

Australian Standard™

**Paints and related materials—Pavement
marking materials**

**Part 3: Waterborne paint—For use with
surface applied glass beads**



This Australian Standard was prepared by Committee CH-003, Paints and Related Materials. It was approved on behalf of the Council of Standards Australia on 1 August 2005. This Standard was published on 26 October 2005.

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Australian Motorcycle Council
Australian Paint Approval Scheme
Australian Paint Manufacturers' Federation
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STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 4049.3—2005

Paints and related materials—Pavement marking materials
Part 3: Waterborne paint—For use with surface applied glass beads

RECONFIRMATION NOTICE

Technical Committee CH-003 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

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NOTES

Australian Standard™

Paints and related materials—Pavement marking materials

Part 3: Waterborne paint—For use with surface applied glass beads

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PREFACE

This Standard was prepared by the Australian members of the Joint Australia/New Zealand Standards Committee CH-003, Paints and Related Materials to supersede AS/NZS 4049.3:1996, *Paints and related materials—Road marking materials Part 3: Waterborne paint—For use with drop-on beads*.

This Standard incorporates Amendment No. 1 (February 2006). The changes arising from the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

This Standard is Part 3 of the series dealing with pavement marking materials. Other Standards in the AS 4049 series are:

AS

4049 Paints and related materials—Pavement marking materials

4049.1 Part 1: Solvent-borne paint—For use with surface applied glass beads

4049.2 Part 2: Thermoplastic pavement marking materials—For use with surface applied glass beads

The objective of this Standard is to provide requirements and recommendations, which may be used when specifying waterborne pavement marking paints.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
FOREWORD.....	4
1 SCOPE.....	5
2 OBJECTIVE	5
3 REFERENCED DOCUMENTS.....	5
4 DEFINITIONS.....	5
5 COMPOSITION	5
6 TESTING AND PERFORMANCE REQUIREMENTS.....	6
7 PACKAGING	8
8 LABELLING	8
APPENDICES	
A LIST OF REFERENCED DOCUMENTS	9
B GUIDANCE ON THE USE AND APPLICATION OF WATERBORNE PAVEMENT MARKING PAINT.....	11
C GUIDANCE ON THE EVALUATION OF WATERBORNE PAVEMENT MARKING PAINT AND LARGE TYPE D GLASS BEADS.....	14
D SAMPLING GUIDELINES.....	16
E DETERMINATION OF FINENESS OF PAINT	19
F ASSESSMENT OF EARLY WASHOUT RESISTANCE	21
G PREPARATION OF TEST PANELS	23
H DETERMINATION OF LUMINANCE FACTOR.....	24
I FIELD TESTS FOR PAVEMENT MARKING PAINT.....	27
J DETERMINATION OF RETROREFLECTIVITY	30
K DETERMINATION OF DEGREE OF WEAR.....	32
L PICTORIAL STANDARDS FOR DEPICTING VARIOUS DEGREES OF WEAR	34
M MEANS OF DEMONSTRATING COMPLIANCE WITH THIS STANDARD.....	37

FOREWORD

Pavement marking paints are expected to perform under a wide variety of application, curing and exposure conditions, and therefore need to be assessed in both the laboratory and in the field. This Standard provides test procedures and performance criteria aimed at identifying paints that will provide satisfactory performance as a beaded pavement marking in the majority of applications.

Skid resistance requirements were considered for inclusion but have not been specified in this Standard. The skid resistance of a pavement marking paint is not a fixed property for any given formulation. For a new marking it may vary considerably according to the road surface and texture and it will also vary throughout its life according to conditions such as traffic wear and weather. Whilst the drop-on addition of glass beads may increase the frictional characteristics, the resultant skid resistance levels may not satisfy the requirements of all road users.

It is recommended that users of this Standard consult material suppliers where skid resistance is a requirement for the applied marking.

STANDARDS AUSTRALIA

Australian Standard

Paints and related materials—Pavement marking materials

Part 3: Waterborne paint—For use with surface applied glass beads

1 SCOPE

This Standard sets out requirements for waterborne paints as used for pavement markings on pavement surfaces. Paints are designed for use with Type B and D glass beads complying with AS/NZS 2009.

NOTES:

- 1 Alternative means for determining compliance with this Standard are given in Appendix M.
- 2 Additional information on the use and application of waterborne pavement marking paint is contained in Appendix B.

2 OBJECTIVE

The objective of this Standard is to provide requirements and recommendations, which may be used when specifying waterborne pavement marking paints.

3 REFERENCED DOCUMENTS

A list of documents referred to in this Standard is contained in Appendix A.

4 DEFINITIONS

For the purpose of this Standard the definitions in AS/NZS 2310 and those below apply.

4.1 Test pavement

Dense grade asphalt and/or sprayed bituminous surfacing constructed using an aggregate with a nominal size of 10 mm, in accordance with Table 1 of AS 2758.2. The pavement shall be free from the impact of turning vehicles, at least 6 months old and free from cracking, rutting or any other defects which may impact on the testing outcome.

4.2 Retroreflectivity

The property of some materials such as solid glass beads, to reflect incident light in directions close to the direction from which it came.

5 COMPOSITION

Paints shall consist essentially of pigments, extenders, solvents and resinous binders. The material shall not be a first schedule or second schedule paint as defined in the Uniform Paint Standard, prepared by the National Health and Medical Research Council (NHMRC), and shall meet the requirements of State and Territory regulatory authorities.

6 TESTING AND PERFORMANCE REQUIREMENTS

6.1 Laboratory testing

6.1.1 *Condition in the container*

When the paint is first examined after delivery it shall be free from skin, lumps, gel and coarse particles as assessed by visual examination in accordance with AS/NZS 1580.103.1. When the settling rating is determined in accordance with AS/NZS 1580.211.1, 4 weeks from the date of manufacture, it shall be not less than 8.

A1

6.1.2 *Fineness of paint*

When washed with water over a sieve of mesh 300 μm complying with AS 1152 using the procedure in Appendix E, not more than 0.1% of the paint shall remain on the sieve.

6.1.3 *Consistency*

When supplied, the liquid paint shall have a consistency within 5 percent of the manufacturer's specification, when tested in accordance with AS/NZS 1580.214.1.

NOTE: This property provides guidance on batch to batch control of paints for which spraying characteristics have been established.

6.1.4 *Application properties*

Unless otherwise specified, the paint shall be suitable for application by spray as delivered.

When applied to one half of a metal test panel by a line marking machine or by hand spraying, according to AS/NZS 1580.205.2 or AS/NZS 1580.205.4, the paint shall produce a uniform smooth film with an even edge without objectionable side splatter and shall not clog the spray gun under normal operating conditions.

6.1.5 *No-pick-up time*

When tested in accordance with the method described in AS/NZS 1580.401.8, at a temperature of $22 \pm 2^\circ\text{C}$ and relative humidity of $75 \pm 5\%$, the paint shall have a no-pick-up time of less than or equal to 25 min. Curing and testing shall be carried out in an area of the room with nil air movement.

6.1.6 *Early washout resistance*

When tested in accordance with Appendix F, paint shall have an early washout resistance time of less than or equal to 120 min, when tested at a temperature of $22 \pm 2^\circ\text{C}$ and relative humidity of $75 \pm 5\%$. Curing and testing shall be carried out in an area of the room with nil air movement.

6.1.7 *Colour*

The colour of a test panel, which has been coated and dried in accordance with Appendix G shall be as follows:

- (a) *White* When assessed visually in accordance with AS/NZS 1580.601.1, the colour shall be whiter than Y35, Off White of AS 2700.
- (b) *Yellow* When assessed visually in accordance with AS/NZS 1580.601.1, the colour shall be an approximate match to Y14, Golden Yellow of AS 2700.

6.1.8 *Specular gloss*

When paint is applied to a glass test panel in accordance with Appendix G and tested in accordance with AS/NZS 1580.602.2 using a 60 degree exposure head, the specular gloss shall not exceed 20 gloss units.

6.1.9 Luminance factor

When measured in accordance with Appendix H, Method 1, the luminance factor shall be not less than 80% for white paint, and shall be in the range of 45–50% for yellow paint.

6.1.10 Storage properties

After storage of 500 mL of test paint in a 500 mL sealed container at $23 \pm 3^\circ\text{C}$ for six months from the date of manufacture, the liquid paint shall—

- (a) Not have changed in consistency by more than ± 5 Kreb units from the initial value when tested in accordance with AS/NZS 1580.214.1;
- (b) Show no evidence of skinning when tested in accordance with AS/NZS 1580.103.1;
- (c) Have a settling rating greater than four when tested in accordance with AS/NZS 1580.211.1;
- (d) Be readily re-incorporated when tested in accordance with AS/NZS 1580.211.2; and
- (e) Comply with the requirements of Clause 6.1.4.

NOTE: Evaluation guidelines are given in Appendix C and sampling guidelines are given in Appendix D.

6.2 Field testing

6.2.1 General

Test lines shall be applied in accordance with Appendix I, to a lane of an asphalt test pavement which is subjected to 2 500 000 vehicle passes in a period of 5 to 15 months, and to the carriageway of a spray seal pavement which is subject to 500 000 vehicle passes in a period of 5 to 15 months. The test periods shall be as described in Table 1.

NOTE: Test regimes and performance requirements for substrates other than those listed in Tables 1 to 3 were not available at the time of the preparation of this Standard.

TABLE 1
TEST PERIODS

Substrate	Paint wet film thickness, μm	Bead type	Bead rate g/m^2	Test period	
				Initial	Final
Asphalt	375	Type B	300	Before traffic	2 500 000 vehicles
Spray seal	375	Type B	300	Before traffic	500 000 vehicles

6.2.2 Degree of wear

When the beaded test line is assessed in accordance with Appendix K, the percentage of paint remaining intact shall be as detailed in Table 2.

TABLE 2
DEGREE OF WEAR

Substrate	Paint wet film thickness, μm	Bead type	Bead rate g/m^2	Area of paint intact, %
				Final
Asphalt	375	Type B	300	$\geq 85\%$
Spray seal	375	Type B	300	$\geq 80\%$

6.2.3 Retroreflectivity

When the beaded test line is assessed in accordance with Appendix J, the retroreflectivity shall be as detailed in Table 3.

NOTES:

- 1 This Clause applies to white paint only. Data for yellow paint was not available at the time of preparing this Standard.
- 2 Measurements taken with a device incorporating a white light source with an entrance angle of 88.76° and an observation angle of 1.05° as described in Clause J3.1(c).

TABLE 3
RETROREFLECTIVITY

Substrate	Paint wet film thickness, μm	Bead type	Bead rate g/m^2	Retroreflectivity, $\text{mcd/m}^2/\text{lx}$	
				Initial	Final
Asphalt	375	Type B	300	300	150
Spray seal	375	Type B	300	300	150

6.2.4 Luminance test

When the beaded test line is assessed in accordance with Appendix H, Method 2, in the wheelpath and between wheelpath areas, at the test periods as detailed in Table 1, the test marking shall be lighter than Natural Color System (NCS) swatch S 2500-N, see SS 01 91 02.

NOTE: This Clause applies to white paint only. Data for yellow paint was not available at the time of preparing this Standard.

7 PACKAGING

Paints shall be packaged in sound, clean and dry containers constructed of a material which is inert to the contents, and sufficiently robust to withstand normal conditions of handling and storage without rupture or leakage. The container shall be capable of being readily resealed, and be airtight.

NOTE: AS 2854 and AS 2905 specify suitable containers. Additionally, intermediate bulk containers (IBCs) used for storage and transportation of non dangerous liquids are suitable, provided they are capable of passing the drop test and stacking test prescribed in AS 2582 series.

8 LABELLING

The following information shall be legibly and permanently marked on each container or on a label permanently attached to each container:

- (a) The name or registered mark of the manufacturer.
- (b) The description 'Waterborne Pavement Marking Paint', or equivalent wording, with the product code.
- (c) The contents; by volume, L and by gross mass, in kg.
- (d) Production or batch number and date of manufacture.
- (e) Storage and handling information required by statutory authorities.
- (f) The colour of the paint film, in relation to that specified in Clause 6.1.7.

APPENDIX A

LIST OF REFERENCED DOCUMENTS

(Normative)

AS	
1152	Specification for test sieves
1199	Sampling procedures for inspection by attributes
1580	Paints and related materials—Methods of test
1580.105.2	Method 105.2: Pretreatment of metal test panels—Sanding
1580.107.1	Method 107.1: Determination of wet film thickness from dry film mass
1742	Manual of uniform traffic control devices
1742.3	Part 3: Traffic control devices for works on roads
2582	Complete, filled transport packages—Methods of test (all parts)
2700	Colour standards for general purposes
2758	Aggregates and rock for engineering purposes
2758.2	Part 2: Aggregate for sprayed bituminous surfacing
2854	Tinplate cans for general use
2905	Steel drums
AS/NZS	
1580	Paints and related materials—Methods of test
1580.101.1	Method 101.1: Conditions of test—Temperature, humidity and airflow control
1580.103.1	Method 103.1: Examination and preparation for samples for testing
1580.104.1	Method 104.1: Recommended materials for test panels
1580.107.2	Method 107.2: Determination of wet film thickness from wet film mass
1580.107.3	Method 107.3: Determination of wet film thickness by gauge
1580.108.1	Method 108.1: Determination of dry film thickness on metallic substrates—Non-destructive methods
1580.205.2	Method 205.2: Application properties—Conventional spraying
1580.205.4	Method 205.4: Application properties—Airless spraying
1580.211.1	Method 211.1: Degree of settling
1580.211.2	Method 211.2: Ease of manual re-incorporation
1580.214.1	Method 214.1: Consistency—Stormer viscometer
1580.401.8	Method 401.8: No-pick-up time of road marking paints
1580.601.1	Method 601.1: Colour—Visual comparison
1580.602.2	Method 602.2: Measurement of specular gloss of non-metallic paint films at 20 degrees, 60 degrees and 85 degrees
2009	Glass beads for pavement-marking materials
2310	Glossary of paint and painting terms
AS/NZS ISO	
9001	Quality management systems—Requirements
9004	Quality management and quality system elements

SAA	
HB18	Guidelines for third-party accreditation and certification
HB18.28	Guide 28—General rules for a model third-party certification scheme for products
NHMRC	
SUSDP	Standard for the uniform scheduling of drugs and poisons
CIE	
15	Colorimetry
CIE/ISO	
10526	CIE standard illuminants for colorimetry
SIS	
SS 01 91 02	Colour Swatches
AUSTRALIAN ROAD RESEARCH BOARD	
Proceedings 15th ARRB Conference,	<i>Non-skid road marking paint system</i>

APPENDIX B

GUIDANCE ON THE USE AND APPLICATION OF WATERBORNE PAVEMENT MARKING PAINT

(Informative)

B1 SCOPE

This Appendix provides information on the use and application of waterborne pavement marking paint.

B2 MANUFACTURER'S TECHNICAL DATA

Before opening the containers for use, the manufacturer's technical data sheets, the labelling instructions and the manufacturer's material safety data sheets should be studied.

B3 GENERAL COMMENTS

Waterborne pavement marking paint may offer the following advantages over solvent-borne road marking paint:

- (a) Improved adhesion to glass beads which may allow the use of Type D beads for wet weather reflectivity and provide better night time visibility over a long period of time.
- (b) Will not support combustion and minimizes explosion risk.
- (c) Has much lower toxicity and volatile organic content and hence presents a much lower risk to the operator.
- (d) Can be transported in bulk containers composed of a supported plastic membrane which can be dried and disposed of as small volume solid waste.
- (e) Is longer wearing.

The ingredients which enable the paint to be 'based' in water also render the applied film more sensitive to rain than solvent-borne paint pavement markings, in the early stages of drying. It is therefore important to carefully consider weather forecasts when using waterborne road marking paint.

B4 SUCCESSFUL APPLICATION

The use of waterborne paint with glass beads will result in increased serviced life and wet night visibility if—

- (a) the pavement is clean, dry and within the recommended application conditions;
- (b) the specified paint film thickness is uniformly applied; and
- (c) a sufficient quantity and even distribution of glass beads is retained in the paint film.

B5 APPLICATION GUIDELINES

B5.1 General

This Paragraph addresses the link between drying time for waterborne paints and on-road performance and durability. Complete drying of the paint film will deliver satisfactory performance with the balance of temperature, humidity and air speed ultimately dictating the drying time required. Paints should NEVER be applied below 5°C irrespective of humidity and air speed.