



The Federation of the
EU-Roadmarking-EU –

www.eu-roadmarking.eu

1st ROAD MARKING
SYMPOSIUM
Amsterdam, 2008

David Calavia Redondo

AETEC (Spain)

Amsterdam April 3, 2008

ROAD MARKINGS TYPE II

Rain and road safety

RAIN REDUCES VISUAL PERCEPTION OF DRIVERS

Rain reduces the efficiency of the headlamps:

- *Illumination is reduced because only a portion passes through the raindrops while the rest is scattered*
- *A part of the light is "backscattered" creating a veiling effect (glare)*

Rain reduces the efficiency of the reflected light

- *Raindrops scatter the reflected light distorting the visual perception*
- *Raindrops falling on the windshield may also mask objects*
- *Windshield wipers reduces the visual field of the driver*

Rain and road safety

As a consequence of the reduction of the visual perception

- *drivers are obliged to concentrate their attention directly ahead and*
- *decreases the probability of seeing with the peripheral field*

Potential of the road markings

- *is the unique road equipment placed over the road*
- *they always go along with the road and*
- *they are always directly ahead of the drivers*

Our approach:

ROAD MARKINGS should be considered by road authorities as a good alternative to compensate the drivers for the lack of visibility

Rain and road markings

However,

Wet or rainy conditions depreciate night visibility of road markings

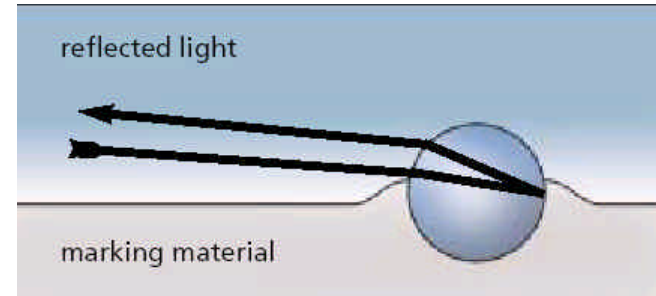
- *Wet conditions occur*
 - *during rain and in periods after rain.*
 - *by dew formation on the road.*

The degree of depreciation depends on the degree of wetness, but may cause almost total loss of reflectivity and visibility in some cases.

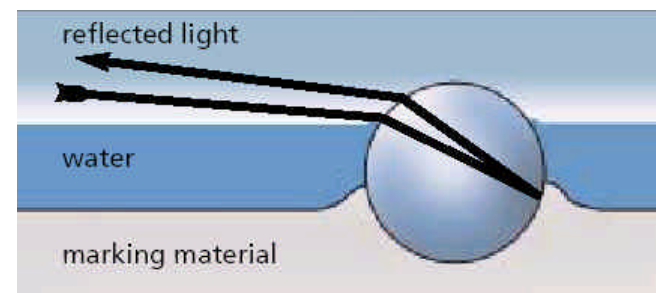
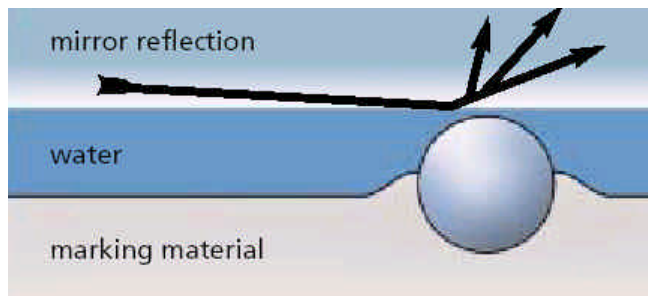
Rainwater creates a smooth mirror-like finish on the road. The headlight beams then strike the road and instead of reflecting back, reflects forward.

Rain and road markings

- Type I (dry conditions)



- Type II (wet or dry conditions)



road markings type II

As defined in EN 1436

type II road markings:

road markings with special properties intended to enhance the retroreflection in wet or rainy conditions

(type I road markings do not necessarily have such special properties)

These road markings can ensure some reflectivity in wet conditions.

due to the darker perception of the pavement, even some reflectivity constitutes considerable improvement.

road markings type II



Requirements for road markings type II

Classes of RL for road markings during wetness

Conditions of wetness	Class	Minimum coefficient of retroreflected luminance R_L in $\text{mcd}\cdot\text{m}^{-2}\cdot\text{x}^{-1}$
As obtained 1 min after flooding the surface in accordance with B.6	RW0	No performance determined
	RW1	$R_L \geq 25$
	RW2	$R_L \geq 35$
	RW3	$R_L \geq 50$
	RW4	$R_L \geq 75$
Class RW0 is intended for cases where this type of retroreflection is not required for economic or technological reasons.		

Classes of RL for road markings during rain

Conditions of rain	Class	Minimum coefficient of retroreflected luminance R_L in $\text{mcd}\cdot\text{m}^{-2}\cdot\text{x}^{-1}$
As obtained after at least 5 min exposure in accordance with B.7 during uniform rainfall of 20 mm/h	RR0	No performance determined
	RR1	$R_L \geq 25$
	RR2	$R_L \geq 35$
	RR3	$R_L \geq 50$
	RR4	$R_L \geq 75$
Class RR0 is intended for cases where this type of retroreflection is not required for economic or technological reasons.		

RL measurement on road markings type II under rainy conditions



RL measurement on road markings type II under wet conditions



Designs of road markings type II

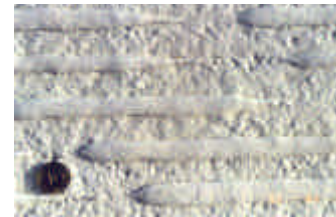
The properties of retroreflection of a road marking, in wet or rainy conditions can be produced:

- by surface texture (as with structured markings),
- large glass beads
- or other means.

In the case of surface texture (profiled road markings) the passage of wheels can produce acoustic or vibration effects which have to be taken into account.

Measurements of luminance factor (β) and skid resistance (SRT) are restricted for structured road markings

Designs of road markings type II



National regulations on road markings type II

Summary of the work presented by Teun van Reeuwijk from CROW in 2006

From a total of 17 answers only 9 had some regulation about type II

country	Austria	Denmark	Germany	Norway	Czech Republic	France	Switzerland	Sweden	UK
<i>Night time visibility</i>									
Type I white	R2, RW2	R2,R3,R4	R3	R2	R2	R3	**) R4, RW4	R2, RW2	R2,RW3
Type II, white	R2, RW2	RW1,RW2	R3, RW2	RW2	R2, RW1, RR1	R3, RW2, RR2	**) R4, RW4	-	R2,RW3
Yellow	R1	R3,R4	R4	R1	R1	R0, R3	**) R4, RW4	R0, RW0	R1

Spain has introduced in 2007 for its national network the use of road markings type II as compulsory with a level of requirement of RW1 and RR1

road markings type II

- 1 *Road markings Type II increases road safety*
- 2 *The benefit/cost ratio of these road markings in terms of road safety is very high*
- 3 *The use of road markings type II have to be considered as a “low cost measurement” and the use must be extended in the European Road Network*