

## FLOOR COATINGS FOR BUILDING INTERIORS

### 1 SCOPE

- a) This specification applies to products applied to various flooring substrates in public buildings (schools, hospitals, aged care facilities etc) for the protection and/or decoration of the substrate.
- b) Certain buildings – mostly public buildings such as schools, hospitals and aged care facilities – require the application of coatings to decorate and/or protect the substrate. Where adequate natural ventilation for extended periods of time is not practical or feasible, a decision to only use low surface-emitting coatings may be required in order to minimise any risk of adverse health reactions in the building occupants. This specification enables tender and painting specification writers to call for complying products.

### 2 BACKGROUND

- a) To obtain a broad overview of the Australian Paint Approval Scheme (APAS), refer to APAS document AP-D001.
- b) To obtain an overview of restricted ingredients in APAS certified products, refer to APAS document AP-D123.
- c) To obtain the current list of APAS participating manufacturers (and suppliers) and resellers, refer to APAS document AP-D152.
- d) To obtain an overview of how to participate in the APAS, refer to APAS document AP-D177.
- e) APAS approval to this specification may be gained by compliance with the requirements detailed in this specification and those in APAS document AP-D192.
- f) In 1994 the Queensland State Government was faced with an OH&S issue that forced the closing of a school following reports of alleged illness among some pupils and staff.
- g) The cause was traced to the emission of chemicals from a floor coating that had been applied some weeks earlier during school vacation.
- h) This resulted in a Queensland State Government ban on the use of seamless flooring products in its buildings until 1998 when an assessment protocol for both the evaluation of supplied products and an accreditation requirement for application contractors (SOA450/EPA450) was developed and implemented by the Queensland Department of Public Works. In September 2010, this pre-qualification arrangement was transferred to APAS (for the surface coating products) and PCCP (for painting contractors).
- i) Hence the purpose of this APAS specification is to document requirements for specialist low surface-emitting coatings for the interiors of public buildings, not only in Queensland but in Australasia generally.

### 3 DESCRIPTION AND GUIDE FOR USERS

#### 3.1 General Requirements

- a) Products approved under this specification are products that produce a seamless protective and/or decorative coating finish for various flooring

substrates encountered in interiors of normal buildings.

- b) They are formulated with restrictions on the amount of volatile components that will be released from the film during curing.
- c) Typically, they are mixed on site and applied by squeegee, spike roller, trowel or other means recommended by the manufacturer.
- d) Products covered by this specification include, but are not necessarily limited to, the following:
  - i. Surface sealers
  - ii. Clear and plain colour finishes
  - iii. Epoxy floor coatings
  - iv. Decorative systems e.g., fleck flooring
  - v. Multi-layer rebound systems for gymnasiums and indoor sports arenas
- e) The products may be either single or multi-pack composition.
- f) Under Public Works Queensland rules, complying products were able to be submitted for certification by one of two possible means:
  - i. Direct submission by the product manufacturer with accompanying evidence of compliance to these requirements, or
  - ii. Submission by the applicator who independently sourced product and arranged and paid for the testing to demonstrate compliance to these requirements
- g) Under APAS Rules, submissions under 3.1 f) i. will only be from fully Recognised Manufacturing Units (RMUs) as is the current practice.
- h) Submissions under 3.1 f) ii. represent a departure from the APAS norm but will be permitted for AP-S0209 certification applications only.
- i) Submissions under 3.1 f) ii. shall be required to identify the manufacturer and full product name(s). This information will be treated as Commercial-in-Confidence by APAS and its officers but will appear on the Registrant's Certificate of Compliance.
- j) Products certified under 3.1 g) above will be listed in the APAS List of Approved Products.
- k) Products certified under 3.1 h) above will **not** be listed in the APAS List of Approved Products. However, a certificate of compliance will be issued to the applicant.
- l) Irrespective of the mode of submission, normal APAS rules for re-submissions will apply.

#### 3.2 Sub-Classes

- a) This specification incorporates the following sub-classes:
  - i. **0209/1:** Solvent based or solvent free coating
  - ii. **0209/2:** Water-based coating
- b) In addition, the following suffix is used to differentiate specialist products:
  - i. **L:** Low surface emitting products complying with APAS Technical Document AP-T002 as indicated in clause 12, Table 1 below

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### 3.3 Basis of this Specification

- a) This specification is based on a requirement developed by the Queensland Department of Public Works (SOA450/EPA450).
- b) Products approved under this specification do not comply with any Paint Reference Number (PRN) of AS/NZS 2311 and AS/NZS 2312.

## 4 REFERENCED DOCUMENTS

- a) The following standards are referenced in this document:
  - i. **AS/NZS 1580** – Paints and related materials: Methods of test
  - ii. **AS 2001.2.28** – Method of test for textiles – Physical tests – Determination of abrasion resistance of textile fabrics (rotary platform, double-head method)
  - iii. **AS/NZS 2311** – Guide to the painting of buildings
  - iv. **AS/NZS 2312** – Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
  - v. **AS 4586** – Slip resistance classification of new pedestrian surface materials
  - vi. **AS ISO 9239.1** – Reaction to fire tests for floor coverings – Part 1: Determination of the burning behaviour using a radiant heat source
  - vii. **ASTM D2794-93** – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
  - viii. **HB 197** – An introductory guide to the slip resistance of pedestrian surface materials

These documents may be purchased through the Reference Standards Australia website:  
<https://www.standards.org.au/>

- ix. **The Poisons Standard June 2021**: Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) No. 33, Part 2: Control on Medicines and Poisons, Section Seven / Appendix I Paint or Tinters

This document is available from the Australian Government Federal Register of Legislation website at:  
<https://www.legislation.gov.au/Details/F2021L00650>

- x. **National Construction Code (NCC) 2019** Amendment 1, Volume 1

This document is available from the Australian Building Codes Board website at:  
<https://www.abcb.gov.au/Resources/All-Resources>

- b) The following APAS documents are referenced in this document:
  - i. AP-D001 Rules Governing How APAS® Operates
  - ii. AP-D123 Restrictions on Ingredients in Product Formulations
  - iii. AP-D152 APAS® Participating Manufacturers and Resellers

- iv. AP-D114 Rules Governing APAS® Recognition as a Testing Authority
- v. AP-D177 Rules Governing How Product Manufacturers participate in APAS®
- vi. AP-D181 Volatile Organic Compounds (VOC) Limits
- vii. AP-D192 Rules Governing APAS® Product Certification Scheme
- viii. AP-T002 Determination of the Surface Emission Characteristics of a Coating for use in Building Interiors

All APAS documents are available for download from the APAS website: <https://vs.csiro.au/apas/documents/>

All APAS specifications are available for download from the APAS website: <https://vs.csiro.au/apas/specifications/>

## 5 COMPOSITIONAL REQUIREMENTS

### 5.1 Binder

- a) There is no restriction placed on the type of binder used. Of primary importance is the compliance with the technical requirements detailed in clause 12, Table 1 below.

### 5.2 Volatiles

- a) The volatile portion, although not defined or restricted, is limited in quantity to ensure indoor air quality of a sufficient standard in use. Refer to clause 12, Table 1 below.
- b) For VOC content restrictions, refer to APAS document AP-D181.

### 5.3 Pigmentation

- a) There is no restriction placed on the type(s) of pigment used with the exception that they shall be non-toxic and non-corrosive and comply with the requirements of the SUSMP. Of primary importance is the compliance with the technical requirements detailed in clause 12, Table 1 below.

### 5.4 Colour

- a) Products approved under this specification are normally available in a wide range of colours including clear finishes. Refer the manufacturer's product or technical data sheet.

## 6 PRODUCT APPROVAL REQUIREMENTS

### 6.1 General Requirements

- a) The product and its application shall comply, during the application process and the life of the approval, with all requirements of APAS document AP-D192 **except for** the condition nominated in clause 3.1 h) above.
- b) Approval will be based on test certification from an APAS Recognised laboratory.
- c) APAS recognises certain laboratories as having the skills, experience, staff and general technical

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- competence to carry out specific testing for APAS certification.
- d) In decreasing order of preference, such laboratories are:
- Current APAS RMUs
  - Laboratories with current NATA accreditation and the specific AP-S0209 test(s) nominated in their Scope of Accreditation
  - Laboratories with current NATA accreditation but without the specific AP-S0209 test(s) nominated in their Scope of Accreditation. However, there are **similar** tests nominated. The degree of **similarity** will need to be approved by APAS.
  - Laboratories without RMU status or current NATA accreditation but which have undergone a process of approval by APAS as specified in APAS document AP-D114
- e) At the time of publication of this document, the following testing authorities were recognised by APAS for compliance to AP-S0209:
- Cetec Pty. Ltd.**  
2/27 Normanby Road  
Notting Hill VIC 3168  
T: +61 3 9544 9111  
E: [info@cetec.com.au](mailto:info@cetec.com.au)
  - CSIRO Materials Durability & Coatings Lab**  
71 Normanby Road  
Clayton VIC 3169  
(sample deliveries to Gate 3)  
T: +61 3 9545 8774  
E: [money.arora@csiro.au](mailto:money.arora@csiro.au)

### 6.2 Technical Requirements

- The product shall comply with **all** the requirements of clause 12, Table 1 below.
- Unless specifically nominated, the testing substrate shall be fibre-reinforced cement board.
- APAS recognises that a final coating system may be composed of different products that have either been separately approved, or not expected to alter the final system below the requirements of this specification, e.g., addition sand or aggregate to create anti-slip properties. In this situation, no additional testing would be required as the composite system would be expected to meet the requirements of this specification.
- In the situation where additives that have not been tested in accordance with this specification and may reasonably be expected to alter some of the test results of a composite system, e.g., acrylic flake in flake floor finishes, the APAS Executive Officer may require a subset of the tests required for approval to this specification (e.g., Fire Testing) to be completed on the composite sample.

### 6.3 Health and Safety Requirements

- The manufacturer's Safety Data Sheet (SDS) must be studied closely prior to using the product and complied with during use of the product.

- Products intended for sale in Australia shall comply with all the requirements of the SUSMP. Products intended for sale in other countries shall comply with all local WHS and environmental requirements.
- The product shall comply with all requirements of clause 6.3 and 6.4 of APAS document AP-D192.

## 7 APPENDIX A

### Dry Condition

#### 7.1 Scope and Method:

- Individual coatings are tested for compliance with maximum drying times as specified in clause 12, Table 1: Dry Film Properties. Both Surface Dry Condition and Hard Dry Condition are tested in accordance with the methods set out in AS/NZS 1580.401.1 and AS 1580.401.6 respectively.
- Where a flooring system is comprised of multiple coats, each coat should be applied in succession to the test panel in accordance with the manufacturer's instructions.
- The number of test panels used should be equivalent to twice the number of coats making up the flooring system; so that each test can be conducted on a fresh panel.

## 8 APPENDIX B

### Fire Testing

#### 8.1 Principle:

- The burning behaviour of a floor coating in response to heat and flame, is determined under laboratory conditions in accordance with AS ISO 9239.1.
- The results are expressed in terms of critical heat flux (kW/m<sup>2</sup>) and smoke density development rate (% x min).

#### 8.2 Substrate Selection:

- Materials or coatings that are usually applied to a substrate shall be applied to the appropriate substrate.
- Where the substrate is unknown, or where the material may be applied to a variety of substrates, the substrate shall be the one that represents the highest reactivity likely end-use condition. Refer to Table B1 below.
- A material tested on any one of the substrates shall apply to any substrate in the same group or a less reactive group.

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Reactivity	Substrate Material
Most Reactive	Standard grade plywood, hardboard, fibre / particleboard (less than 12 mm thick)
	Standard grade plywood, hardboard, fibre / particleboard (12 mm or greater thickness)
	All paper face gypsum board products
Least Reactive	Concrete or masonry, fibre-reinforced cement board, non-paper-faced gypsum boards

Table B1

8.3 Performance Requirement:

- 8.3.1 Critical Radiant Flux (CRF) expressed in kW/m<sup>2</sup>; NCC 2019 Amendment 1, Volume 1, Specification C1.10 Fire Hazard Properties; sets out the minimum CRF for the various NCC building classes.
- 8.3.2 Maximum Smoke Development Rate in buildings not fitted with sprinklers: ≤750%-minutes (not applicable in buildings fitted with sprinklers).
- 8.3.3 Source: NCC 2019 Amendment 1, Volume 1, Specification C1.10 Fire Hazard Properties.

9 APPENDIX C  
Abrasion Resistance

- 9.1 **Equipment:** Abrasion resistance is determined using a Taber wear testing machine (or an APAS approved equivalent) and a calibrated CS-17 abrasive wheel.
- 9.2 **Method:** The methodology is as described in AS 2001.2.28 and AS 1580.403.2, with the following variations:
  - i. Testing is undertaken 72 hours after the final coat of the applied flooring system was applied. Refer Note<sup>2</sup> below for details of test film preparation.
  - ii. A single 100 mm square panel is cut from each board. The samples should be taken away from the edges of the board (minimum distance should be 50 mm).
  - iii. A calibrated, rubberised CS-17 abrasive wheel is used. Previous testing has found that this grade of wheel, when under a 1 kg load, and applied for 1000 revolutions, provides appropriate sensitivity and discrimination over widely diverse applied floor coatings.
  - iv. The abrasive wheel is pre-conditioned (re-faced) using a standard conditioning disc prior to the test.
  - v. The samples are weighed to an accuracy of ±1mg before and after testing.
  - vi. Apply the abrasive wheel to the sample under a 1kg load and run for 50-100 revolutions to ensure a smooth even surface exists free of micro blisters and orange peel. Dust off and weigh the panel to obtain the initial weight. Re-condition the abrasive wheel.

- vii. Re-apply the abrasive wheel and weight to the conditioned track and run for 1,000 cycles. Re-weigh and calculate the mass loss.
- viii. The loss in mass is thus used to rate the wear characteristics of the floor.

9.3 Rating:

Mass Loss	Abrasion Resistance
> 400mg	Low
100 – 399mg	Moderate
< 100mg	High

Table C1

10 APPENDIX D  
Impact Resistance

- 10.1 **Equipment:** The test equipment comprises a 2.0 Kg cylindrical mass with a 12.7 mm diameter ball indenter contained inside a 1.2 m long guide tube as specified in ASTM D2794.
- 10.2 **Method:** The method is as described in AS 1580.406.1 with the following variations:
  - i. Testing is undertaken 16 days after the final coat of the applied flooring system has been applied i.e., immediately after the last VOC test samples have been taken.
  - ii. A mass is dropped onto the coated surface of the test board at different locations while progressively incrementing the height in 50 mm steps until damage is observed. Drops should be made alternatively on the two test boards.
  - iii. Each indentation is inspected for damage using a stereomicroscope at 10X magnification.
  - iv. Repeat the test in different locations under the same conditions, continuing to increase the height in 50 mm increments as necessary until four consecutive tests (two on each test board) all achieve the same positive results i.e., fracture or cracking of the coating.
  - v. Damage is defined as the point at where fracture or cracking of the coating is observed. Plastic (permanent) deformation of the coating is not regarded as constituting damage unless accompanied by fracture.
  - vi. The impact energy is calculated using the formula:

$$E = g \times m \times h$$

Where

- E = Impact energy in J (Joules)
- g = Acceleration (9.8m.sec<sup>-2</sup>)
- m = Mass of drop weight in Kg
- h = Height from which mass dropped in m (metres)

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**11 APPENDIX E**  
**Dry Slip Resistance**

**11.1 Method:**

11.1.1 Friction profiles of the coatings are recorded using a floor friction tester, such as the **Tortus II**, in accordance with the method specified in AS 4586 Appendix B. The floor friction tester is motor driven and drags a rubber **foot** of standard composition and hardness for a predetermined distance across the surface of the floor under test. The foot is loaded with a known mass (normal force – P) and the lateral force due to frictional restraint (F) is measured as the surface is traversed.

11.1.2 The vertical (normal) load shall be 200 ± 20g.

11.1.3 The kinetic coefficient of friction (μ) is calculated according to the formula:  $\mu = F/P$ .

11.1.4 Two traverses, each 800 ± 50mm long, are made of the floor in the grain direction.

**NOTE:** The **grain direction** is specified in AS 4586 Appendix B as the direction that gives the lowest coefficient of friction reading. Several determinations may be required to ascertain the grain direction.

11.1.5 Reface the friction foot before each series of traverses using wet and dry abrasive paper, grade P 400, as specified in AS 4586. Report the lowest reading obtained for the coefficient of friction (μ) for the surface.

**11.2 Rating / Classification:**

Classification	Floor Friction Tester Mean Value
F	≥ 0.40
G	< 0.40

**Table E1**

11.2.1 For Classification F, the mean of the test results shall be equal to, or greater than, 0.4 and each individual test result shall be equal to, or greater than, 0.35.



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12 TABLE 1: PERFORMANCE PROPERTIES

TEST	AS/NZS 1580 METHOD	REQUIREMENTS
<b>For Each LAYER of the System (e.g., Primer, Topcoat)</b>		
<b>Wet Paint Properties</b>		
Preliminary Examination of Fluid Components for Testing	103.1	Record any defects in the container and any visible leakage. Record any properties of the contents that might impact on the tested performance properties including: <ul style="list-style-type: none"><li>- Ullage i.e., the air space above the contents of the container expressed as an approximate percentage of the total capacity of the container.</li><li>- Surface skinning: its extent, consistency and thickness.</li><li>- Consistency i.e., has gelling taken place or is the material thixotropic.</li><li>- Extraneous matter.</li></ul> <b>Do not</b> continue with the test if skinning, or gelling has occurred, or if extraneous matter is present.
Ease of Manual Reincorporation	211.2	The stirred material should be smooth and uniform and free of sediment or lumps. If this is not the case, record as <b>not readily incorporated</b> . In this situation, do not continue with the test. <b>Note:</b> While this test method sets out a procedure for assessing the ease of manual reincorporation of paints and related materials in standard 500 mL containers, the same requirements will apply irrespective of the size of container and the method of stirring or mixing employed.
Application Properties		Using only the methods appropriate to the product and nominated on the technical data sheet. Shall show satisfactory application properties and the dry film shall be free of defects.
<b>Dry Film Properties<sup>1</sup></b>		
Surface Dry Condition	401.1	Not more than 6 hours.
Hard Dry Condition (Mechanical Thumb Test)	401.6	Not more than 24 hours.
Finish – General Appearance	603.1	Shall be free of coarse particles, wrinkling, streakiness, and orange peel effects and have a smooth surface of uniform colour and appearance.



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TEST	AS/NZS 1580 METHOD	REQUIREMENTS
<b>For the COMPLETE System (Substrate, Primer, Topcoat)<sup>1</sup></b>		
TVOC Content - for <b>0209/1L</b> and <b>0209/2L</b> products <b>only</b>	AP-T002	≤ 600 µg/m <sup>2</sup> /hr at 14 days. The TVOC at each test interval (1, 3 and 7 days) shall also be reported.
Critical Radiant Flux	Clause 8, Appendix B (AS ISO 9239.1)	Report result. Application of product is to be determined by the requirements of NCC 2019 Amendment 1, Volume 1, Specification C1.10 Fire Hazard Properties.
Maximum Smoke Development Rate	Clause 8, Appendix B AS ISO 9239.1	Report result. Classify product as either <b>suitable</b> or <b>not suitable</b> for use in buildings not fitted with a sprinkler system complying with NCC 2019 Amendment 1, Volume 1, Specification E1.5. To be classed as suitable, the Maximum Smoke Development Rate must be ≤ 750%-minutes. Source: NCC 2019 Amendment 1, Volume 1, Specification C1.10 Fire Hazard Properties.
Abrasion Resistance <sup>2</sup>	Clause 9, Appendix C 403.2 AS 2001.2.28	Using an CS-17 abrasive wheel and a 1kg load for 1000 revolutions, determine and report the mass lost and the relevant abrasion resistance rating.
Impact Resistance	Clause 10, Appendix D 406.1 Method B ASTM D2794	Report the impact energy in Joules at which failure of the coating occurs consistently (four consecutive drops at the same height) and the relevant impact resistance rating.
Dry Slip Resistance  <b>NOT</b> for kitchens, laundries, bathrooms or toilet/amenities blocks	Clause 11, Appendix E AS 4586 Appendix B HB 197	≥ 0.4. Source: Standards Australia HB 197.

### NOTE:

<sup>1</sup> A minimum curing time of ten days from time of application of the final coat is to elapse prior to commencement of all physical tests with the exception of the Dry Condition Tests (see clause 7, Appendix A above). The physical tests include: Fire Testing, Abrasion Resistance, Impact Resistance and Dry Slip Resistance.

<sup>2</sup> Where the flooring system includes the addition of materials such as flake or rubber particles, the abrasion resistance test shall be performed on dry films without these additions i.e., on the base resin/pigment system only.



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## FLOOR COATINGS FOR BUILDING INTERIORS

### 13 APPENDIX F

#### Document History

Status: Current  
Version: 2  
Date Published: 10-09-2021

Document Version No.:	Date Published:	Summary of Changes:
2	10-09-2021	<ul style="list-style-type: none"><li>• General format changes</li><li>• Updated background information in clause 2</li><li>• Updated SUSMP information</li><li>• Updated APAS website information</li></ul>
1	27-11-2020	<ul style="list-style-type: none"><li>• Changed Taber wear wheels to the more common CS-17 type</li><li>• Note 2 was added to clarify abrasion resistance testing</li><li>• Original Appendix F (Certification Transfer Process) was deleted</li><li>• Clarification of testing requirements for systems has been added to 6.2 c) and d)</li><li>• Clause 9, Appendix C, 9.2 vi. and vii. added</li><li>• Addition of clause 13 Appendix F (Document History) and removal of the Editorial Note previously used in specification versions</li><li>• Updated document to the current format</li><li>• Updated internal and external document references (BCA have been changed to NCC)</li><li>• Addition of "People + Product = Protection" to Footer</li></ul>
0	07-02-2011	<ul style="list-style-type: none"><li>• Original document</li></ul>