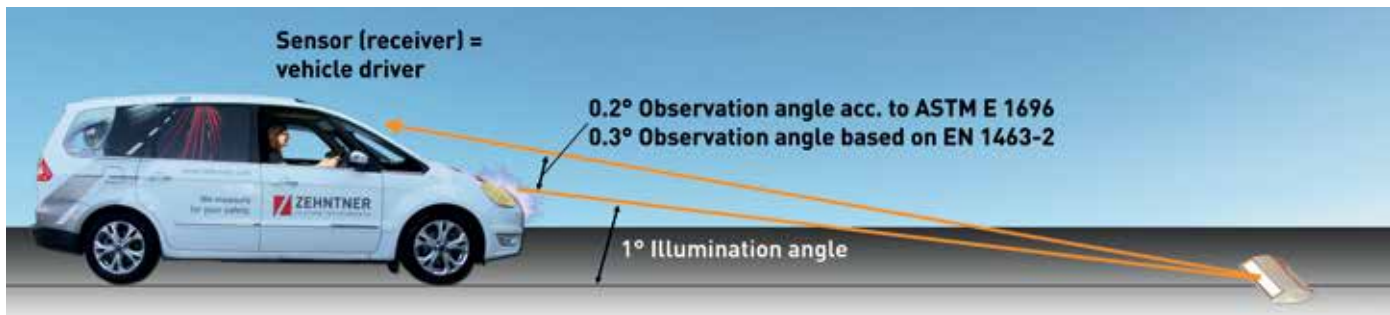


Testing visibility in the field

Raised retroreflective pavement markers are an asset both economically and socially, but they must be maintained. Technology is ensuring that testing is carried out efficiently, so that the road safety budget can go further

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Visibility is a key factor in road traffic safety. To assist and guide road users, several countries use raised retroreflective pavement markers, so-called road studs, to supplement road markings and traffic signs. They come in a variety of shapes, colors and materials, and serve as horizontal guiding devices that reflect light from the headlight back to the driver. Road studs may be constructed from one or more integral parts, and may be bonded to, anchored on or embedded within the road surface.

Although pavement markers are available that are compatible with snowplows, countries with colder climates and frequent snowfalls usually use fewer road studs. For example, Switzerland does not use retroreflective pavement markers, while in the UK they are very widespread.

Local standards

There are numerous local standards and regulations to be observed. In Europe, the most important standards are EN 1463-1, which defines the initial performance requirements, and EN 1463-2, which outlines road test performance specifications. In

the USA, the Manual on Uniform Traffic Control Devices (MUTCD) defines the nationwide standards applicable by road managers for the installation and maintenance of traffic control devices on all public streets, highways, bikeways and private roads open to public travel. While the MUTCD states general requirements and application regulations, the US standard ASTM E1696 defines specifications for field measurements. ASTM E1696 is not only used in the USA, but also in many other countries. Some states supplement the MUTCD with their own specific rules. For example, the state of Illinois released a supplement with a whole chapter about the inspection of reflective pavement markers.

Regular field tests

To guarantee ongoing traffic safety, an initial performance test is not sufficient. Retroreflective pavement markers are subjected to wear and tear, so regular field tests and a structured maintenance policy are required to ensure that repairs or replacements are carried out in due time.

While it may make sense to carry out the

initial performance test in a laboratory using a goniophotometer, it would be a waste of time and material to extract raised pavement markers from the road for field tests. It is much easier and more cost-efficient to use a handheld retroreflectometer for on-site field measurements of the night visibility (coefficient of luminous intensity R and R_v) without extracting them. Zehntner offers the portable handheld retroreflectometer models ZRP 6030 and the newly launched ZRP 6030+. The operator simply places the retroreflectometer onto the pavement marker and, with a press of a button, the night visibility, ambient temperature, relative humidity and, optionally, the GPS coordinates, are recorded. The night visibility measurements are related to the visual observation as seen by a car driver at distances of approximately 220m (722ft) or 440m (1,444ft) for trucks, both under low-beam headlight illumination.

Zehntner retroreflectometers are appreciated worldwide for their fast and easy operation, as well as their Swiss precision. The new ZRP 6030+ comes with a 5.7in (14.5cm) high-resolution color

Opposite: **The observation angle requirements of road stud measurements differ, depending on the country developed for**
 Below: **Zehntner's ZRP 6030+ retroreflectometer is used to measure the night visibility of road studs**



touchscreen with excellent visibility under all light conditions.

Software advances

Measurements are nearly useless if not evaluated and processed in an intelligent and efficient manner. Therefore, Zehntner has enhanced its powerful free mapping and data analysis software, MappingTools, to also support the newly launched ZRP 6030+. Thus, retroreflection measurements of raised pavement markers, road markings and traffic signs can all be displayed at the same time on the same map. Furthermore, the retroreflection measurements can be analyzed according to individual specifications. The color-coding of retroreflection ranges classifies the measurements into different quality levels, which enables a quick visual evaluation. The retroreflective quality of the object or marking can be seen at a glance, showing where maintenance measures would be of the most benefit.

Zehntner devices and software are designed for maximum compatibility with all existing systems and procedures. Measuring reports, which are available in several languages, can be generated as PDF and XLS files and it is possible for the data itself to be imported to external geographic information systems. ■

Innovation first...



ZDR 6020 Dynamic Retroreflectometer R_L
 measures the night visibility of road markings
 handheld precision at traffic speed
 up to 150 km/h (93 mph)



ZRM 6014 Retroreflectometer R_L/Qd
 measures the day and night visibility of road markings
 top class with colour touchscreen and fold-away telescopic handle
 and unique options such as camera, compass, level-meter



ZRM 6013+ Retroreflectometer R_L/Qd
 measures the day and night visibility of road markings
 fast, precise with memory, PC and printer interfaces



ZRM 6006 Retroreflectometer R_L/Qd
 measures the day and night visibility of road markings
 fast, precise retrometer with one button operation



ZRS 6060 Retroreflectometer R_A
 measures the night visibility
 of road signs and warning clothes
 triple angle measurements
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**fast
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