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# Optimized retro-reflectivity performance for traffic signs

# Juergen Ewald, ORAFOL Europe GmbH

### **Optimized retro-reflectivity performance** with constant brightness under difficult traffic conditions

- Geometrical conditions
- Vehicle Headlamps
- Contrast / Glare
- Surrounding conditions (dark/bright)
- Road design conditions
- Retroreflective sheeting requirements





### **Geometrical conditions**

Rotational angle  $\varepsilon$ 

Entrance angle  $\beta$ 

The specific coefficient of retroreflection as a measurable value depending on the geometry.

Observation angle  $\alpha$ 







### Vehicle Headlamps

### Vehicle Headlamp light distribution







### Contrast

# KONTRAST





### Glare







## Bright surrounding







### Dark surrounding







## Road design conditions

### **Complex Geometry**

Low speed, when approaching the sign in a roundabout.

There is the possibility of bigger entrance angles, as well, when the signs are installed with a twist.







### Keeping constant brightness







### How we look at signs







### **Constant Luminance**







# Principles of sheeting technologies

Enclosed type glass beads sheeting, **Design A** 



Legend: 1 Top layer 4 Micro glass beads 5 Distance layer 6 Reflective layer 8 Adhesive layer

### Encapsulated glass beads type sheeting, **Design B**



Legend: 1 Top layer

- 2 Encapsulation 3 Air layer
- 4 Micro glass beads 6 Reflective layer
- 7 Support layer
- 8 Adhesive layer

#### Microprismatic retroreflecticve sheeting,





### Retro-reflective sheeting technologies

### **Micro-glass beads**

**ORALITE ® 5710 Engineer Grade (***Premium***)** 



"Typ 1"-Sheeting

Reflective-Class RA 1

Design A

### **Micro-prismatic**

#### **ORALITE ® 5910 High Intensity Prismatic Grade**



Microprismatic sheeting

Reflective-Class RA 2

Design C

#### **ORALITE ® 5810 High Intensity Grade**



"Typ 2"-Sheeting

Reflective-Class RA 2

Design B



**ORALITE ® 6910 Brilliant Grade** 

Mikroprismatic sheeting

Reflective-Class RA 3

Design C





## Standard traffic sign positions

rural/country road conditions high speed road conditions









### Recommended selection of the type

Traffic signs		standard surrounding brightness			bright surrounding brightness		
		Motorway	Rural area	City area	Motorway	Rural area	City area
All signs	Installation right	RA2	RA1/RA2	RA2	RA2/RA3	RA2	RA3e
	Installation left / overhead	RA2	RA2	RA2	RA3	RA2/RA3	RA3
Railroad crossing signage		_	RA2/RA3	RA2/RA3	-	RA3	RA3
Waiting signs, warning signs, Stop- Signs		RA2/RA3	RA2	RA2/RA3	RA3	RA3	RA3
Construction signing		RA2	RA2	RA2	RA2/RA3	RA2	RA2
Parking/ non-parkingsigns, touristic signing, information signs		RA1					





# Requirements on retro-reflectivity

- Long distance visibility performance for high-speed roads
- Wide angularity performance for ramps an and roundabouts
- Distinguish the sheeting properties in the target of the location
- To add additional safety features to the sheeting characteristics





## **Additional features**

- To add safety features to the sheeting to increase the visibility:
  - at daytime at very dangerous locations, to use sheeting with **fluorescent colours**
  - at sign locations with weather conditions of dew-forming on the signs, using specific Anti-Dew overlays
  - At sign locations, where graffiti or sticker will destroy the sign, using Anti-Graffiti overlay





### **Additional Properties**

### Anti-Graffiti Overlay Fluorescent colour





### Anti-Dew Overlay







# Modern production technologies

- Digital Printing of traffic signs
  - High flexibility
  - Production on demand
- Automated plotter cutting











# Summary

- Retroreflective sheeting are distributing the incoming light
- Depending on the design of sheeting properties for wide angularity or long distance characteristics can be designed
- The selection of the sheeting type depends on the sign position
- Additional features can be added to enhance the visibility





# Thank you very much for your attention!





