Modern Technologies in Road Traffic Signs

Overview
1. Traffic Sign Requirements
2. Retroreflective Technology
3. Environmental Aspects
4. Driver’s Needs - Effectiveness
1. Traffic Sign Requirements (CIE No. 74)

- Conspicuity
- Legibility (at all conditions and relevant distances)
- Comprehensibility (ease of understanding)
- Credibility (driver to act upon sign)
Traffic Sign Requirements (CIE No. 74)
Figure 24: A general model of factors that affect the effects of traffic signs on road safety.

Conspicuity and Legibility

What you see during the day

Is not always what you get at night
RETROREFLECTION

Incident Light Beam

Reflected Light Beam

Glass Bead

Cube Corner

Two Systems of Retroreflection
Retroreflective Sign Sheeting History

1939: Birth of the first Scotchlite product
1940

1948: Development of Engineer Grade sheeting
1949: Introduction of retroreflective fabrics
1950

1965: Introduction of Scotchlane marking tapes
1960

1971: Introduction of High Intensity Sheeting
1970

1976: Introduction of Stamark marking tapes
1980

1988: Introduction of Diamond Grade sheeting
1990

2000: Introduction of Diamond Grade Cubed sheeting
2005

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Light Return Efficiency

- Light Retroreflected (%)
  - Glass Beads
  - Paint
  - Class 1
  - Class 2
  - Class 2 Prismatic
  - Class 3A Prismatic
  - Class 3A + 3B Full Cube
  - Full Cube

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‘Use Table’ Spain

**TABLE 701.3**
**CRITERIA FOR SELECTING THE MINIMUM LEVEL OF RETROREFLECTION**

<table>
<thead>
<tr>
<th>TYPE OF SIGN OR NOTICE</th>
<th>LOCATION OF SIGN OR NOTICE</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>URBAN FRINGE AREA (side streets, ring roads)</td>
<td>MOTORWAY, DUAL CARRIAGEWAY AND FAST LANE</td>
<td>CONVENTIONAL ROAD</td>
<td></td>
</tr>
<tr>
<td>POLICE SIGNS</td>
<td>Level 2 (**)</td>
<td>Level 2</td>
<td>Level 1 (*)</td>
<td></td>
</tr>
<tr>
<td>GUIDE SIGNS</td>
<td>Level 3</td>
<td>Level 3</td>
<td>Level 2 (**)</td>
<td></td>
</tr>
</tbody>
</table>

(*) “Level 2” must be used for signs indicating danger warnings, priority and no entry.
(**) The suitability of “Level 3” must be studied whenever the surrounding lighting hinders visibility where it is thought necessary to increase road signs and in areas where large traffic flows converge or diverge, intersections, junctions etc.
Performance Classes

prEN 12899-6 ‘Visual Performance’

- Guideline for the Selection of Performance Classes

≈ Class 1 ‘Inadequate Performance…’
≈ Class 3 ‘Much better performance, but still reduced compared to daylight’
3. Environmental Aspects

(Prismatic Reflective Sheeting Production compared to Glass Bead 'Class 2')

- Saving in VOC emission: -97%
- Reduction of Solid Waste: -46%
- Saving in Energy Consumption: -77%
Traffic Signs & Traffic Safety

Is it effective?

Conspicuity

Visibility

Readability

Intelligibility

Motivation

Understanding

Compliance

Reduced risk

Less accidents

Figure 24: A general model of factors that affect the effects of traffic signs on road safety

4. Driver’s Needs - Effectiveness

Review of latest research

1. Subjective Rating
2. eye tracking study
3. % drivers served concept
On-Road Test
‘Traffic Sign Performance’
Glass Bead vs. Microprismatic Technology

Kuratorium für Verkehrssicherheit KfV, Vienna, 2005
Authors:
Dr. Michael Gatscha
Sandra Reichenauer

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On-Road Test

Glass Bead vs. Prismatic
Class RA 2 according EN 12899-1

![Graph showing luminance vs. distance for Glass Bead and Prismatic materials.](image)
On-Road Test

subjective brightness rating

- Prismatic Class 2 Technology is ‘bright enough’ for 74%
- Glass Bead only ‘bright’ for 42%
Perceived brightness often correlates with age.
Analysis of eye movement characteristics for different performance classes of retro-reflective traffic signs

Kuratorium für Verkehrssicherheit KfV, Vienna, 2006
Authors:
Dr. Michael Gatscha
Günther Schreder
Sandra Reichenauer
Eye Tracking study Vienna

Eye tracking equipment: monitors and records eye movements

On-Road scene and viewing direction

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Objective

Two different classes of retro-reflective traffic signs

- Class 2  EN 12899-1
  “current“ ( ~ 80% use of glass bead technology in Europe)

- Class 3  DIN 67520
  “state of the art“ (full cube microprismatic, „DG³“)
Conclusion

- Information on Class 3 traffic signs was perceived faster
- Class 3 traffic signs have a positive impact on observation behaviour and on traffic safety itself
- Drivers have potentially more time to concentrate on other essential stimuli in traffic (e.g. pedestrians, cars, obstacles...)

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- Calculated ‘Percent Drivers Served’ level for an overhead sign with large letters (representative of motorways).

- Glass bead technology (Class RA 1 and RA 2) can only satisfy the performance expectations of a small percentage of drivers.

- Microprismatic materials give much better service levels, closer to the benchmark performance.
Questions?
Traffic Safety Systems Division

Thank You