



# Test Method T1416

Field measurement of retroreflective signs using a portable retroreflectometer

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## About this release

<b>Title:</b>	Field measurement of retroreflective signs using a portable retroreflector
<b>Test method number:</b>	T1416
<b>Author:</b>	Materials Technology
<b>Authorised by:</b>	Director Pavements and Geotechnical

## Summary of changes

Issue number	Clause number	Revision description	Authorised by	Publication date
Issue 1.0	All	New issue	Director Pavements and Geotechnical	June 2020

*Note: The functions of the former State Government agency Roads and Maritime Services (RMS or Roads and Maritime) are now administered by Transport for NSW.*

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# Test Method T1416

## Field measurement of retroreflective signs using a portable retroreflectometer

### 1 Scope

This test method covers the measurement of the retroreflective properties of sign materials such as traffic signs and symbols (vertical surfaces) using a portable retroreflectometer.

This test method is intended to be used for the field measurement of traffic signs. It may also be used to measure the performance of sign sheeting materials before placing the sign in the field; or before adhering the sign sheeting material to the sign (blank or backing).

This test method covers measurements at a 0.2 degree ( $^{\circ}$ ) observation angle.

*NOTE: This test method can also be used with a retroreflectometer capable of taking measurements at 0.5 $^{\circ}$  and 1 $^{\circ}$ .*

### 2 General

This test method can be used to determine the retroreflectivity value of retroreflective signage before cleaning (as discovered), after cleaning or both.

Table 1 has a list of terms and definitions used in this test method.

**Table 1. Terms and definitions**

Term	Definition
Coefficient of retroreflection ( $R_A$ )	The ratio of the coefficient of luminous intensity of a plane reflecting surface to its area, expressed in candelas per lux per square metre (cd/lx/m <sup>2</sup> ).
Cleaned	Testing surface is prepared so that prior to testing, there is no dust, oil, dirt, or any other contaminants.
As discovered	Testing surface where no cleaning is required.
Entrance angle ( $\beta$ )	The angle between the illumination axis and the retroreflector axis.
Observation angle ( $\alpha$ )	The angle between the illumination axis and the observation axis.
Portable retroreflectometer	A hand-held instrument that can be used in the field or in the laboratory for measurement of retroreflectivity.

Term	Definition
Retroreflection	A reflection in which the reflected rays are returned preferentially in directions close to the opposite of the direction of the incident rays. This property is maintained over wide variations of the direction of the incident rays.

### 3 Equipment

- (a) Portable retroreflectometer that satisfies the requirements for both the entrance angle of  $-4^\circ$  and observation angle of  $0.2^\circ$  ( $0.5^\circ$  or  $1.0^\circ$  are optional). The instrument must have the capability to select the colours of white, yellow, red, green, blue, and brown.
- (b) GPS unit (if required).
- (c) Certified calibration/check standard of known retroreflectivity.
- (d) Extension pole for accessing signs (if required).
- (e) Cleaning cloths that is non-abrasive (both dry and damp).
- (f) Water (if required).
- (g) Mild detergent (if required).
- (h) Worksheets.

### 4 Preparation

- (a) Attach the GPS unit to the retroreflectometer (if required for the job).
- (b) Switch on the retroreflectometer as per the manufacturer's instructions and allow it to reach equilibrium and ensure the GPS signal is received (if used).
- (c) Carefully place the calibration/check standard on the unit, measure the certified calibration/check standard, and record the measured value.
- (d) If the measured value falls within the range stated on the calibration/check standard, the instrument calibration is acceptable. If the measured value falls outside the range stated on the calibration/check standard, recalibrate the instrument using the instructions within the manufacturer's instruction manual.
- (e) Attach any further optional components to the retroreflectometer that are required for the job (i.e. extension pole, remote display, etc.).

## 5 Procedure

If the sign is requested to be tested in its ‘cleaned’ state, undertake cleaning according to Clause 5.1 below. If the sign is to be tested in its ‘as discovered’ state, skip to Clause 5.2.

### 5.1 Cleaning

- (a) Clean the sign by using a damp cloth and/or using water and mild detergent (if necessary) to wipe off the grime in broad sweeps rinsing the cloth regularly during this process.
- (b) Dry the sign using another cloth.

*NOTE: For new or very lightly contaminated signs, a wipe with a dry cloth may suffice.*

*NOTE: It is essential that the sign is dry after cleaning and before measurements are taken.*

### 5.2 Measurement

- (a) Select the colour of the sheeting background (not required if the instrument selects colours automatically).

*NOTE: If the colour is not available on the colour selector switch, alternatives are provided in Table 2. Operator to determine when averaging does not apply based on the equipment in use.*

**Table 2. Alternative solution for colours which are not on colour selector switch**

Colour to be measured	Alternative solution
Fluorescent yellow-green	Perform measurements using both ‘yellow’ and ‘green’. Average the readings to obtain the result for the measured material.
Orange	Perform measurements using both ‘yellow’ and ‘red’. Average the readings to obtain the result for the measured material.

- (b) Position the instrument vertically against the sign ensuring full contact.

*NOTE: The orientation of the instrument does not significantly affect the measurement of beaded sheeting. However, a small change in angle can significantly affect the measurement of microprismatic sheeting.*

*NOTE: A trigger may need to be activated to take a reading.*

- (c) For each sign, take a measurement of the background and the legend.

*NOTE: When taking a reading, ensure the retroreflectometer remains in contact with sign until a reading is displayed on the screen. Hold the retroreflectometer so that it remains in contact with the sign until the end of the measurement process.*

- (d) Measure the retroreflective background of the sign at 5 or 6 points (see Appendix A). If any single measurement is more than 50% above or below the adjacent readings, the sign should be re-measured.
- (e) Measure the retroreflective legend of the sign in at least 3 points (see Appendix A).

*NOTE: Care must be taken to ensure that the aperture of the instrument covers only the area to be measured and does not include any of the surrounding sheeting of a different colour.*

- (f) After each measurement, record the value on an appropriate laboratory worksheet.

## 6 Reporting

Include the following data and results in the report:

- (a) Report the sign type or take a photo of the sign.
- (b) Report the status of “cleaned” or “as discovered” status of each sign.
- (c) For 0.2° observation angle, report the average of the measured values for both the background and legend area of each sign. The average value for each sign shall be reported to the nearest 0.1 cd/lx/m<sup>2</sup> in cases where the value is between 0.1 and 199.9 cd/lx/m<sup>2</sup>; and the nearest 1 cd/lx/m<sup>2</sup> in cases where the value is between 200 and 2000 cd/lx/m<sup>2</sup>.

*NOTE: If an instrument capable of measuring observation angles of 0.5° and 1° is used, report the results.*

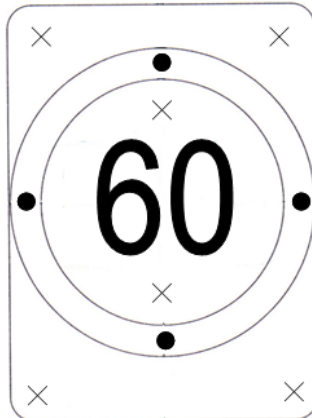
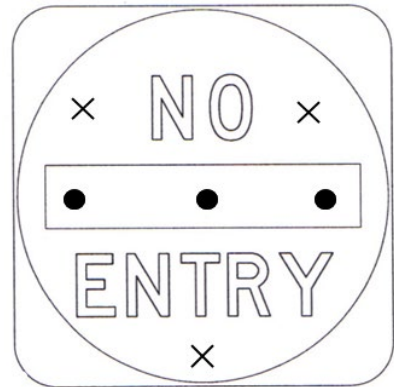
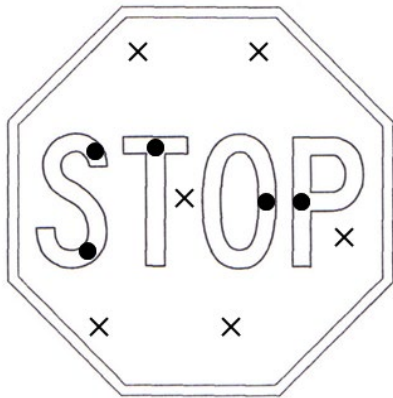
- (d) Reference to this test method.

## 7 References

The following documents are referred to in this test method: Nil.



## Appendix A. Typical road sign measurement points



### Suggested Measurement Points

× Background Points

● Legend Points

## Contact Us:

If you have any questions or would like more information on this document please contact Transport for NSW:



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