Asphalt recycling in the Netherlands

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Dutch Asphalt Pavement Association
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• Development / history
• Facts and figures
• Technique
• Requirements
<table>
<thead>
<tr>
<th>Country</th>
<th>Production (million tons)</th>
<th>RAP in HMA (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>34</td>
<td>3</td>
</tr>
<tr>
<td>France</td>
<td>39</td>
<td>7</td>
</tr>
<tr>
<td>Austria</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>USA</td>
<td>327</td>
<td>17</td>
</tr>
<tr>
<td>Germany</td>
<td>45</td>
<td>26</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>10</td>
<td>32</td>
</tr>
</tbody>
</table>
History


- technique
- economy
- policy
Circumstances in the Netherlands

Technique

- available technique
- support by the client
- Dutch standard specifications
Environmental Circumstances

- global environmental awareness
- scarcity of quarry material
- alternative construction materials
Economic Circumstances

- oil crisis
- high bitumen prices
- return on investment
- min. 50% reclaimed asphalt in specs
Summarising

- accepted technology
- co-operation client - industry
- environmental policy
- scarcity of natural aggregates
- waste reduction
- oil crises
Today's incentives

- Dumping not allowed
- Economic value
- Mixing plants equipped
- Standard technical specifications
- Green Procurement
ENVIRON-MENTALITY
Facts and figures

- production HMA 8 - 9 million tns/yr
- 40 asphalt mixing plants equipped for recycling
- RAP 3.5 - 4 million tns/yr
% RAP in HMA

% parallel drum

- 1996
- 1998
- 2000
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
Availability

- right place
- right time
- right quantity
- right quality
Requirements for RAP

- reclaimed bitumen quality
- aggregate size
- aggregate shape
- no pollution
- no tar
- homogeneity
Quality!
Pavement demolition = Preparing valuable material
No Waste!!
RAP = Reclaimed Asphalt Pavement

Quality test on existing pavement
RAP = Reclaimed Asphalt Pavement

Cold Milling:

Possibly in layers
RAP = Reclaimed Asphalt Pavement

Crushing
Percentage RAP in Mix

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage RAP</th>
<th>Reference Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subbase</td>
<td>&gt; 50 %</td>
<td>(98 %)</td>
</tr>
<tr>
<td>Binder</td>
<td>45 %</td>
<td>(90 %)</td>
</tr>
<tr>
<td>Wearing course</td>
<td>35 %</td>
<td>(50 %)</td>
</tr>
<tr>
<td>Porous asphalt</td>
<td>30 %</td>
<td>(20 %)</td>
</tr>
<tr>
<td>Stonemastic asphalt</td>
<td>25 %</td>
<td>( 1 %)</td>
</tr>
</tbody>
</table>
Requirements for hot mix with reclaimed asphalt = hot mix with 100% new materials
Possible solution

Recipe approach

Performance based requirements
Conclusions

Success-factors

- acceptance of technique
- environ-mentality
- co-operation
- return on investment
- market