SPECIFICATION AP-S0155

THERMOSETTING POWDER COATING

1 SCOPE

An electrostatically applied thermosetting powder coating which is heat cured, typically for 10 minutes at 200°C, for interior or exterior use.

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.

3 DESCRIPTION AND GUIDE FOR USERS

3.1 General Requirements

a) An electrostatically applied thermosetting powder coating which is heat cured, typically for 10 minutes at 200°C.
b) **Sub-class 0155/1:** for application to interior surfaces where aesthetic appearance is of more of a concern than corrosion resistance.
c) **Sub-class 0155/2:** intended for use on exterior equipment where good durability and corrosion resistance is required.
d) Both sub-class grades shall be free of TGIC (triglycydl isocyanurate), lead and other heavy metals.
e) Apply to metal surfaces prepared as recommended by the powder coating manufacturer. Chemical pre-treatments greatly enhance coating adhesion. Non-ferrous surfaces require pre-treatments varying according to the metal type.
f) To obtain optimum performance, the powder organic coating should be applied as soon as possible after surface pre-treatment.
g) Powder coatings are generally applied within the dry film thickness range 40-80µm.
h) Depending on the profile obtained, abrasive blasted surfaces will require a higher film build to provide adequate protection to the higher peaks.

3.2 Sub-Classes

a) This specification incorporates the following any sub-classes:
   i. 0155/1: Interior grade
   ii. 0155/2: Exterior grade

3.3 Basis of this Specification

a) This specification is based on AS 4506.
b) This product type corresponds to Paint Reference Number (PRN) B45 of AS/NZS 2311.

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 3715** – Metal finishing – Thermoset powder coating for architectural applications of aluminium and aluminium alloys
   iii. **AS 4506** – Metal finishing – Thermoset powder coating
   iv. **BS EN 12206** – Paints and Varnishes - Coating of aluminium and aluminium alloys for architectural purposes - Part 1: Coatings prepared from coating powder
   v. **BS EN 13438** – Paints and varnishes - Powder organic coatings for galvanized or sherardised steel products for construction purposes

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

   vi. **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 web site at: https://www.legislation.gov.au/Details/F2021L00650

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-D177 Rules Governing How Product Manufacturers participate in APAS®
   v. AP-D181 Volatile Organic Compounds (VOC) Limits
   vi. AP-D192 Rules Governing APAS® Product Certification Scheme

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

5 COMPOSITIONAL REQUIREMENTS

5.1 Binder

a) Binder requirements are not restricted by this specification. Sub-class 0155/1 shall typically consist of epoxy and/or polyester thermosetting resin, curing agent(s) and minor additives. Sub-class 0155/2 shall typically consist of thermosetting polyester resin, curing agent(s) and minor additives.

5.2 Volatiles

a) Not applicable.
b) For VOC content restrictions, refer to APAS document AP-D181.

5.3 Pigmentation

a) The pigmentation shall be chosen to impart the properties detailed in clause 8, Table 1 below.
b) Some colours (e.g., reds, oranges or yellows) may variously contain lead or chromate-based pigments qualifying specific Schedule status according to the SUSMP. Such colours shall be clearly identified in accordance with local legislation and regulations.

5.4 Colour

a) Products approved under this specification are normally available in a wide range of colours.

6 PRODUCT APPROVAL REQUIREMENTS

6.1 General Requirements

a) The product and its application for approval shall comply with the relevant requirements of APAS document AP-D192 during the life of the approval.

6.2 Technical Requirements

a) The product shall comply with **all** the requirements of clause 8, Table 1 below.
b) The manufacturers own quality control schedule of tests and limits shall be allowed subject to the approval of the Executive Officer (EO), APAS.
c) On request, the EO may request the results of the tests for a batch and compare these with previous batches.
d) Density and non-volatile content by weight (NVCW) figures for each production batch of the approved product shall be within ±3% of the actual (not theoretical) figures quoted in the original product approval submission (APAS document AP-D139).
e) Subject to compliance with all the requirements of this specification, the level of Approval appropriate to the application shall be given to the system.

6.3 Health and Safety Requirements

a) The manufacturer's Safety Data Sheet (SDS) must be studied closely prior to using the product and complied with during use of the product.
b) Both sub-class grades shall be free of TGIC (triglycydl isocyanurate), lead and other heavy metals.
c) 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.
d) The product shall comply with all requirements of clause 6.3 and 6.4 of APAS document AP-D192.

7 APPENDIX A

T-Bend Adhesion and Flexibility Test

7.1 **Scope**

7.1.1 This Appendix sets out the method of assessing paint adhesion and flexibility by the T-bend test.

7.2 **Application**

7.2.1 This method is suitable for the testing of products up to 1.2mm thick.

7.3 **Principle**

7.3.1 Prepainted metallic product is bent flat on a mandrel of specified diameter.

7.3.2 Adhesion of paint on the outside of the bend is assessed by the application of adhesive tape and its subsequent rapid removal.

7.4 **Apparatus**

7.4.1 The following test apparatus is required:

i. A bench vice with jaws approximately 150mm wide or alternative bending apparatus.
ii. Adhesive tape 20 to 25mm wide, pressure-sensitive, semi-transparent with nominal adhesion strength of 5.5 N/25mm width. Adhesive force may be tested in accordance with AS 1635.

7.5 **Preparation of Test Pieces**

7.5.1 Test pieces shall be 75mm wide and of sufficient length to enable the test to be performed. Test pieces of 200mm length are normally adequate.

7.6 **Test Temperature**

7.6.1 Tests shall be carried out within the temperature range 20 to 25°C. In the event of dispute, tests shall be carried out in accordance with the referee conditions specified in Method 101.4 of AS/NZS 1580.

7.7 **Procedure for T-Bend Adhesion**

7.7.1 The T-bend adhesion test shall be performed as follows:

i. Clamp approximately 25mm of one end of the test piece in the vice.
ii. Bend the test piece through 90 degrees with the coating to be assessed on the outside of the bend.
iii. Remove the test piece from the vice and complete the bend through to approximately 180 degrees by hand.
iv. Reinsert the test pieces in the vice and compress flat. This represents a zero T-bend or starting point for subsequent folding.
v. Fold once (as described above) for IT and compress, fold twice for 2T and compress and so on until the specified requirement is completed.
vi. Apply the adhesive tape along the entire length of the external bend and press down firmly.
vii. Remove tape at right angles to the bend with a rapid single pull.
viii. Visually examine the test piece for the removal of paint.

8 TABLE 1: PERFORMANCE PROPERTIES

TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Powder Testing		
Preliminary Examination	Visual	The powder shall be uniform in colour and free of large particles.
Sieve Analysis	AS 1289.3.6.1	Less than 0.5% of the powder shall be retained on a 100μm sieve.
Density	Liquid Displacement	To be within ±5% of stated value.
Cured Coat Testing – cured for 7 days		
General Requirements	AS 3715	Shall comply with **all** the requirements of **clause 2 Performance Requirements,** except for clause 2.5.9. All results shall be reported.
Electrostatic Spray Application	-	Application shall produce a smooth even film, free of defects.
Cure	-	After recommended cure schedule, there shall be no coating removal and only slight softening when the surface is gently swabbed with cotton wool soaked with 9:1 Toluene:MEK.
Flexibility and Adhesion	Clause 7, Appendix A	6T bend shall show no cracking or adhesion failure i.e., no coating removed.
Scratch Resistance	403.1	Not less than 2kg.
Opacity		Complete visual opacity at 60μm (or specified minimum film thickness) on black and white tinplate.
Colour	601.3	ΔE less than 2.
Testing on Coating exposed 24 months at 45°N at an approved site - applicable to 0155/2 products only		
Durability Refer to APAS document AP-D192 clause 12 b) and c) for applicable exposure sites	457.1 481.1 481.1.2 481.1.5 481.1.7 481.1.8 481.1.9 481.1.10 481.1.11 481.1.12 481.1.13	There shall be no integrity failure and the following minimum ratings shall apply: **Whites / Pastels / Dark Colours** Discolouration 1 / 1 / 1 Gloss Change 2 / 2 / 3 Checking 0 / 0 / 0 Cracking 0 / 0 / 0 Blistering 0/0 / 0/0 / 0/0 Flaking and Peeling 0 / 0 / 0 Chalking 1 / 1 / 2 Colour Change 0 / 1 / 1 Corrosion 0 / 0 / 0 Ratings quoted are those in the AS/NZS standard. Where more than one rating is quoted in the standard, the ratings above correspond to the current ISO rating practice.

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TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Testing on Coating exposed 24 months at 45°N at an approved site - applicable to 0155/2 products only (Cont.,)		
Adhesion	408.4	A rating ≥ 1.
Reverse Impact Resistance	AS 3715 Appendix H	No loss of adhesion.
Testing on Coating exposed 7 years at 45°N at an approved site - applicable to 0155/2 products only		
Adhesion	408.4	A rating ≥ 1.
Reverse Impact Resistance	AS 3715 Appendix H	No loss of adhesion.
Durability Refer to APAS document AP-D192 clause 12 b) and c) for applicable exposure sites	457.1 481.1 481.1.7 481.1.8 481.1.9 481.1.10 481.1.13	There shall be no integrity failure and the following minimum ratings shall apply: **Whites / Pastels / Dark Colours** Checking 1 / 1 / 2 Cracking 1 / 1 / 2 Blistering 2/2 / 2/2 / 2/2 Flaking and Peeling 0 / 0 / 0 Corrosion 2 / 2 / 2 Ratings quoted are those in the AS/NZS standard. Where more than one rating is quoted in the standard, the ratings above correspond to the current ISO rating practice.

9 APPENDIX B

Document History

Status: Current
Version: 9
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Document Version No.:	Date Published:	Summary of Changes:
9	30-08-2021	• General format changes • Updated background information in clause 2 • Updated SUSMP information • Updated APAS website information
8	19-11-2020	• Addition of Appendix B Document History and removal of the Editorial Note previously used in specification versions • Updated document to the current format • Updated internal and external document references (BS 6496 superseded by BS EN 12206 and BS 6497 superseded by BS EN 13438) • Addition of "People + Product = Protection" to Footer
7	08-10-2003	• Deleted reference to GPC numbering and incorporated a general format update
6	06-03-2001	• Reduced the sub classes of powder coatings from the previous five to two - a highly durable (epoxy) type with good corrosion resistance, and a decorative system with lower requirement for durability and corrosion resistance • Initiated the second stage of the move to new specification numbering with prominence given to the new number (previously GPC-P-155)