

# Pavement Materials Utilizing Renewable Resources Deriving from Plants

Matériaux de revêtement à base de ressources renouvelables d'origine végétale



## Introduction

Bio-Binder is a type of binder used in pavement, designed as a sustainable binder that replaces a portion or a significant share of petroleum-based asphalt with bio-based components. With the goals of carbon neutrality and resource circulation, its basic concept is to use plant-derived materials to ensure the viscoelasticity and durability required for paving applications.

## Description for Bio-Binder

Bio-Binder is synthesized as shown in the figure. Plants as raw materials are widely available and can be easily procured.



Plant-derived material (87-88%)



Petroleum-derived material (12-13%)



Bio-Binder



Bio-Binder has these features:

- Has a biomass rate of 80% or higher.
- Strongly bonds with aggregates.
- Can be repaired and recycled.



## Other materials

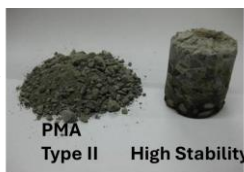
Below are various applications that use plant-derived materials, such as modifiers for bitumen and adhesive waterproofing materials. All of these can be installed using conventional construction techniques.

Items	HS Ascon	HiRAC Adhesive waterproofing	High Rigid Asphalt Concrete (HiRAC)	Bio-Binder
Application	High-stability asphalt concrete	Waterproofing material for slabs	Steel Deck reinforcement method	Biomass mixture
Bitumen Substitution Rate	20% In PMB	100%	45% In PMB	100%
Prior use	Semi rigid asphalt pavement	Water membrane	Steel fiber reinforced concrete	Asphalt pavement
Features	<ul style="list-style-type: none"> <li>• High dynamic stability and oil resistance</li> </ul>	<ul style="list-style-type: none"> <li>• High adhesion at low and high temperatures</li> </ul>	<ul style="list-style-type: none"> <li>• Effective in preventing fatigue cracks in steel decks</li> </ul>	<ul style="list-style-type: none"> <li>• Asphalt-free mixture</li> </ul>



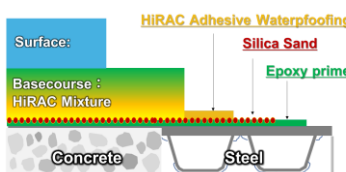
Before

48h



After extraction

HS Ascon

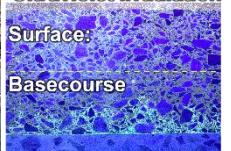


HiRAC



HiRAC Adhesive waterproofing

Ultraviolet Irradiation



T. Hirato, DEVELOPMENT OF HIGH STABILITY HOT MIX ASPHALT CONCRETE WITH HYBRID BINDER, ISAP, 2012

Hui Qu, Development and Evaluation of Pavement Materials Utilizing Renewable Resources Deriving from Plants, 7th E&E, 2021

N. Shitara, Development of Steel Deck Reinforcement Method Using Asphalt Utilizing Plant-Derived Materials, 8th E&E, 2024

