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# Historical development of noise-reducing wearing courses in Denmark

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## Content

- Experiences with porous asphalt types
- First generation of thin-layer noise-reducing wearing courses
- Danish involvement in the EU SILVIA project
- National “Noise Reduction Group”
- Noise classification system and specification for noise reducing wearing courses

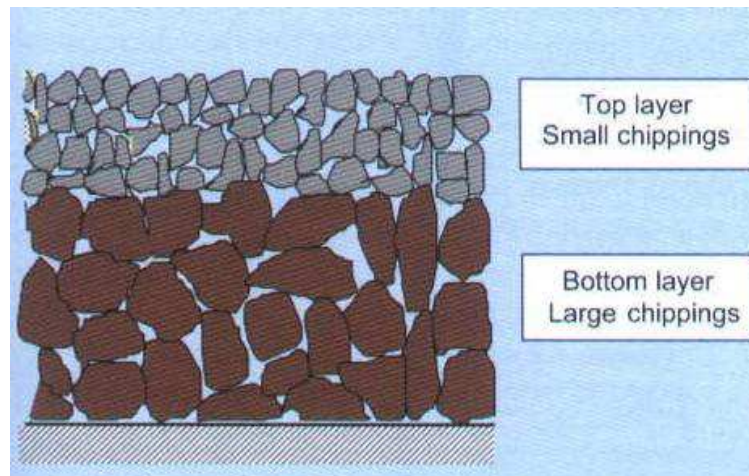
## Conclusion on porous asphalt

- **Noise reduction of 3-4 dB(A) compared to DAC**
- **Structural lifetime app. 7 years. Optimisation needed**
- **Small aggregate size is better**
- **Average speed < 50 km/h no “self cleaning effect”**
- **Special winter maintenance**



## Conclusion on double layer porous asphalt

- Noise reductions up to 6.5 dB(A).
- Both engine and tyre/road noise are reduced
- Optimal solution PA8 on top PA16 or PA22 as the bottom layer
- Sensitive towards side way forces
- Needs cleaning, high-pressure water jetting
- Relatively expensive and requires a lot of planning and maintenance.





## **Thin-layer noise reducing wearing, optimisation of**

- **Ultra Thin Layer Asphalt Concrete**
- **Open graded asphalt concrete**
- **Stone mastic asphalt**

**Mainly focused on:**

- **Open surface texture**
- **Small amount of connecting voids**



## **SILVIA**

**To avoid noise from air pumping:**

- **Open surface texture**

**To avoid noise from tyre vibrations:**

- **Very even surface**
- **As small max. aggregate size as possible**
- **As cubic aggregate as possible**
- **If possible an elastic pavement**

## SILVIA

- SMA 6+ seems to be a promising compromise
- Good skid resistance with small max. aggregate sizes





## Needs

- Comparison of different pavements
- Reference, noise measurement, speeds etc.

## Decision

- Standardisation by  
“National noise reduction working group”
- Participants from asphalt contractors, road authorities and consultants.



## Results of the WG covered:

- Consistent measurement method,  $CPX_{DK}$
- National reference values

$CPX_{DK}$  reference at 50 km/h: 94.0 dB(A)

$CPX_{DK}$  reference at 80 km/h: 102.0 dB(A)

These values are established to represent an 8 years old dense graded 0/11 asphalt concrete or SMA

## Classification and declaration of noise-reducing pavements

### Noise reduction in dB(A)

**Class A: Very good noise reduction**  $x > 7.0$

**Class B: Good noise reduction**  $5.0 < x < 7.0$

**Class C: Noise reduction**  $3.0 < x < 5.0$



**National Noise Classification  
has been published for  
different thin layer  
noise-reducing wearing  
courses such as UTLAC,  
SMA 8, SMA 6+ and OAC.**

 **Noise Classification**  
- Asphalt pavement



Danish Road Institute  
Technical note 61  
2007

## Status

- All Danish asphalt contractors have products in class C and B, some even in class A
- Noise classification system is accepted and used by clients and contractors
- Noise-reducing pavements is widely used on roads near residential areas





## Perspective

- **Model for development of traffic noise with time and traffic**
- **No further noise-reduction by means of traditional asphalt technology**
- **Optimization for ensuring longer duration of noise-reduction, longer structural durability as well as cost reductions**
- **Revise the noise classification system**





Thank you for your attention

Obrigado pela vossa atenção