AS 1906.3—1992

Australian Standard®

Retroreflective materials and devices for road traffic control purposes

Part 3: Raised pavement markers (retroreflective and non–retroreflective)

This Australian Standard was prepared by Committee MS/49, Retroreflective Devices. It was approved on behalf of the Council of Standards Australia on 27 March 1992 and published on 15 June 1992.

The following interests are represented on Committee MS/49:

Australian Federation of Construction Contractors

Australian Road Federation

Australian Road Research Board

Austroads

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Railways of Australia Committee

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PREFACE

This Standard was prepared by the Standards Australia Committee on Retroreflective Devices to supersede the 1982 edition. It is one of a series of three Standards dealing with retroreflective sign and delineation materials.

Other Standards in the series are as follows:

AS
1906 *Retroreflective materials and devices for road traffic control purposes*
1906.1 Part 1: *Retroreflective materials*
1906.2 Part 2: *Retroreflective devices (non–pavement application)*

This Standard is a performance specification for devices intended to provide night and day delineation by retroreflective and diffuse reflective means respectively, the latter type being referred to as nonretroreflective raised pavement markers. The Standard deals only with devices which are bonded to the pavement surface in locations where they are liable to be traversed by vehicle wheels.

Retroreflective devices which are attached to guideposts are dealt with in AS 1906.2. Retroreflective material for road signs is dealt with in AS 1906.1, and the manufacture of the signs is covered by AS 1743–1989, *Road signs – Specification.*

This Standard differs from the previous edition in that the requirement to demonstrate in all cases that a retroreflective marker is capable of a minimum photometric performance after a specified exposure to traffic has been replaced by a provision whereby the performance under traffic can be predicted from measurements made on as–new markers. Since different types of markers have different performance characteristics, the types need to be separately identified, thus necessitating an extended categorization system. There were, at the time of publication, two established types, but the Standard provides a type acceptance procedure to allow the prediction system to be extended to new marker types the performance characteristics of which were yet to be established.

The coefficient of luminous intensity measurement procedure in this Standard continues to require measurement with the entrance and observation angle both in the horizontal plane. It is likely that a future edition will require the observation angle to be in the vertical plane.

The publication of test methods in AS 2445.3, *Methods of sampling and testing retroreflective materials and devices for road traffic control purposes*, Part 3: *Raised pavement markers*, has been discontinued. All required test methods are now included as appendices to this Standard.

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FOREWORD

A characteristic of the great majority of raised retroreflective pavement markers in current use is that when exposed to traffic on the road surface they degrade in photometric performance, often rapidly, and often to performance values which are only a small fraction of those in their as-new condition. Recent research has established minimum or terminal values to which photometric performances can fall before the markers are considered to be no longer effective as pavement delineators. Despite these often rapid and substantial reductions in performance, many markers still have the ability to maintain a performance at or above these terminal values over a useful life span.

Research has also shown that for markers made to a particular design and using the same materials it is possible, through experience gained in on-road testing, to predict from photometric performances in the as-new condition the terminal values that will be reached after a given exposure to traffic. A complication, however, is that the as-new to terminal-value prediction factor can vary widely, not only among different marker designs and materials used in their manufacture, but also with changing measurement geometry.

To cope with this complexity, this Standard embodies a philosophy which allows certain established designs to be tested for photometric performance in the as-new condition only, where as-new to terminal-value prediction factors are known. The philosophy is extended to new designs by allowing them to establish their own as-new to terminal-value prediction factors as part of a specified type acceptance procedure, following which future manufacture to that design requires only testing in the as-new condition. Separate prediction factors will need to be established for each specified measurement geometry.

STANDARDS AUSTRALIA

Australian Standard

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies the performance requirements for retroreflective and non-retroreflective raised pavement markers, which are to be bonded directly to the pavement surface. This does not preclude the development of markers with alternative methods of affixing to the road, for which the performance shall be not less than for those directly bonded to the surface.

Test methods are given in Appendices A to J.

The Standard does not apply to materials and devices which are to be located above or to one side of the carriageway.

1.2 DESCRIPTION For the purpose of this Standard, retroreflective markers consist of discrete devices of sufficiently small size as to be effectively a point source of light when viewed at normal night-time highway viewing distances. They may provide a degree of delineation during daylight owing to the contrasting colour, reflection and profile with respect to the pavement surface. Non-retroreflective markers primarily reflect ambient light during the day-time and to a limited degree when illuminated by vehicle headlights or roadway lighting at night.

NOTE: This description is not intended to limit the design or method of manufacture, provided that the devices can be satisfactorily type acceptance tested in accordance with Clause 2.3 and comply with the requirements of Section 3, as applicable to retroreflective markers, non-retroreflective markers, or both.

1.3 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS
1627 Metal treatment — Preparation and pretreatment of surfaces
1627.10 Part 10: Cleaning and preparation of metal surfaces using acid solutions (non-immersion)

1734 Aluminium and aluminium alloy — Flat sheet, coiled sheet and plate

1906 Retroreflective materials and devices for road traffic control purposes
1906.1 Part 1: Retroreflective materials

2001 Methods of test for textiles
2001.4.1 Colourfastness tests — Definitions and general requirements

3554 Adhesives — Epoxy — For raised pavement marker installations

CIE
13.2 Method of measuring and specifying colour rendering — Properties of light sources

1.4 DEFINITIONS For the purpose of this Standard, the definitions below apply.

1.4.1 Retroreflective marker — a device which produces an effective point source of light at normal highway viewing distances by reflecting incident light in directions close to the direction from which it came.

1.4.2 Reference point — the centroid of the surface carrying the reflective elements.

1.4.3 Reference direction — a line passing through the reference point, parallel to the longitudinal axis of symmetry, and lying in a plane parallel to the base of the marker.

1.4.4 Observation angle (α) — the angle between the straight lines joining the reference point of the marker to the centre of the receptor (Y) and to the centre of the source of illumination (X) (see Figure 1.1). Both the observation and the entrance angle are always in the same plane and on the same side of the line joining the centre of the marker to the centre of the source of illumination.

1.4.5 Entrance angle (β) — the angle between the reference direction and the straight line joining the reference point of that marker to the centre of the source of illumination (X) (see Figure 1.1).

1.4.6 Coefficient of luminous intensity (CIL) — the quotient expressed in candela per lux (cd/lx) obtained by dividing the reflected luminous intensity in the direction considered, by the illuminance at the retroreflective surface, for given observation, entrance and rotation angles. It is referred to as the 'CIL value'.