be exercised to minimise temperature segregation and ensure any joints are well constructed. When practical, hot match joints formed in echelon are considered best practice*.

If necessary the material can be hand-laid, but as with any performance asphalt care should be taken to minimise placement time to facilitate effective compaction.

*See TRL Road Note 42, 'Best practice guide for durability of asphalt pavements'.

Weather Restrictions

Laying asphalt in inclement weather can increase the risk of insufficient compaction due to rapid cooling of the asphalt layers – particularly thin surfacing materials. Wind chill, resulting from cold weather working and even moderate wind speed can create particularly onerous conditions for laying asphalt surfacing materials.

TRL has produced Project Report 13, 'Acceptable weather conditions for laying bituminous materials', which provides general guidance on suitable laying conditions.

Availability

Nypol 103 is available throughout the UK.

At certain times a 24 hour order lead time is required. Please contact your local Sales Manager/office for further advice.

Product HSE

Nynas is accredited to ISO 9001 for Quality Standards, ISO 14001 for Environmental Standards and OHSAS 18001 for Health and Safety.

For product related HSE information please refer to the corresponding Safety Data Sheet available on request or download from our website at www.nynas.com.

Recycling

Asphalt is considered 100% recyclable. Asphalt materials incorporating Nypol 103 are subject to the same limitations as recycling any regular paving grade bitumen. An appropriate assessment of the properties of the reclaimed asphalt should be conducted during the design of the new asphalt mix.

Product Support

As part of the Nynas product offer, full technical support is available before and after sales from our team of product specialists. Nynas provides assistance and advice to customers on product selection, design and end-performance needs. Contact your local Sales office for further assistance.