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Retroreflective materials and devices for road traffic control purposes

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Specifies performance requirements for retroreflective materials used in the manufacture of road signs and related traffic control devices, but excluding retroreflective pavement markings, raised pavement markers, and post-mounted delineators. Test methods are given in appendices.
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Australian Standard®

Retroreflective materials and devices for road traffic control purposes

Part 1: Retroreflective materials

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STANDARDS AUSTRALIA

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The following interests are represented on Committee MS/49:

Australian Road Federation
Australian Road Research Board
Austroads
Confederation of Australian Industry
Confederation of Construction Contractors
CSIRO, National Measurement Laboratory
Metal Trades Industry Association of Australia
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Retroreflective materials and devices for road traffic control purposes

Part 1: Retroreflective materials

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PREFACE

This Standard was prepared by the Standards Australia Committee on Retroreflective Devices, to supersede AS 1906.1—1976, *Retroreflective materials and devices*, Part 1: *Retroreflective materials*.

This edition of the Standard includes some major changes brought about by technical developments in the manufacture of retroreflective material, and the policy of Standards Australia to bring its Standards into line with International Standards wherever possible.

Class 1 and Class 2 categories of retroreflective material have been retained but with revised CIL/m^2 values which reflect the increased performance of material that is now available and bring the Australian Standard more into line with International Standards. A new category (Class 2A) which specifies a photometric performance and durability lying between Class 1 and Class 2 has been introduced. This class of material is now commercially available and allows sign designers more flexibility in selecting legend contrast and overall brightness of the sign. Class 3 material has been deleted from the Standard as it is no longer used. As acceptable materials of higher photometric performance become available it is proposed to introduce at least one additional class, Class 1A, at a future time.

In accordance with a decision by the Standards Australia Committee on Road Signs and Traffic Signals, MS/12, to discontinue the specification of the colour 'Freeway Green' in AS 1742, (i.e. the colour specified simply as 'green' in AS 1906.1—1976), and to specify only 'standard green' for all purposes requiring the colour green, the photometric performance and colour specification have been altered to suit the new colour, and the designation 'standard green' has been retained to avoid confusion at least for the time being. The colour brown has also been added to the Standard.

The entrance and observation angles specified in Tables 2.1, 2.2, and 2.3 differ from those in the previous Standard in that 0.33-degree observation angle has been substituted for 0.2-degree, and 30-degree entrance angle has been substituted for 40-degree. These altered angles are a move towards partial harmonization with International Standards. In anticipation of complete harmonization in a future edition of this Standard, values for 2.0-degree observation angle have been included in light type. These latter values are for information only at this stage.

A reference to wrinkling has been included in the Standard as a form of degradation. It has not yet been determined under what, if any, circumstances wrinkling can be tolerated, nor has a suitable test method yet been developed. These matters are being investigated by the Committee and will result in either an amendment to this Standard or an inclusion in a future revision.

A durability designation which will provide a standardized form in which suppliers can describe materials in terms of real time minimum life expectancy, has also been included.

The test methods described in Section 3 of the previous edition have been revised and published separately but simultaneously with this Standard as AS 2445.1, Methods of sampling and testing retroreflective materials and devices for road traffic control purposes, Method 1: Retroreflective materials.

CONTENTS

FOREWORD

The type of retroreflective material described in this Standard can find application in a wide range of uses. Its principal use is for road traffic signs where all three classes of the material (Classes 1, 2A, and 2) may be used. Careful consideration should be given as to whether material which complies with this Standard is appropriate for other applications. This Standard has been written solely as a performance specification for retroreflective material and does not give guidance on its use.

STANDARDS AUSTRALIA

Australian Standard

Retroreflective materials and devices for road traffic control purposes

Part 1: Retroreflective materials

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies the performance requirements for retroreflective materials used in the manufacture of road signs and related traffic control devices. It does not apply to reflective pavement markings, markers placed directly on the pavement surface, or post mounted delineators.

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

AS
2445 Methods of sampling and testing retroreflective materials and devices for road traffic control purposes
2445.1 Retroreflective materials

CIE
Publication No 39.2 (1983)—Surface colours for visual signalling

ISO
3864 Safety colours and safety signs

1.3 DESCRIPTION Retroreflective material usually consists of one of the following:

(a) Minute glass beads enclosed in a thin transparent smooth-surfaced plastics matrix, tinted according to the required colour.

(b) Glass beads encapsulated in a series of cells, the upper surface of which is a transparent film, tinted according to the required colour.

(c) Minute cube-corner or prismatic elements moulded into the rear face of a clear flexible sheet, tinted according to the required colour (commonly referred to as micro-prismatic material).

NOTE: These descriptions are not intended to limit the design or method of manufacture provided that the material complies with the requirements of this Standard.

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

1.4.1 Viewing geometry

1.4.1.1 *Observation angle* (α)—the angle between the straight lines joining the centre of a piece of material to the centre of the receptor and to the centre of the source of illumination (see Figure 1.1). Both the observation and the entrance angles are always in the same plane and on the same side of the line joining the centre of the piece of material to the centre of the source of illumination.

1.4.1.2 *Entrance angle* (β)—the angle between the normal at the centre of a piece of material and the straight line joining the centre of that piece of material to the centre of the source of illumination (see Figure 1.1).

1.4.1.3 *Rotation angle* (ε)—the angle measured from an arbitrary starting point, through which the retroreflective material is rotated during the photometric testing, about an axis normal to, and passing through the centre of, the piece of material (see Figure 1.1).

1.4.2 Light technical parameters

1.4.2.1 *Illuminance at the retroreflective material*—the expression conventionally used to designate the illuminance produced by the source of light and measured in a plane perpendicular to the incident light beam and passing through the centre of the piece of material.

1.4.2.2 *Coefficient of luminous intensity (CIL)*—the quotient expressed in candela per lux, obtained by dividing the 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'.

NOTE: This coefficient is applicable to devices which are effectively point sources of light at normal highway viewing distances.

1.4.2.3 *Coefficient of luminous intensity per unit area*—the value expressed in candela per lux per square metre, obtained by dividing the coefficient of luminous intensity of a piece of material by the area in square metres of that piece of material measured parallel to its surface. It is referred to as the 'CIL/m^2 value'.

NOTE: This coefficient is applicable to retroreflective surfaces of discernible size at normal highway viewing distances.