SPECIFICATION AP-S0140

HOT WATER GRADE EPOXY ENAMEL (SHIPS)

1 SCOPE

A two-pack epoxy enamel for application to the interior of hot water storage tanks.

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) A two-pack epoxy enamel for application to the interior of hot water storage tanks.
b) The proportion of curing agents to the epoxy resin is to be so arranged by the product manufacturer as to produce a paint meeting the requirements of this specification and shall be such that the mixing ratio is a simple numerical ratio (e.g., 1:1, 4:1, etc).
c) Apply in a minimum of two coats by brush or spray to an abrasive blast cleaned steel surface prepared to class 3 of AS 1627.4. If brush application is employed, additional coats will be necessary to achieve the desired dry film thickness.
d) The product shall be supplied in kit form i.e., in two containers, one being capable of holding both components after mixing. The mixing proportions shall be a simple ratio i.e., 1:1, 2:1, 3:1 or 4:1.
e) The mixed material shall be ready for use by brushing or airless spraying without thinning.

3.2 Sub-Classes

a) This specification does not incorporate any sub-class.

3.3 Basis of this Specification

a) This specification is not based on any known specification or standard.

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 1627.4** – Metal finishing – Preparation and pre-treatment of surfaces – Abrasive blast cleaning of steel

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

iii. **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) The binder shall typically consist of epoxy resin and a curing agent of polyamine, polyamide or amine adduct resins with or without accelerators.

5.2 Volatiles

a) The volatile component shall typically consist of hydrocarbons.
b) For VOC content restrictions, refer to APAS document AP-D181.

5.3 Pigmentation

a) Products shall typically consist of appropriate colouring pigments chosen to impart the properties detailed in clause 8, Table 1 below.

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) Test panels shall be mild steel or tinplate in accordance with AS/NZS 1580.104.1.

c) The mild steel test panels shall be prepared by blast cleaning in accordance with AS 1627 Part 4, class 3.
d) The tinplate panels shall be prepared in accordance with AS/NZS 1580.105.2.
e) The dry film thickness per coat shall be 120 - 130 μm.
f) Except for the spraying properties test, the coated panels shall be prepared by brushing.
g) A drying time of 24 hours shall be allowed between coats and 7 days before performance testing.
h) All panels shall be prepared according to the schedule in clause 9, Table 2.
i) The manufacturers own quality control schedule of tests and limits shall be allowed subject to the approval of the Executive Officer (EO), APAS.
j) On request, the EO may request the results of the tests for a batch and compare these with previous batches.
k) 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).
l) 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) Shall not be a Schedule 1, Schedule 2 or Schedule 3 paint (SUSMP).
b) The manufacturer's Safety Data Sheet (SDS) must be studied closely prior to using the product and complied with during use of the product.
c) Since the products covered by this specification contain hydrocarbon or chemical solvents, the paint is flammable and should be stored away from all sources of heat or ignition.
d) Containers should be resealed immediately after use and good ventilation provided during use to minimise the risk of fire or explosion and the long-term toxic effects of absorption of the vapour into the lungs. Forced ventilation will probably be required.
e) Care should be taken to avoid contact with the skin by the use of protective clothing and barrier cream. All pumping equipment should be adequately earthed. A full-face air fed respirator should be used when spraying.
f) 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.
g) The product shall comply with all requirements of clause 6.3 and 6.4 of APAS document AP-D192.

7 APPENDIX A

Test Method for Resistance to Thermal Shock

a) Prepare the test panel as specified clause 9, Table 2.
b) Place the panel vertically in a 2 L beaker and pour in enough hot fresh water at 90°C to cover 75% of the panel.
c) Allow to stand for 24 hours.
d) Pour out the water and replace immediately with hot water again at 90°C.
e) Repeat the procedure every working day until 20 cycles have been completed.
f) Remove the panel and examine.

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8 TABLE 1: PERFORMANCE PROPERTIES

TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Individual Component Testing – To be carried out on <u>both</u> Part A and Part B components		
Preliminary Examination	103.1	To be readily reincorporated. Shall be free of coarse particles, gel and foreign matter.
Consistency		Shall be such as to allow ready mixing of base and hardener.
VOC Content	APAS AP-D181	Refer to APAS document AP-D181 for method and limits. If the APAS specification is not listed on AP-D181, a declaration of VOC content **is still required.**
Mixed Product Testing		
Flash Point	AS 2106	Minimum 15°C.
Application Properties - Brushing - Rolling - Spraying	 205.1 205.3 205.4	 Satisfactory with minor brush marks allowed. Coat 75% of the panel, allow to dry for 5 minutes before coating remainder of panel - to produce a smooth film free from defects.
Thinning or Mixing Properties	208.1	Using the manufacturers recommended maximum amount of thinners which shall not exceed 10% by volume, there shall be no signs of incompatibility.
Consistency	214.1	To be recorded; results range to be between 60-110 KU. Other appropriate methods may be substituted by prior arrangement.
Non-volatile Content by Volume (Volume Solids)	301.2	Minimum 40%.
Surface Dry Condition	401.1	Maximum 3 hours.
Flexibility and Adhesion	402.1	6mm mandrel, slight cracking may be tolerated but there shall be no adhesion failure.
Scratch Resistance	403.1	Not less than 2kg.
Recoating Properties	402.1 403.1 404.1	No lifting, cracking, wrinkling or other defects. After 48 hours, shall withstand the 2kg scratch test and show no delamination when bent around the 6mm mandrel.
Colour - Visual Comparison	601.1	To be an approximate match.
Specular Gloss	602.2	To be recorded (60° head).

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TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Mixed Product Testing (Cont.,)		
Finish	603.1	To be smooth and even, free of sagging, streaking, pin holing, cratering, floating and other defects.
Reincorporation after Storage	211.2	To comply with all the preceding requirements after 24 months storage at ambient temperature.
Degree of Settling	211.1	Not to fall below 6.
Pot Life	-	After 90 minutes, a 500mL full open can of the mixed material shall have satisfactory application properties - brushing and thinner compatibility.
Resistance to Thermal Shock	Clause 7, Appendix A	No blistering or corrosion after 20 cycles.

9 TABLE 2: PANEL PERFORMANCE TESTS

Test Name	AS/NZS 1580 Test Method	Test Panel	Minimum Size (mm)	First Coat Paint	Drying Period	Second Coat Paint	Drying Period
Surface Dry Condition	401.1	Tinplate	100x50	Enamel	-	-	-
Flexibility and Adhesion	402.1	Tinplate	100x50	Enamel	7 days	-	-
Scratch Resistance	403.1	Tinplate	100x50	Enamel	7 days	-	-
Recoating Properties - bend test - scratch resistance	404.1 402.1 403.1	Tinplate	100x50	Enamel	(i) 16 hrs (ii) 48 hrs (i) 16 hrs (ii) 48 hrs	Enamel	(i) 16 hrs (ii) 48 hrs (i) 16 hrs (ii) 48 hrs
Gloss	602.2	Glass	100x100	Enamel	7 days	-	-
Finish	603.1	Tinplate	100x50	Enamel	7 days	-	-
Resistance to Thermal Shock	Clause 7, Appendix A	Tinplate	150x100	Enamel	24 hrs	Enamel	7 days
Spray Application	205.2 or 205.4	Mild Steel	500x500	Enamel	-	-	-

10 APPENDIX B

Document History

Status: Current
Version: 9
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Document Version No.:	Date Published:	Summary of Changes:
9	27-08-2021	• General format change to clause 1 • Updated background information in clause 2 • Updated SUSMP information • Updated APAS website information
8	16-11-2020	• 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 • Inclusion of VOC Content requirement to Table 1 Performance Properties • Addition of "People + Product = Protection" to Footer
7	14-05-2003	• Deleted reference to GPC numbering and incorporated a general format update
6	02-02-2001	• Initiated the second stage of the move to new specification numbering with prominence given to the new number (previously GPC-E-140)