



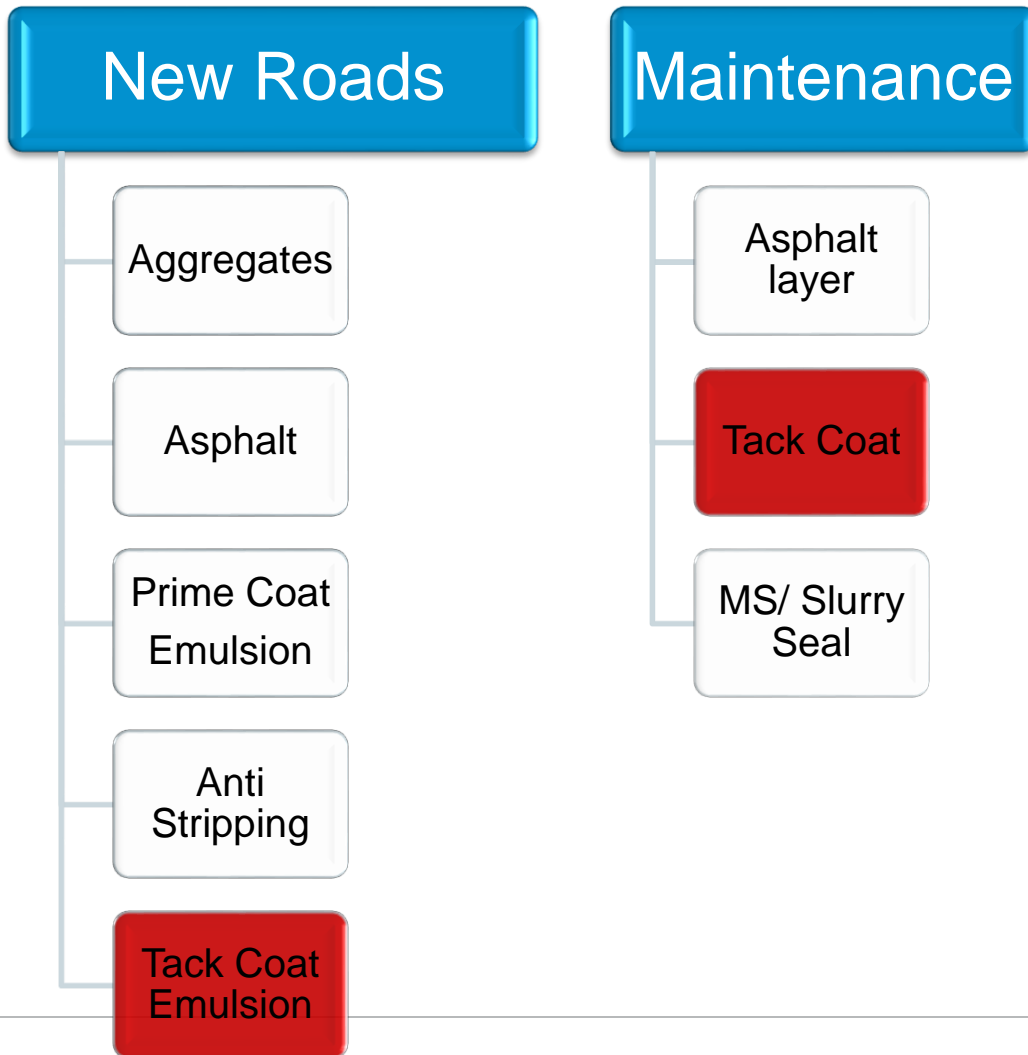
Asphalt Applications

Andrew Tham



Asphalt Applications

Market & product portfolio



Emulsions

Redicote emulsifiers

Viscosity Modifier

Hot Mix

Wetfix Adhesion Promoters

Warm Mix

Rediset warm-mix additives
and compaction Aids

Asphalt Applications

AkzoNobel Adhesion Promoter Technology:

WETFIX® series of Products,

e.g. **WETFIX® BE**

Advantages of using **WETFIX® BE**:

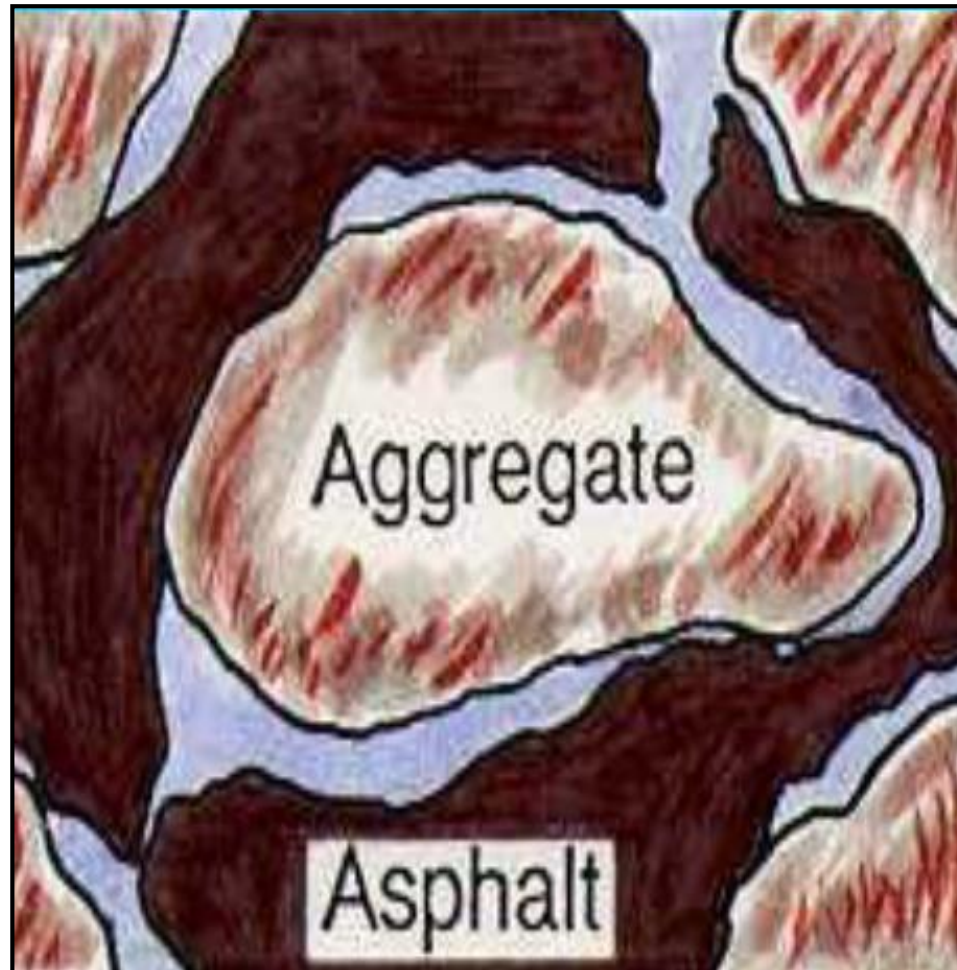
- Safety
- Wider aggregate selection
- Prolongs lifetime of pavement



Good Adhesion

Bad Adhesion

Passive Adhesion Loss



Asphalt Applications

Philippines Field Trial (2014)

Newly paved in Jan-2014:



With 0.30% **WETFIX® BE**

(Left Lane)

Without **WETFIX® BE**

(Right Lane)

Asphalt Applications

Philippines Field Trial (2014)

8 months later in

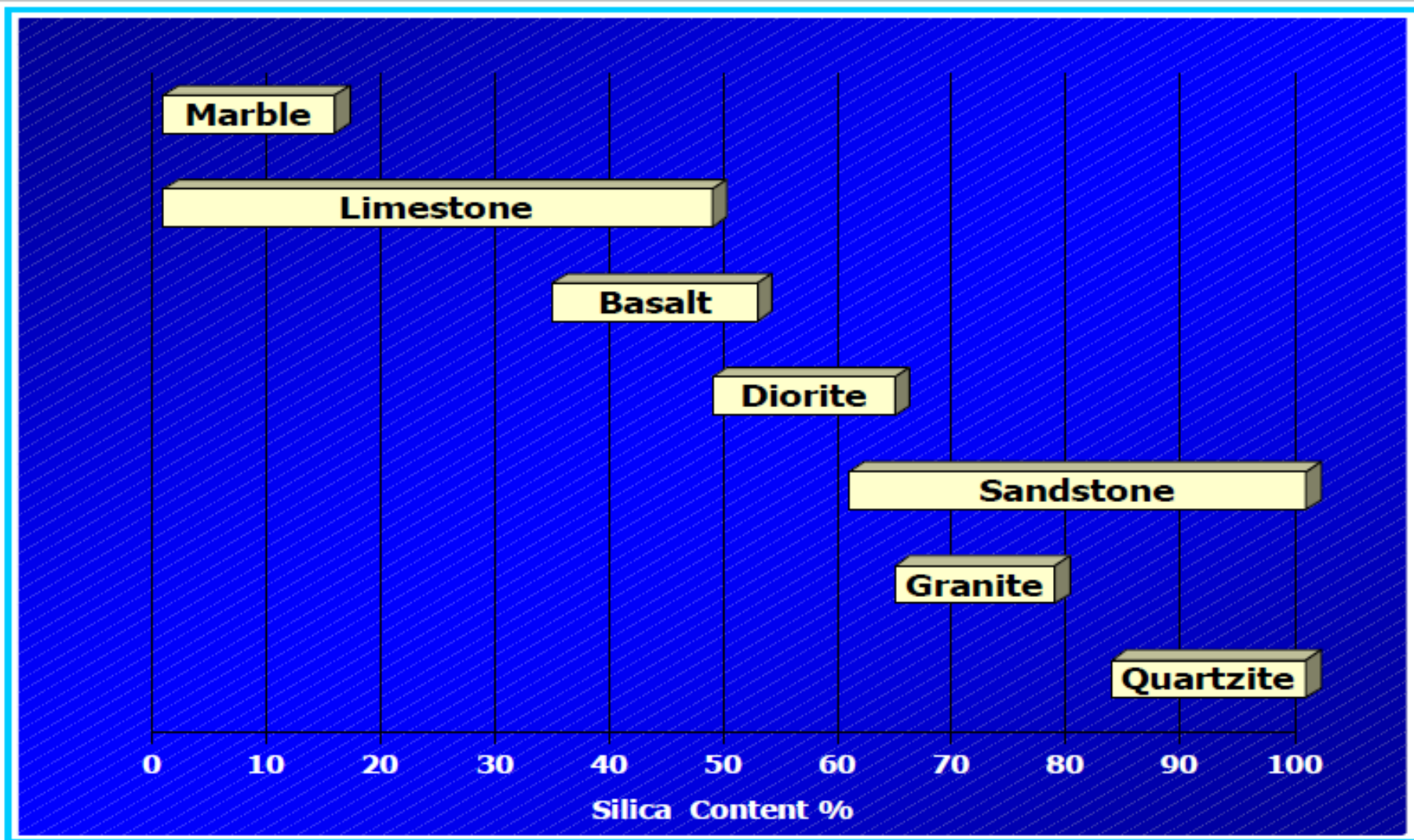
Sep-2014:



With 0.30% **WETFIX® BE**
(Left Lane)

Without **WETFIX® BE**
(Right Lane)

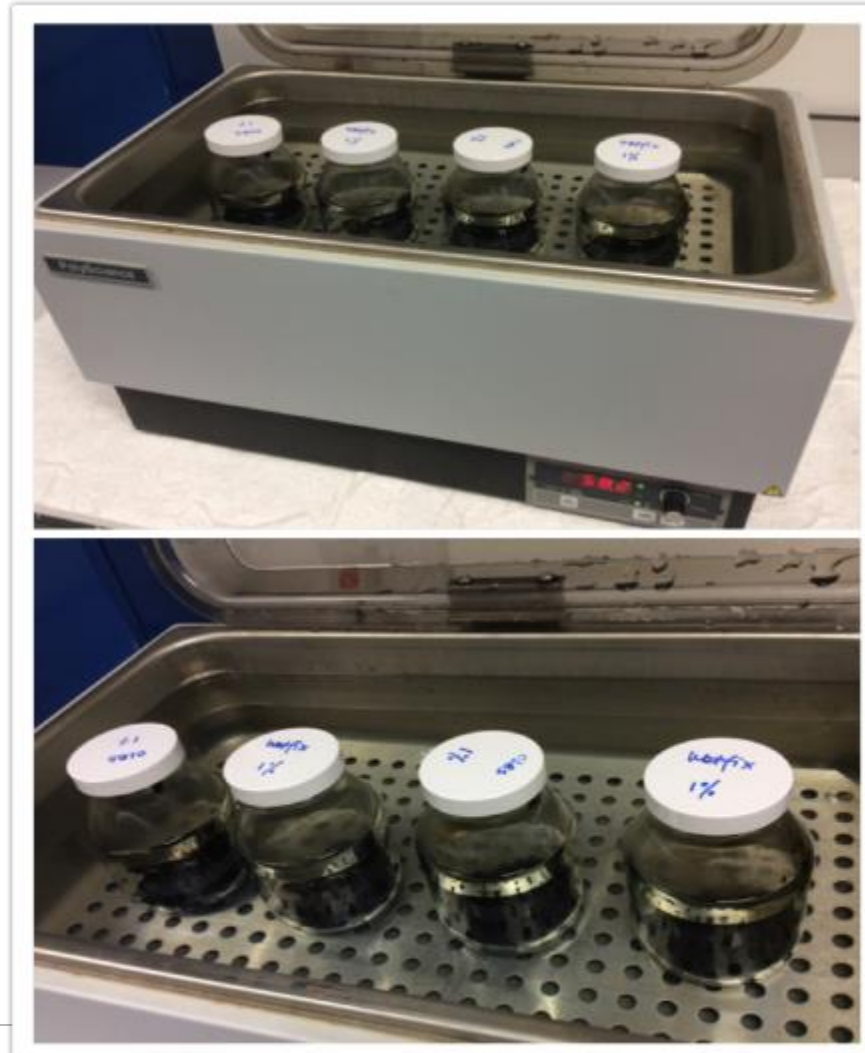
Silica Content of Road Aggregates



Active Adhesion Demonstration

Passive Adhesion

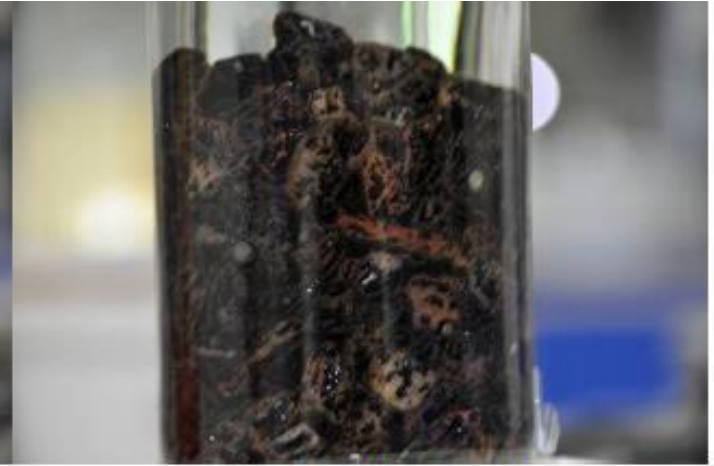
Static Immersion Test



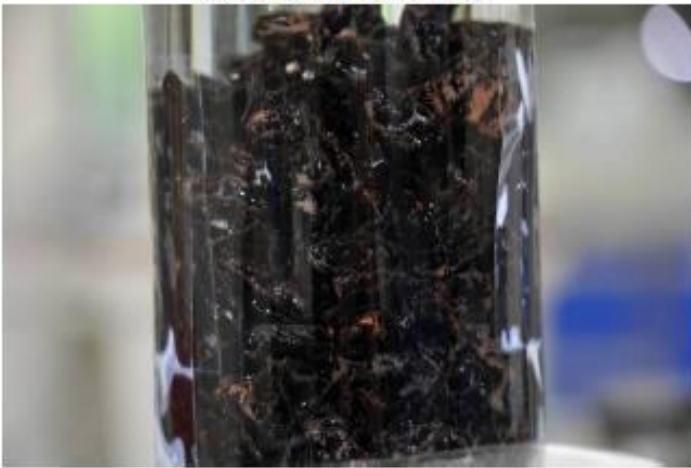
Static Immersion Test



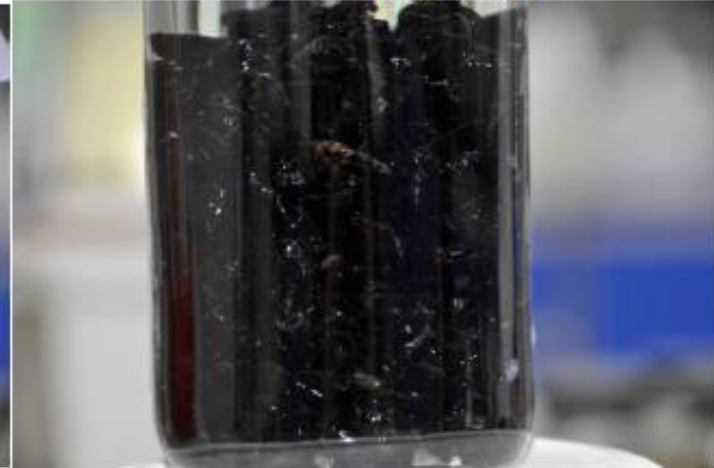
Binder Only



0.2% Wetfix BE

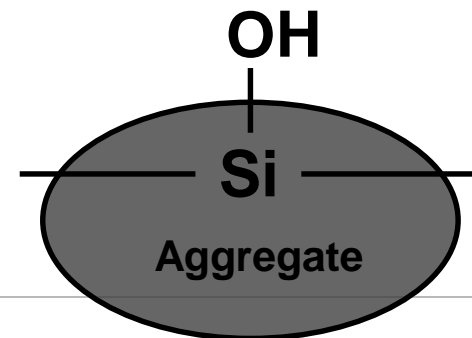
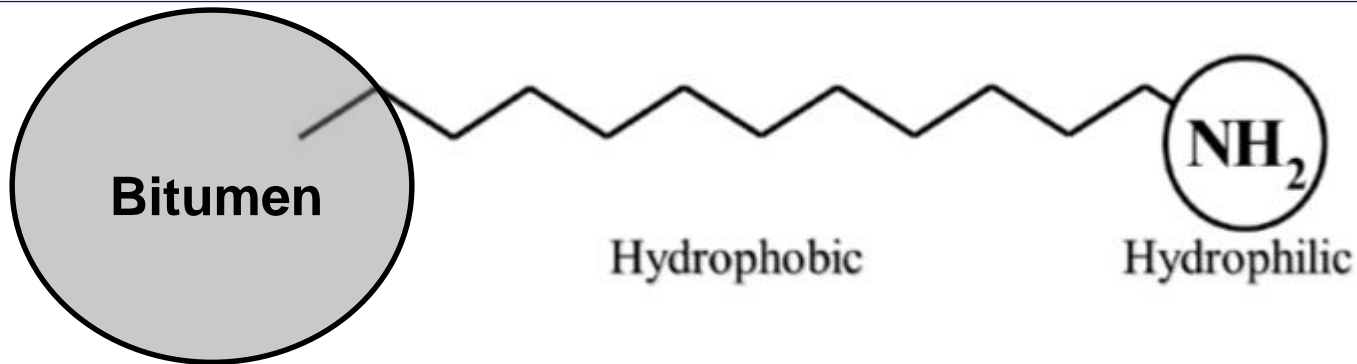
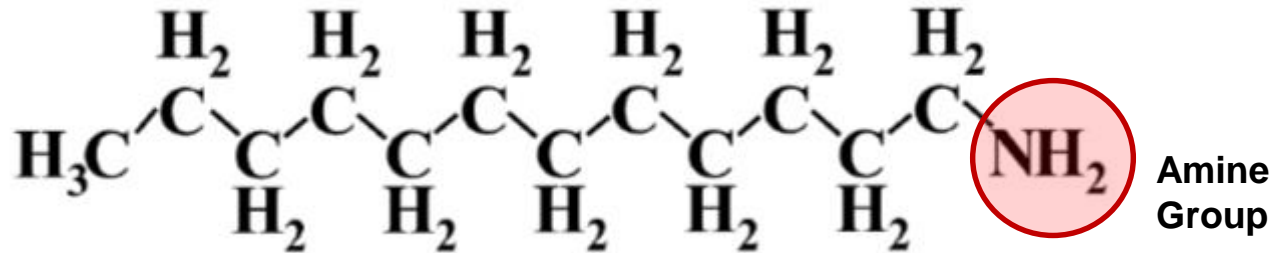


0.4% Wetfix BE

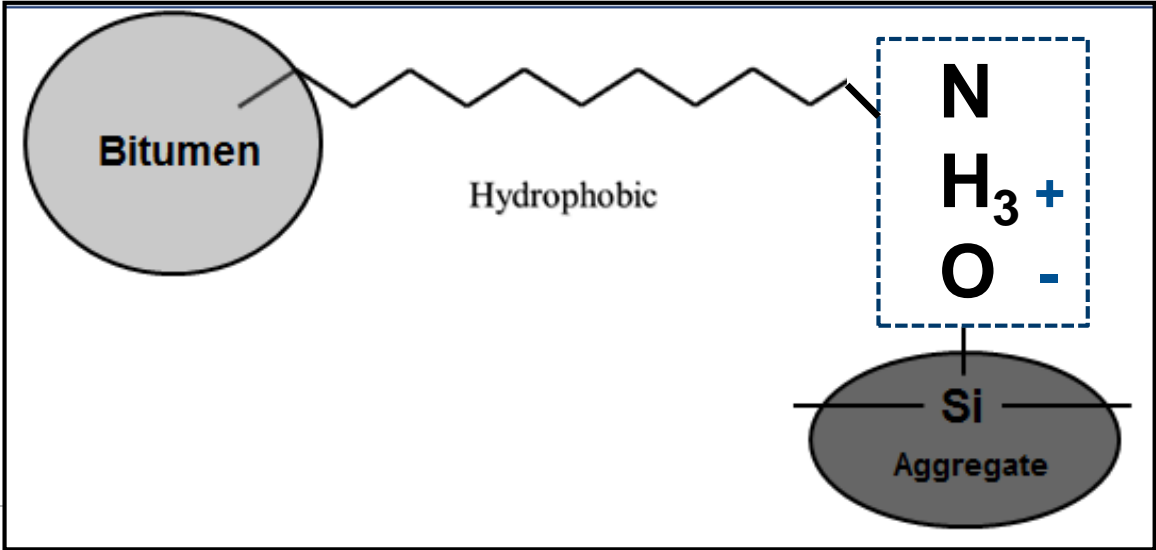
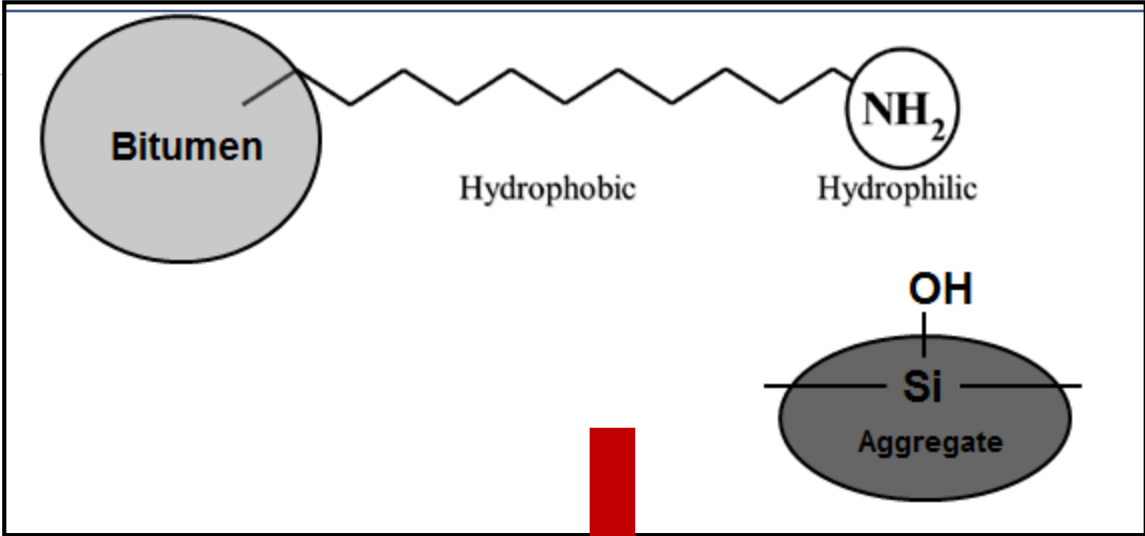


0.6% Wetfix BE

Chemical Structure of WETFIX® BE



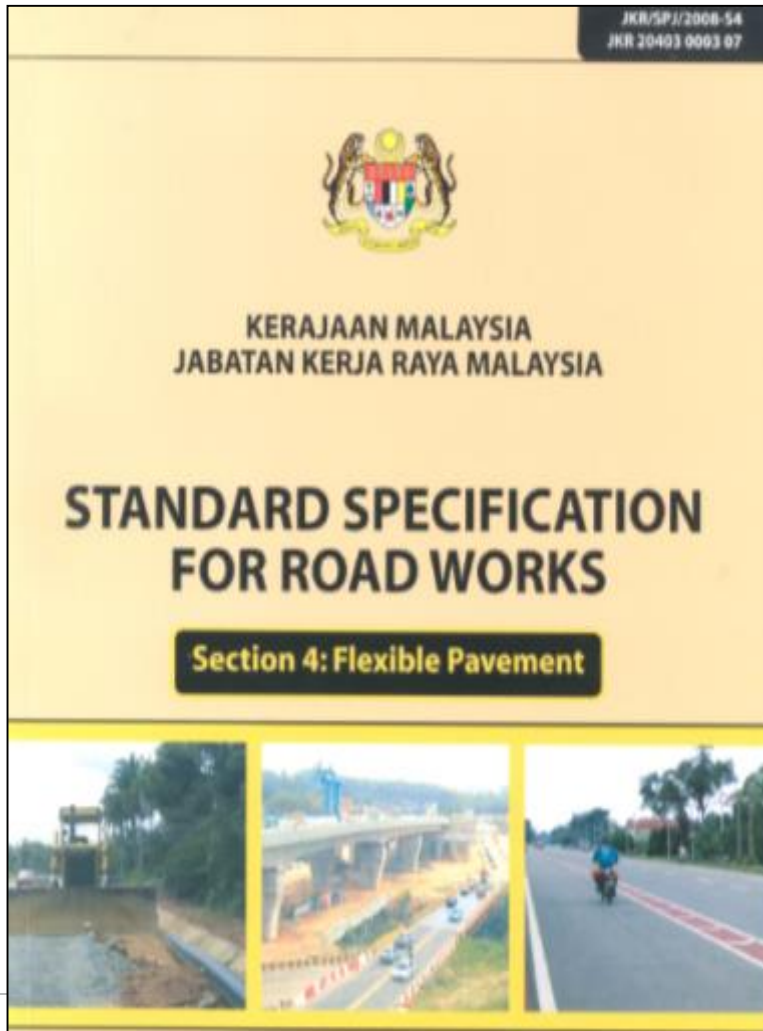
Asphalt Applications



Application of **WETFIX® BE** in
Malaysia

Asphalt Applications

Malaysia recognizes the need for Anti-Stripping agents.



(d) *Cutter and Flux*

Kerosene shall be used as cutter while diesel as flux.

(e) *Precoat and Adhesion Agent*

Precoat shall conform to the following blend:

Bitumen residue (by volume)	50%
Kerosene (by volume)	49%
Adhesion agent (by volume)	1%

Adhesion agent shall be **Wetfix N422** or equivalent.

S4-129

Any substitute must be **equivalent** to Wetfix N422

Asphalt Applications

Recent Malaysia project involving **WETFIX® BE** :

- **Kuala Lumpur International Airport Terminal 2 (KLIA-2) runway/taxiway (2013)**
- *(Undertaken by **Swee Construction**, with a 0.30% dosage for **WETFIX® BE**)*



Malaysia Field Trial (2006)

Condition Before Trial (5-July-2006)



Asphalt Applications

The Culprits?



- Heavy Trucks

- Rains

These factors, including others, make the roads very vulnerable to Water Damage, and hence Stripping.



Malaysia Field Trial (2006)

Newly Paved – Without WETFIX® BE (5-Jul-2006)



Malaysia Field Trial (2006)

3 months later – Without WETFIX® BE (28-Oct-2006)



Malaysia Field Trial (2006)

3 months later – With 0.30% WETFIX® BE (28-Oct-2006)



Asphalt Applications

AkzoNobel

Without WETFIX® BE

4 months



6 months



11 months



Malaysia Field Trial (2006)

Asphalt Applications

AkzoNobel

With 0.30% WETFIX® BE

4 months



6 months



11 months



Malaysia Field Trial (2006)

Application of **WETFIX® BE** in
Indonesia

Asphalt Applications

Indonesia recognizes the need for Anti-Stripping agents.

Nowadays, in some projects especially around the Jakarta regions, it is a **MUST** to use Anti-Stripping Agents.

AkzoNobel's **WETFIX® BE** was the first Anti-Stripping agent to be approved and adopted by the country.

- (3) Bahan aspal harus diekstraksi dari benda uji sesuai dengan cara SNI 03-3640-1994. Setelah konsentrasi larutan aspal yang terekstraksi mencapai 200 ppm, partikel mineral yang terkandung harus dipindahkan ke dalam suatu sentrifugal. Pemindahan ini dianggap memenuhi bilamana kadar abu dalam bahan aspal yang diperoleh kembali tidak melebihi 1% (dengan pengapian). Bahan aspal harus diperoleh kembali dari larutan sesuai dengan prosedur SNI 03-4797-1998.
- (4) **Bahan Aditif Untuk Aspal**
Anti pengelupasan (anti-strips) harus ditambahkan ke dalam bahan aspal. Aditif tersebut haruslah jenis yang disetujui Konsultan Pengawas/Direksi, persentase aditif yang diperlukan dan lamanya pencampuran harus sesuai dengan petunjuk pabrik pembuatnya.
- (5) Disamping aspal Pen 60/70 untuk campuran aspal dapat juga digunakan aspal modifikasi apabila ditentukan dalam kontrak atau disetujui oleh Konsultan Pengawas

Document from Department of Public Works, Indonesia,


stating that all Anti-Stripping Agents must first be approved by the government

Application of **WETFIX® BE** in
Vietnam

Asphalt Applications

AkzoNobel and EDSTACHEM have been working closely with the relevant Vietnam authorities such as **Institute of Transport Science and Technology Road Laboratory (ITST)** on the implementation of **WETFIX® BE** since 2008 .

In a report released by ITST in 2008, the conclusion is as follows:

	<p>INSTITUTE OF TRANSPORT SCIENCE & TECHNOLOGY ROAD LABORATORY NO.III Add: 84 Nguyễn Thị Minh Khai - Wadr 6 - Dist 3 - HCMC Phone: 08.8247191 ; Fax: 08.8244612 ; Email: roadlab3@vnn.vn</p>
<p>Number : 58 /KT/TNTĐĐBIII HCMC, day 27 month 05 year 2008</p>	
<p>5- Conclusion and Recommendation:</p>	
<p>Base on test result which is collected in Table 1, Table 3, Table 5 and all comments from Section 4.2 and Section 4.3, we can conclude as below:</p>	
<ul style="list-style-type: none"> ▲ Anti-stripping agent Wetfix-BE provided by Akzo Nobel reflect many benefits when produce Bitumen Concrete with aggregate and bitument is taken from mixing plant of Construction Joint Stock Company No.6 (JSCONO6) at Long Dinh – Chau Thanh Tien Giang. Specific at below: <ul style="list-style-type: none"> + Improve Coating Criteria 1 level (from level 3 to level 4) + Marshall durability and stability achieve significant improve. + Indirect Tensile Strength attain the best improvement, especially with “Bitumen concrete with everage grading”. ▲ Although Wetfix-BE additive make the Penetration come over the limit, Softening Point reduce, but provide many bebefits in Bitumen Concrete, improve many technical index of Hot Mix compare with only use bitumen ICT 60/70. 	

Vietnam Field Trial (2014)



Vietnam Field Trial (2014)



Asphalt Applications

Other Case References

1. Europe

- Sweden, Denmark, Norway – In Hot Mix specification
- Other European countries – common practices

2. USA

- Common practices in Hotmix, Thin Overlays etc

3. Australia/New Zealand

- Common practices in Chip Seal application

Asphalt Applications

4. China

- TianJin天津市廊坊, GuangZhou 广州佛山, Hebei 河北省仓州 – Recycling
- XinJiang 新疆 - >100mt Wetfix BE – Hot Mix
- Inner Mongolia 内蒙古哈大支线 - acidic aggregates, Hot Mix
- Guangzhou – SMA, acidic aggregates
- Beijing water dam project – water proofing bitumen

5. Other Countries

- Japan - in PMA, & in Porous Asphalt
- South Korea – in PMA, & in SMA

Asphalt Applications

Cost of adding Wetfix®BE

Dosage of Wetfix®BE = **0.30%** (by weight of Bitumen in Hotmix)

Assuming Bitumen % = 5.0% of Total Hotmix

In 1 ton of Hotmix = **150gm of Wetfix®BE**

Cost of Hotmix = **4000 peso/ton**

Cost of Wetfix®BE = 260 peso/kg

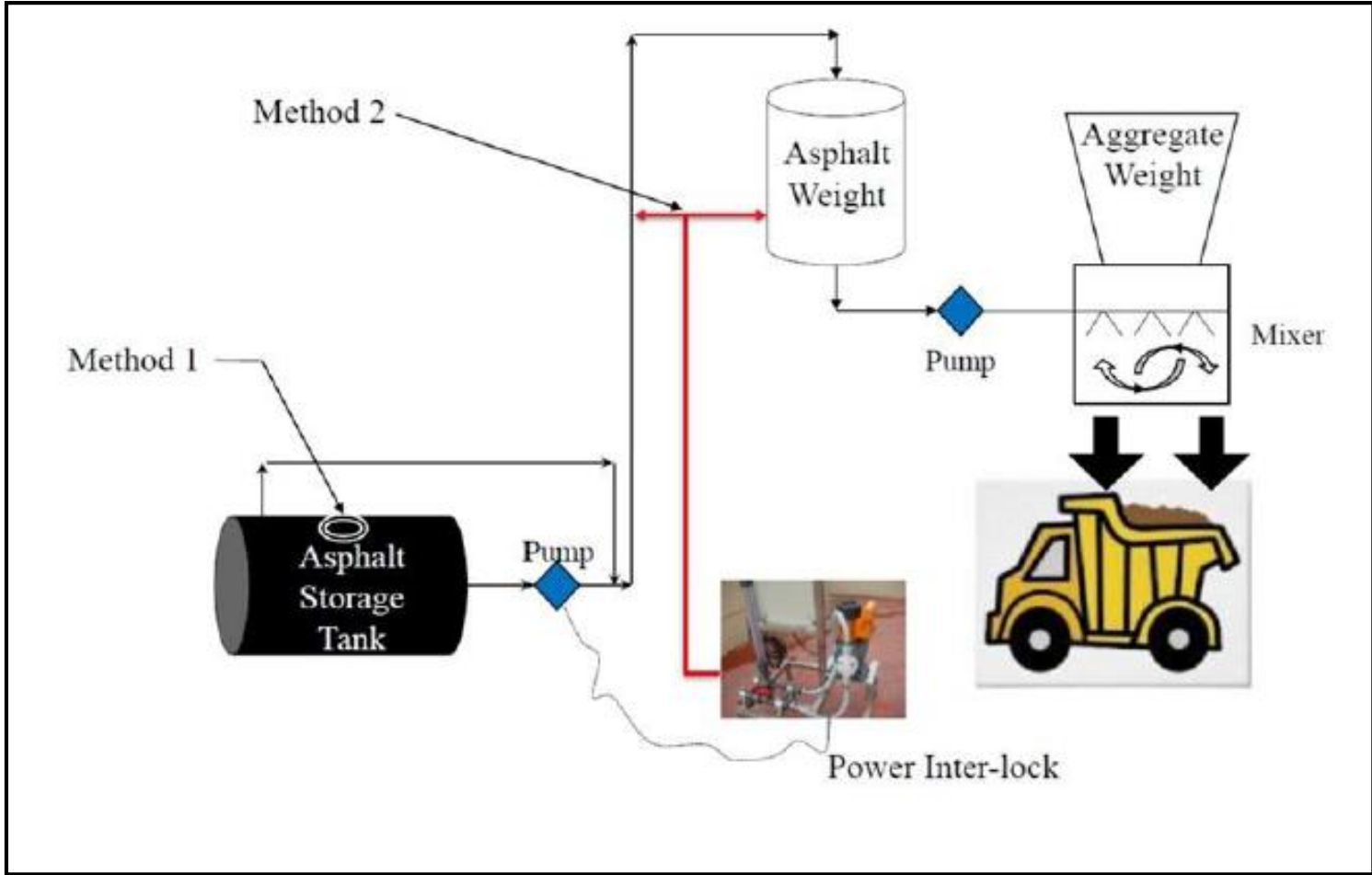
= **39 peso/150gm**

% Cost of adding Wetfix®BE = $(39/4000) \times 100\%$

= **~1%**

Asphalt Applications

How to add Wetfix®BE into Hotmix Plants





Level-2



AkzoNobel

**Dosing Pump directly
connected to Control
Panel for power**

**Wetfix-BE from
Top-up Pail just
outside Control
Room**

Level-2

AkzoNobel

Bitumen
Weighing Station



AkzoNobel