

High-Rigidity Base

High Modulus Asphalt Optimized for Japanese Conditions

Base à haute rigidité

Asphalte à haut module optimisé pour les conditions japonaises



What is High-Rigidity Base?

- An upper base course method that uses a high-stiffness asphalt mixture optimized for the Japanese environment through mix design and a dedicated binder, based on High Modulus Asphalt (HiMA), which has been adopted worldwide since its development in France in the 1990s.

* This pavement technology was developed through joint research with Nippon Expressway Research Institute Co., Ltd.

Features

- High stiffness reduces tensile strain at the bottom of the asphalt mixture layer, thereby suppressing the occurrence of fatigue cracking.
- A higher asphalt content improves resistance to fatigue cracking.
- Low air voids improve watertightness, and high stiffness enhances resistance to stripping (by reducing inter-aggregate abrasion), ensuring excellent water resistance.

Quality standard of the dedicated binder

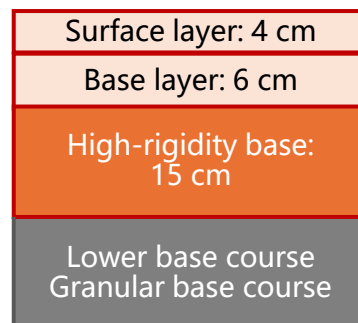
Test item		Reference value
Penetration (at 25°C)	1/10 mm	20 to 40
Softening temperature	°C	44.0 to 65.0
Elongation (at 25°C)	cm	50 or greater
Mass change ratio in thin film oven test	%	0.6 or less
Residual penetration ratio in thin film oven test	%	58 or greater
Penetration ratio after evaporation	%	110 or less
G* (20°C)	MPa	9 to 17

Quality standard of mixture

Item	Target value
Marshall stability (kN)	6.0 or greater
Air voids ratio (%)	2.0 to 3.0
Stiffness (MPa)	9,000 ± 2,500
Number of cycles to failure (passes)	10,000 or greater
Dynamic stability (passes/mm)	1,000 or greater



Finished Surface



Example of pavement cross section

Effects

- High stiffness significantly improves resistance to fatigue cracking, thereby extending pavement service life.
- Low air voids increase watertightness and enhance resistance to stripping.
- Dynamic stability (rutting resistance) is equal to or greater than that of conventional base-course mixtures, making it suitable for heavy-traffic roads.

Demonstration test example

Location	Prefectural road, Aomori Prefecture, Japan
Construction period	December 2022
Traffic volume classification (Pavement design traffic volume)	N6 (1,000 to 2,999 vehicles/day/direction)
Stiffness	10,363 MPa
Number of cycles to failure	67,733 passes
Dynamic stability	6,300 passes/mm

