

# Australian/New Zealand Standard™

## Wet area membranes

## **AS/NZS 4858:2004**

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee BD-038, Wet Areas in Buildings. It was approved on behalf of the Council of Standards Australia on 7 April 2004 and on behalf of the Council of Standards New Zealand on 2 April 2004. It was published on 15 April 2004.

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The following are represented on Committee BD-038:

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Australian Chamber of Commerce and Industry  
Australian Consumers Association  
Australian Institute of Building Surveyors  
Australian Tile Council Inc.  
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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

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**RECONFIRMATION**

**OF**

**AS/NZS 4858:2004**

**Wet area membranes**

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Major stakeholders of this publication have 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/New Zealand Standard™

## Wet area membranes

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## PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee BD-038, Wet Areas in Buildings.

The objective of this Standard is to classify membranes based on elastic properties which can then be used to give guidance on the type of detailing for a specific membrane referred to in AS 3740, *Waterproofing of wet areas within residential buildings*. This detailing, in relating to the elastic properties of the membrane being used, will assist an installation in meeting the performance requirements of AS 3740.

The test methods referenced herein are derived from documents published from either Standards Australia or ASTM, with the acceptance criteria being listed in this publication. These criteria were not previously given in an Australian Standard.

Bond failures can occur through the full tiling system to the substrate, which includes the waterproofing membrane where it forms part of the system. This failure can be a result of bond and/or shear failure between components or within a single component of the overall tiling system. The BD-038 committee considered the best way to address a comprehensive test to determine satisfactory performance against this type of failure was to propose the formation of a joint working party between BD-038 and BD-044 committees as both the properties of membranes and the tiling adhesives contribute to the overall performance of the whole tiling system against this type of failure. As the development of such a test will take some time, BD-038 considered that this Standard should be published in its current state rather than wait for the development of test methods by the working party. The BD-038 committee will consider the findings of the proposed working party in the ongoing review of the standard.

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> |
|---|-------------|
| 1 SCOPE .....   | 4           |
| 2 APPLICATION .....   | 4           |
| 3 REFERENCED DOCUMENTS .....  | 4           |
| 4 DEFINITIONS .....   | 4           |
| 5 CLASSIFICATION .....  | 5           |
| 6 JOINT MOVEMENT ACCOMMODATION .....  | 5           |
| 7 PERFORMANCE REQUIREMENTS .....  | 6           |
| 8 REQUIREMENTS OF MEMBRANES .....   | 6           |
| 9 PREPARATION OF LIQUID APPLIED MEMBRANES .....   | 6           |
| <br>APPENDICES  |             |
| A ASSESSMENT OF DURABILITY OF WATERPROOFING MEMBRANES .....                                       | 7           |
| B ASSESSMENT OF RESISTANCE OF WATERPROOFING MEMBRANES TO<br>CYCLIC MOVEMENT .....                 | 9           |
| C ASSESSMENT OF THE SUITABILITY OF WATERPROOFING MEMBRANES<br>WHEN USED OVER PARTICLE BOARD ..... | 11          |

## STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

**AUSTRALIAN/NEW ZEALAND STANDARD****Wet area membranes****1 SCOPE**

This Standard sets out the performance and general test requirements for waterproof membranes as defined in AS 3740.

The Standard does not apply to metal shower trays, preformed shower bases or exposed membranes.

The Standard may also be applied to waterproof membranes used in non-residential buildings.

**2 APPLICATION**

This Standard applies to buildings throughout Australia and New Zealand and is intended for use by manufacturers, suppliers and specifiers of waterproofing membranes, and appraisal bodies.

The Standard may also serve as a useful reference document for residential property owners and managers.

**3 REFERENCED DOCUMENTS**

The following documents are referred to in this Standard:

**AS**

1145 Determination of tensile properties of plastics materials

1145.3 Part 3: Test conditions for films and sheets

3558 Methods of testing plastics and composite materials sanitary plumbing and fixtures

3558.1 Part 1: Determination of water absorption characteristics

3740 Waterproofing of wet areas within residential buildings

**ASTM**

E 96 Standard test methods for water vapour transmission of materials

**4 DEFINITIONS**

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

**4.1 Sheet membranes****4.1.1 Loose laid**

A membrane sheet that is not bonded to the substrate.

**4.1.2 Bonded**

A membrane sheet that is bonded to the substrate.

## 4.2 Liquid membranes

### 4.2.1 Reinforced

A liquid applied membrane that has a fibre reinforcement that may be random strand mat, woven mesh or chopped strands. (Random strand mat and woven mesh are in a sheet form that is embedded into the liquid during application. Chopped strands are usually added to the liquid during manufacture.)

### 4.2.2 Unreinforced

A liquid applied membrane that contains no fibre reinforcement.

## 4.3 Shower base

A preformed prefinished vessel which is installed as the finished floor of a shower compartment and which is provided with a connection point to an approved sanitary drainage system.

NOTE: Shower bases are commonly made of plastics, composite materials, vitreous enamelled pressed steel, stainless steel or vitreous china.

## 4.4 Wet area

An area, within a building, supplied with water from a water supply system.

## 5 CLASSIFICATION

For the purpose of this Standard, membranes shall be classified in accordance with Table 5.1.

**TABLE 5.1**  
**CLASSIFICATION OF MEMBRANES**

| Class                     | Elongation at break AS 1145.3 type 5 specimen | Include reinforcement if part of system |
|---------------------------|---|---|
| I (Low extensibility)     | 10–59%  | Yes                                     |
| II (Medium extensibility) | 60–299%                                       | Yes                                     |
| III (High extensibility)  | ≥ 300%  | Yes                                     |

## 6 JOINT MOVEMENT ACCOMMODATION

Accommodation of joint movement by membranes shall be in accordance with Table 6.1.

**TABLE 6.1**  
**REQUIREMENTS FOR JOINT MOVEMENT**

| Class | Desired parameter          | Minimum bond breaker/tape width to bridge joints opening up by 5 mm                       |
|-------|----------------------------|---|
| I     | 50% of elongation at break | 100 mm tape for wall junctions, and 75 mm tape with backing rod for wall/floor junctions. |
| II    | +35%                       | 35 mm   |
| III   | +200%                      | 12 mm   |

NOTE: For example, for a Class II membrane, a 35 mm wide bond breaker/tape should be applied over a joint to accommodate the joint opening up by up to 5 mm.

## 7 PERFORMANCE REQUIREMENTS

### 7.1 General

This Clause sets out the performance requirements for wet area membranes used in the waterproofing of wet areas in residential buildings, as defined in AS 3740.

### 7.2 Materials

Materials used in waterproofing wet areas shall be waterproof or water resistant for their intended life and shall maintain their integrity in their intended use.

## 8 REQUIREMENTS OF MEMBRANES

Wet area membranes shall meet the test criteria set out in Table 8.1. Those materials demonstrating compliance with the test criteria shall be deemed to satisfy the performance requirements of this Standard.

**TABLE 8.1**  
**REQUIREMENTS FOR MEMBRANES PROPERTIES**

| Property   | Test method and accommodation factor   | Include reinforcement if part of system | Requirements   | Pass/fail criteria   |
|--|--|---|--|--|
| (a) <i>Moisture vapour transmission rate</i>       | ASTM E96 Desiccant method  | Yes                                     | Record result  | If $> 8\text{g} / \text{m}^2 / 24$ hours, additional testing referred to in (e) will be required to establish suitability for use over particleboard |
| (b) <i>Water absorption</i>                        | AS 3558.1 (with sample size modified to be a 50 mm × 50 mm by the thickness as used in practice) | Yes                                     | Record result  | Max figure to be supplied  |
| (c) <i>Acceptance of cyclic movement</i>           | In accordance with Appendix B  | Yes                                     | Record result specifying if tested as Class I, II or III | Pass criteria as per test method   |
| (d) <i>Durability</i>                              | In accordance with Appendix A  | Yes                                     | Record result  | Pass criteria as per test method   |
| (e) <i>Suitability for use over particleboard*</i> | In accordance with Appendix C  | Yes                                     | Record moisture increase                                 | Moisture increase recorded shall not be greater than 10%   |

\* Excessive water vapour transmission will cause an increase in the moisture content of the particleboard which may result in movement to the extent that the membrane ruptures.

## 9 PREPARATION OF LIQUID APPLIED MEMBRANES

Liquid applied membranes shall be prepared to produce a specimen that represents the finished membrane as specified by the manufacturer's installation instructions including any reinforcement.

Sheets of membrane may be prepared by casting on a non-stick surface. Teflon or polyethylene sheet materials are suitable for a casting surface. The film thickness is built up to that used in practice in the number of layers as specified in the installation procedures.

APPENDIX A  
ASSESSMENT OF DURABILITY OF WATERPROOFING MEMBRANES  
(Normative)

**A1 GENERAL**

This appendix sets out a method for assessing the durability of waterproofing membranes. The durability requirements of membranes, when prepared in accordance with this Standard, shall be as given in Table A1.

**A2 APPARATUS—TESTING MACHINE**

A 'Class A' universal testing machine that will record the maximum load and elongation at break. The strain rate shall be set so the maximum load is reached in not less than 30 s.

**A3 PREPARATION OF SPECIMENS**

Specimens to be tested shall be prepared in accordance with AS 1145.3 (type 5 specimen), and shall be allowed to dry or cure at  $23 \pm 2^\circ\text{C}$  and  $65 \pm 15\%$  relative humidity for the manufacturer's recommended cure time before the material is overlaid. The specimen shall then be cut from the sheet of cured material and measured for thickness.

The specimens shall be of the film thickness and number of layers normally recommended by the manufacturer, and shall include any reinforcement.

The specimens shall then be exposed to the conditions listed in the Table A1 before being tested for elongation at break and tensile strength in accordance with AS 1145.3.

**TABLE A1**  
**DURABILITY OF MEMBRANES**

| Exposure                       | Conditions  | Requirements   | Pass/fail criteria  |
|--------------------------------|---|--|---|
| (a) <i>Controls</i>            | 7 days at 23 ±2°C and 65 ±15% relative humidity   | Record the tensile strength and elongation at break  | N/A   |
| (b) <i>Water immersion</i>     | 7 days at 23 ±2°C and 65 ±15% relative humidity + 7, 28 and 56 days immersed in 1 L of deionized water at 23 ±2°C, + surface dry and test   | Record the tensile strength and elongation at break<br><br>Note any significant change in appearance, e.g., blistering, etc. | Elongation at break shall not be less than 50% of that of the controls for the bond breakers given in Table 6.1. For an elongation between 50% and 25% of the controls the membrane requires additional bond relief above that given in Table 6.1. A failure is for less than 25% retention of elongation at break of the controls  |
| (c) <i>Bleach immersion</i>    | 7 days at 23 ±2°C and 60 ±15% relative humidity + 7, 28 and 56 days immersion in 1 L of 10.5 g/L of sodium hypochlorite* and 2.25 g/L of sodium hydroxide* at 23 ±2°C, + surface dry and test | Record the tensile strength and elongation at break<br><br>Note any significant change in appearance, e.g., blistering, etc  | Elongation at break shall not be less than 50% of that of the controls for the bond breakers given in Table 6.1. For an elongation between 50% and 25% of the controls the membrane requires additional bond relief above that given in Table 6.1. A failure is for less than 25% retention of elongation at break of the controls  |
| (d) <i>Detergent immersion</i> | 7 days at 23 ±2°C and 65 ±15% relative humidity + 7, 28 and 56 days immersion in 1 L of 2% solution of N8† at 23 ±2°C, + surface dry and test   | Record the tensile strength and elongation at break<br><br>Note any significant change in appearance, e.g., blistering, etc  | Elongation at break shall be not less than 50% of that of the controls for the bond breakers given in Table 6.1. For an elongation between 50% and 25% of the controls, the membrane requires additional bond relief above that given in Table 6.1. A failure is for less than 25% retention of elongation at break of the controls |
| (e) <i>Heat ageing</i>         | 7 days at 23 ±2°C and 65 ±15% relative humidity, + 7days heat ageing at 50 ±2°C + 2 days at 23 ±2°C and 65 ±15% relative humidity   | Record the tensile strength and elongation at break<br><br>Note any significant change in appearance, eg blistering, etc.    | Elongation at break shall be not less than 50% of the result recorded for the controls  |

\* Immersion should be carried out in a sealed container kept out of direct sunlight, and the sodium hypochlorite and sodium hydroxide solution should be replaced with fresh solution every 7 days.

† Or equivalent. N8 is available from Huntsman.

## APPENDIX B

ASSESSMENT OF RESISTANCE OF WATERPROOFING MEMBRANES TO  
CYCLIC MOVEMENT\*

(Normative)

**B1 INTRODUCTION**

Elastomeric and plastics sheet materials used for waterproofing may exhibit very high elongations to rupture when tested by standard unidirectional tensile tests. They may, however, rupture in use under small strains when these are applied repeatedly and slowly. In practice, cases of rupture have been found to be associated with restrained membranes where small movements in the supporting substrate or surfacing occur, such as at cracks or joints where the movements have to be accommodated over small free lengths of membrane material and so induce high strains.

The movements are caused by thermal or moisture content changes in the surfacing or substrate and are very slow. Such slow straining of membrane materials may induce plastic and permanent deformation rather than purely elastic response. Furthermore, repeated slow cycling may 'neck down' the membrane and cause it to eventually rupture or to induce a fatigue-type rupture. The process is not completely understood but sufficient is known to indicate that standard tensile tests do not indicate a material's susceptibility to the phenomenon and that very slow and repeated strain cycling over a small gauge length of specimen is pertinent.

**B2 TEST METHOD****B2.1 Procedure**

The test shall be conducted under controlled conditions of  $20 \pm 2^\circ\text{C}$  and  $65 \pm 15\%$  relative humidity.

The procedure shall be as follows:

- (a) Clamp a specimen of  $65 \text{ mm} \times 25 \text{ mm} \times$  sheet thickness (in millimetres) between machined metal blocks of rectangular dimensions  $70 \times 45 \times 20 \text{ mm}$ . The blocks shall have plates top and bottom, fitted with four screws that act as grips, and contain all of the membrane specimens except for a central  $25 \times 2 \text{ mm}$  portion. Tighten the screws by hand so that slippage does not occur during the testing.
- (b) Place the blocks in the grips of a machine that simulates joint movement. The machine shall be geared so that the  $2 \text{ mm}$  gauge length of the membrane is under test. Repeat this cycling continuously 50 times at a constant rate of strain for both the elongation and the return, the full cycle taking a nominal 2 hours.

**B2.2 Measurement criteria**

For a Class I type membrane the maximum strain used for the cycling shall be 50% the elongation at break.

For a Class II type membrane the maximum strain used for the cycling shall be 50% the elongation at break.

For a Class III membrane type the extension movement used for the cycling is 4 mm extension.

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\* Based on CSIRO Moving Joint Test

**B3 REPORTING OF RESULTS**

Daily observations of the membrane when fully extended shall be made and the onset of crazing, surface tears and membrane rupture shall be noted.

**B4 TEST CRITERIA**

Any rupture holing the specimen or extending through the thickness for more than 1 mm in from the edge of the specimen shall be taken as a failure and the number of cycles to failure shall be reported. If failure does not occur after 50 cycles it shall be reported together with the types of any surface defects that have been induced and the number of cycles at which onset of the defect occurred.

## APPENDIX C

ASSESSMENT OF THE SUITABILITY OF WATERPROOFING MEMBRANES  
WHEN USED OVER PARTICLE BOARD\*

(Normative)

**C1 INTRODUCTION**

This Appendix sets out controls, a test method and procedure to enable the assessment of the suitability of flexible waterproofing membranes when used over particle board flooring, for membranes that have a water vapour transmission rate greater than  $8 \text{ g/m}^2/24 \text{ h}$  when tested in accordance with ASTM E96.

**C2 TRAY**

The tray shall consist of the following:

- (a) *Base*—constructed out of particle board flooring of 19 mm or 20 mm thickness, with a longitudinal joint through the centre. Size  $900 \times 900 \text{ mm}$ .
- (b) *Upstand*—constructed out of solid timber at least 70 mm high and making a  $800 \times 800 \text{ mm}$  internal tray dimension.
- (c) *Bond breaker*—from material specified in the membrane installation instructions. To be installed at the junction between the upstand and the base, and over the longitudinal joint in the flooring.
- (d) *Membrane*—installed in accordance with manufacturer's instructions, covering all of the base and the upstands to a height of 60 mm.

**C3 CONTROL SAMPLE**

For the purpose of this assessment the test sample shall be a piece of particleboard cut from the flooring, at least  $500 \times 200 \text{ mm}$ .

**C4 TEST METHOD****C4.1 Procedure**

The procedure shall be as follows:

- (a) Place base in a controlled room at a temperature of  $23 \pm 2^\circ\text{C}$  and  $65 \pm 15\%$  relative humidity, and place on a stand that allows access to the underside, for measurements with the moisture meter.
- (b) After the membrane has cured, flood the tray with water to a depth of 25 mm.  
Maintain the water level at 25 mm depth  $\pm 5 \text{ mm}$  until completion of the test. A control specimen shall be located adjacent to the test specimen and shall be, completely free from any direct contact with water for the duration of the test.
- (c) Measure moisture content of specimen and control in accordance with Paragraph C4.2.

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\* Based on CSIRO Test Procedure for Flexible Membranes Over Particleboard Flooring

## **C4.2 Moisture content measurement**

### **C4.2.1 General**

The measurement of the moisture content of the sample shall be made with a standard high-resistance electrical moisture meter as specified in Clauses 4.2.2 and 4.2.3.

Measurement shall be made at 6 locations on the test specimen and 2 locations on the control specimen, as specified Paragraph C4.2.3, in between nails complying with the requirements of Paragraph C4.2.2. Nail fixing shall be in accordance with Paragraph C4.2.3(c).

### **C4.2.2 Specification—Nails, gauge length, and nail fixing**

- (a) *Nails* Nails shall be 50 mm, 3.4 mm diameter, insulated with a piece of PVC sleeving to within 3 mm of the point of the nail.
- (b) *Gauge length* Gauge length between nails shall be the calibrated distance for the moisture meter used.
- (c) *Nail fixing* Nails shall be fixed prior to the membrane installation. They shall be positioned from the underside of the base that is to be covered by the membrane. At the nailing locations, pre-drill holes to the diameter of the sleeving and for a depth of 14 mm. The nails shall be driven to within 3 mm of the surface to be coated by the membrane.

### **C4.2.3 Specification—Measurement**

The following applies:

- (a) *Specimen* The specimen shall be measured at 6 locations across the centre-line, perpendicular to the longitudinal joint; and at 2 locations at distances 20, 70 and 250 mm away from the longitudinal joint in the particle board base.
- (b) *Control* The control shall be measured at 2 locations along the longitudinal centre-line with the end point of each being located at 100 mm from either end of the control.

## **C4.3 Measurement recording**

Measurements shall be recorded to the nearest 1%. Measurements shall be taken before flooding, and after 3 days, 7 days, then weekly until a minimum of 42 days after flooding or until the moisture content has stabilized to less than 1% increase over a 7 day period, whichever is the greater.

## **C5 TEST CRITERIA**

To achieve a pass, the moisture content at all 6 locations in the test specimen shall not reach a moisture content 10% above the average of the 2 control measurements taken on the same day.

## NOTES

## NOTES

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