Standardization of Cold Mixed Asphalt in Europe

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Motto: Asfaltové vozovky – bezpečná cesta k prosperitě
Overview

1. Introduction

2. Standardization in Austria / Germany

3. Testing methods in Austria

4. Reactive Cold Mixed Asphalt
1. Introduction

- No uniform standardization in Europe

- In Austria and in Germany there is already a draft of a standardization

- A lot of different Cold Mixed Asphalts in Europe
  - Bitumen emulsions
  - flux bitumen
  - reactive binders
2. Standardization in Austria / Germany (I)

**Austria**
- Valid just for Cold Mixed Asphalts
- Performance oriented test methods
- Different quality classes (declaration matrix)

**Germany**
- Valid for Cold and Hot Mixed Asphalts
- Standard test methods
- No declaration matrix
2. Standardization in Austria / Germany (II)

**Austria**
- Obligated declaration
- First test by an accredited laboratory
- Factury production control
- Once a year a control by external auditor

**Germany**
- No obligated declaration
- Fist test by an accredited laboratory
- Factury production control
- Once per year a control by external auditor
- Site job regulation
- Claims of the customer
2. Standardization in Austria / Germany – Differentiation of Cold Mixed Asphalts

Presumably it will be differentiated between following Cold Mixed Asphalts

<table>
<thead>
<tr>
<th>Austria</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMG-DD</td>
<td>KMG-DSK</td>
</tr>
<tr>
<td>KMG-FL</td>
<td>KMG-F</td>
</tr>
<tr>
<td>KMG-LM</td>
<td>KMG-L</td>
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<tr>
<td>KMG-RE</td>
<td>KMG-R</td>
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<td></td>
<td>KMG-E</td>
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<td>HMG</td>
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<td>WMG</td>
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</tbody>
</table>
2. Standardization in Austria – Characteristic Values (I)

Technical

- Aggregate classification (delivery agreement)
- Binder content
- Marshall stability at 60°C
- Loss of aggregates at -20°C (Cantabric test)
- Tensile splitting strength after storage in water at 25 °C
- Increase of binder viscosity at 60°C
2. Standardization in Austria – Characteristic Values (II)

Application-specific

- Void content
- Flowability at 0°C
- Shelf life
- Workability
2. Standardization in Austria – Characteristic Values (III)

Environmental

- Content of renewable raw materials
- Content of volatile organic carbon (VOC)
2. Standardization in Germany – Characteristic Values

- Grain size distribution
- Binder content
- Softening point Ring and Ball of the recovered binder
- Volume density
- Void content
- Depth of stamp penetration
- Marshall stability at 60°C
3. Standard test methods in Austria – binder content

Extraction of binder by a suitable solvent

\[ BM(\%) = \frac{EW_{tr} - (AW_{tr} + H_2O)}{EW_{tr}} \times 100 \]

\( EW_{tr} \) ...... dry weight before extraction
\( AW_{tr} \) ...... dry weight after extraction
\( H_2O \) ...... weight of water

- Storage of Marshall body in water bath at 60°C
- Force and deformation are recorded
- Marshall stability / Flowing value
3. Standard test methods in Austria – Cantabric test

- Determination of grain loss at -20 °C
- 300 Rounds with 30-33 rounds per minute
- Weigh Marshall body before and after the test

\[ PL = 100 \times \frac{W_1 - W_2}{W_1} \]

PL ... Grainloss (%)  
W1 ... Weight before test (g)  
W2 ... Weight after test (g)
3. Standard test methods in Austria – Tensile splitting strength

- Marshall body is placed into the Marshall press
- The pressure is raised till the body brakes
- Tensile splitting strength is calculated

\[ \beta_{SZ} = \frac{2F}{dl\pi} \]

- \( F \) .... Force when the body brakes
- \( d \) .... diameter of the body
- \( l \) .... length of the body
3. Standard test methods in Austria – Void Content

- Determine particle density
- Determine bulk density
- Ratio → void content

$$H = \frac{\rho_R - \rho_A}{\rho_R} \times 100$$

$H$ ... Void content
$\rho_R$ ... raw density
$\rho_A$ ... bulk density
3. Standard test methods in Austria – Void Content

- Measurement at 0 °C or 7 °C
- After 60 seconds a stamp (300 g) is put on top
- After 4 minutes another 500 g is put on top
3. Standard test methods in Austria – Volatile organic carbon content

- Testing method: GC with FID
- Solvent: CS$_2$
- Determination of VOC`s up to 300 °C (related to the binder)
4. Reactive Cold Mixed Asphalt

- New technology
- Reactive – chemical hardening reaction
- Fast and economical repair-method
4. Reactive Cold Mixed Asphalt - Rephalt

- Chemical hardening reaction with water
- Compaction of the Rephalt
- Hardens within one hour
- No difference in performance to hot mixed asphalt
4. Reactive Cold Mixed Asphalt - Rephalt

- High binder content (extraction)
- Low void content (densities)
- Good flowability (flowability test)
- High Marshall stability (Marshall test)
- Low abrasion (catabric test)
- 0 % of volatile organic carbon (environment)
4. Rephalt – Binder content [M-%]
4. Reactive Cold Mixed Asphalt - Rephalt

- High binder content (extraction)
- Low void content (densities)
- Good flowability (flowability test)
- High Marshall stability (Marshall test)
- Low abrasion (catabric test)
- 0% of volatile organic carbon (environment)
4. Rephalt – Void content [V-%]
4. Reactive Cold Mixed Asphalt - Rephalt

- High binder content (extraction)
- Low void content (densities)
- **Good flowability** (flowability test)
- High Marshall stability (Marshall test)
- Low abrasion (catabric test)
- 0 % of volatile organic carbon (environment)
4. Rephalt – Flowability [s]
4. Reactive Cold Mixed Asphalt - Rephalt

- High binder content (extraction)
- Low void content (densities)
- Good flowability (flowability test)
- High Marshall stability (Marshall test)
- Low abrasion (catabric test)
- 0 % of volatile organic carbon (environment)
4. Rephalt – Marshall stability [kN]
4. Reactive Cold Mixed Asphalt - Rephalt

- High binder content (extraction)
- Low void content (densities)
- Good flowability (flowability test)
- High Marshall stability (Marshall test)
- Low abrasion (catabric test)
- 0 % of volatile organic carbon (environment)
4. Rephalt – Abrasion [M-%]
4. Reactive Cold Mixed Asphalt - Rephalt

- High binder content (extraction)
- Low void content (densities)
- Good flowability (flowability test)
- High Marshall stability (Marshall test)
- Low abrasion (catabric test)
- 0 % of volatile organic carbon (environment)
4. Rephalt – Volatile organic carbon content [M-% of the binder]
4. Reactive products of Vialit – Road repair

- Rephalt
- Repatch
4. Reactive products of Vialit – Joint sealing

- Refug 100
- Refug 2 K
4. Reactive products of Vialit – Sealing buildings

- Rebond KMB
4. Reactive products of Vialit - Coatings

- Resist 2 K
- Resist Top Color
- Resist Top Coat
Thank you for your attention