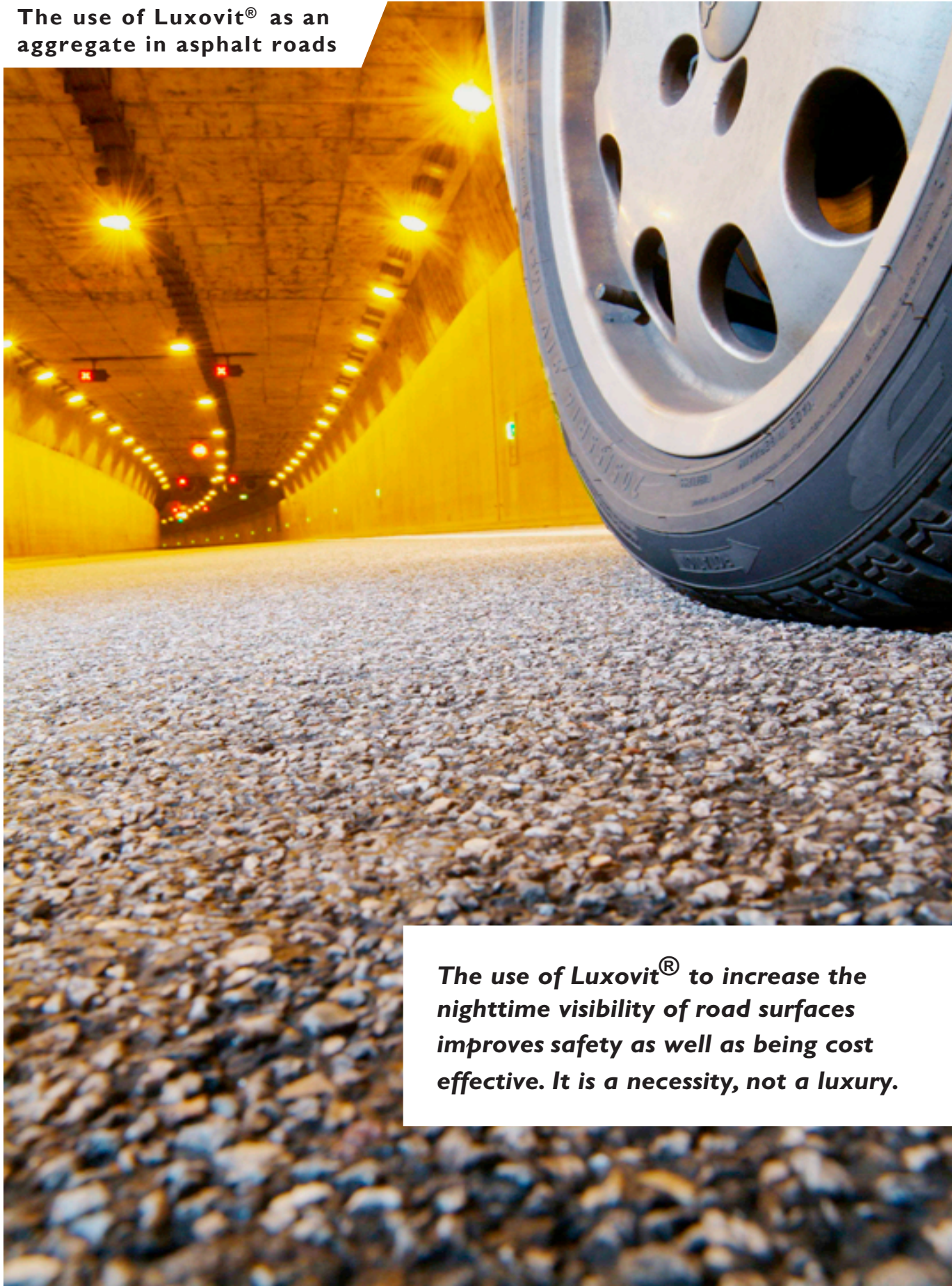




LUXOVIT®

The use of Luxovit® as an aggregate in asphalt roads



The use of Luxovit® to increase the nighttime visibility of road surfaces improves safety as well as being cost effective. It is a necessity, not a luxury.

LUXOVIT®

Luxovit® is calcined flint, i.e. flint that has been calcined, or heated, to high temperatures.

Originally the flint was formed in cavities of lime formations through which water oozed for thousands of years.

Hereby the water liberated silicon oxides in the form of tiny grains. The raw flint still contains about 0.2 % of chemically bound water.

When the flint is calcined to about 1200°C the water is liberated from flints and the stone becomes white and crystalline in character. If thin slices were cut through the stone it would appear transparent. This crystalline structure of the stone is what gives it its extremely high reflectivity of light and heat.

After calcination the white flint is crushed and sieved into the required fractions.

The white crystalline flint, Luxovit®, has a hardness of 7 on the Moh scale, diamond having a value of 10. This is why the Luxovit® is called the "Danish Diamond".

LUXOVIT AS AN AGGREGATE IN ASPHALT

The use of the product as an aggregate in the top layers of asphalt roads greatly increases the light reflection, thereby significantly increasing night time visibility in both dry and wet conditions.

ADVANTAGES

- High anti skid resistance of the road surface.



Luxovit® - the "Danish Diamond" - is produced in Kløv Kær in Denmark.

- High resistance against deformation of the road surface, the highly reflective surface reduces the summer temperature build up of the road by several degrees.
- Good adhesion of the stone to binder, due to the cubic shape.
- Cost savings, initially in investments in road and street lighting and maintenance, thereafter in reduced energy consumption.

Other important advantages:

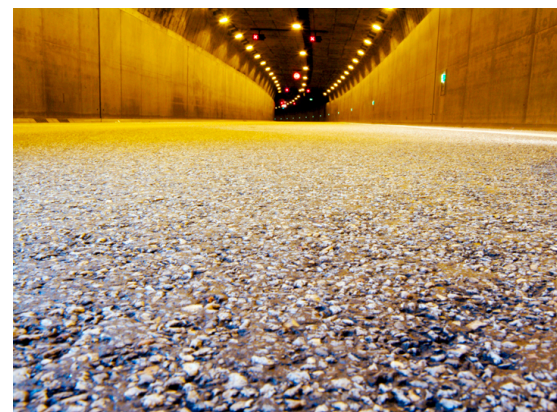
Luxovit® is primarily used in Europe where great importance is attached to the following characteristics of road surfaces:

- Good visibility under wet and dry conditions
- High PSV
- High resistance to deformation in hot, sunny conditions
- High anti skid resistance
- Luminance
- Specular factors
- Remaining luminance
- Luminance coefficient
- Safety of drivers and pedestrians
- Cost effective, low maintenance lighting systems.

On roads without lighting, a driver can see a pedestrian from twice the distance if the surface contains the required amount of Luxovit® compared with standard roads.

In tunnels and other dark areas the road must be illuminated efficiently, mainly for safety reasons.

Tests show that the use of Luxovit® increases the whiteness and therefore the reflectivity of the road, allowing the necessary levels of luminance to be easily achieved.



The Elb tunnel in Hamburg where the asphalt is made with Luxovit®.

INFLUENCE OF THE ROAD SURFACE LIGHTNESS ON THE ROAD LIGHTNING

Road example:

Width of carriageway 8 m, 2 lanes.
Lighting class ME3, 1.0 cd.m⁻²
(CEN TC 169/226 Draft EN)
including additional requirements
for wet road surface.

Mast geometry:

One sided, 3 m from the kerb.
Overhang: -2.5 m.

Luminaires:

100 W or
150 W – Philips SGS 203/-TFG
250 W – Philips SGS 306/250 TFG
Plane screen, mounting
inclination: 3°.

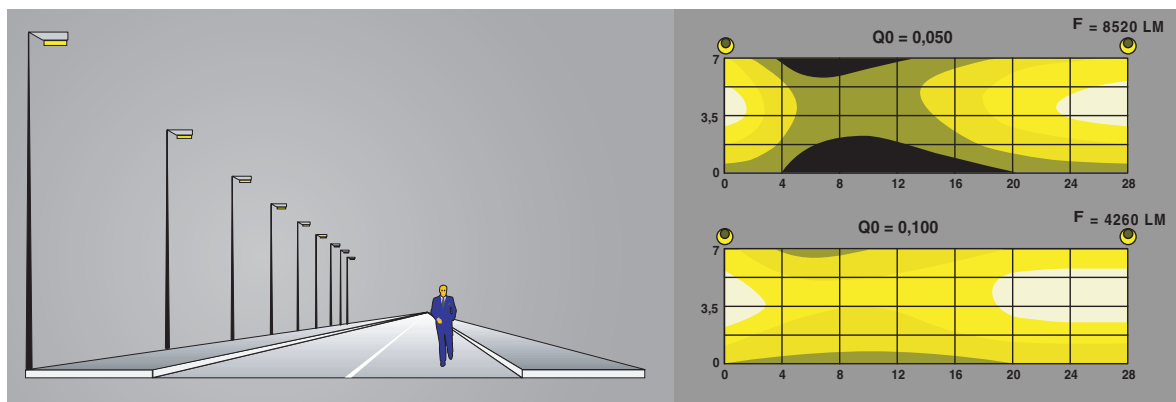
Road surfaces:

Brightness parameter:
Qd according to CEN TC 226

and CIE TC 4-25. (Earlier used
parameter Q0).

Specularity according to standard
reflections tables, r-tables dry
and wet by CIE 4-25.

Increasing Qd from normal dark
to medium light makes the road
surface less specular and makes
it easier to meet the require-
ments of luminance uniformity.



The graphic above shows the difference in the view seen from the driver seat. With a dark roadsurface the driver will meet an endless variation between dark and light areas. With a light roadsurface the variation disappears.

Energy consumption and installation costs

Road surface	Dark without light stone material		Medium light		Light
Qd(cd·m ⁻² ·lx ⁻¹)	0.054		0.078		0.096
(Q0(cd·m ⁻² ·lx ⁻¹))	(0.069)		(0.090)		(0.110)
r-table dry/wet	N3 / W4		N2 / W4		N2 / W4
Height	8 m	9 m	8 m	9 m	8 m
Wattage	150 W	250 W	100 W	150 W	100 W
Masts per km	37	23	32	25	26
kW per km	6.3 kW	6.3 kW	3.6 kW	4.2 kW	3.0 kW
Installation cost per km	DKK 455,000	DKK 375,000	DKK 410,000	DKK 370,000	DKK 370,000
Running costs per km per year*	DKK* 30,000	DKK* 29,000	DKK* 18,000	DKK* 20,000	DKK* 15,000
Under the given condition	*Energy cost: 1.00 DKK per kWh		To achieve such a lightness of the road you have to mix in app. 20% Luxovit® – depending of how dark the rest of the stonemix is		To achieve such a lightness of the road you have to mix in app. 30% Luxovit® – depending of how dark the rest of the stonemix is



The factory at Kløv Kær.

LUXOVIT® - TECHNICAL DATA

SiO ₂	97 %
Na ₂ O + K ₂ O + MgO	1 %
CaO	1,2 %
Fe ₂ O ₃	0,2 %
Al ₂ O ₃	0,5 %
Specific gravity	2400 kg/m ³
Bulk density	1200 kg/m ³
Water content	<0,1 %
Hardness (Moh's scale)	7
Content of organic ingredients	0 %
The contents of grains without fractures do not exceed:	2 %
Alkali silica reactivity:	0 - no cracks (20 weeks)
Water absorption:	2 - 3 %
pH value:	app. 10
PSV:	55 - 60
Free from asbestos. Particles < 5 µ	< 0,2 %

Luxovit® is acid and base proof (normally used acids and bases).

When used under normal conditions in the building and road construction sectors the material can be considered frost proof.

The material is totally crushed and angular-shaped.

SALES AND PRODUCTION:



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