

LINING FOR WATER PUMPS AND VALVES

1 SCOPE

This specification includes a range of products or coating systems intended for the internal lining of ferrous and non-ferrous pumps and valves used for potable water reticulation.

2 BACKGROUND

- To obtain a broad overview of the Australian Paint Approval Scheme (APAS), refer to APAS document AP-D001.
- To obtain an overview of restricted ingredients in APAS certified products, refer to APAS document AP-D123.
- To obtain the current list of APAS participating manufacturers (and suppliers) and resellers, refer to APAS document AP-D152.
- To obtain an overview of how to participate in the APAS, refer to APAS document AP-D177.
- 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

- This specification includes a range of products or coating systems intended for the internal lining of ferrous and non-ferrous pumps and valves used for potable water reticulation.
- Products will usually be high build materials with good resistance to erosion, low water permeation and a smooth finish to aid water flow. They may be used in conjunction with high build putties/fillers used to fill pitting/erosion, corrosion or other voids.
- May be applied to new units to extend initial service life or may be applied as a repair coating to provide further life to a worn unit
- Service life of these coating systems will be very much dependent upon the conditions of use, e.g., volume/speed of water flow and whether the water contains particulate matter.
- Satisfactory application will generally require attention to such properties as: substrate temperature, product temperature, ambient application temperature, wet/dry film thickness and curing conditions.
- In all applications to this specification, the suitability of all approved products for an application should be confirmed with the product's manufacturer.
- Specific details of surface preparation and application techniques should be confirmed with the products manufacturer prior to beginning any application works.
- The successful application of the products/coating systems covered by this specification will require the use of specially trained applicators. In some cases, these products will have a very short pot life due to their exothermic reaction on mixing.
- In general, surface preparation will involve abrasive blast cleaning to AS 1627.4. However other methods of surface preparation, or a combination of methods, may be required for a specific application or a specific

substrate type, e.g. acid cleaning. In some situations, it may be beneficial to allow a freshly blasted metal surface the opportunity to flash rust to provide a visual indication of the presence of any contamination.

3.2 Sub-Classes

- This specification does not incorporate any sub-class.

3.3 Basis of this Specification

- This specification is not based on any known standard or specification.

4 REFERENCED DOCUMENTS

- The following standards are referenced in this document:
 - AS/NZS 1580** – Paints and related materials: Methods of test
 - AS 1627.4** – Metal finishing – Preparation and pre-treatment of surfaces – Abrasive blast cleaning of steel
 - AS 3862** – External fusion-bonded epoxy coating for steel pipes
 - AS 3894.1** – Site testing of protective coatings – Non-conductive coatings – Continuity testing – High voltage ('brush') method
 - AS 3894.4** – Site testing of protective coatings – Assessment of degree of cure
 - AS/NZS 4020** – Testing of products for use in contact with drinking water
 - ASTM D4060-19** – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abrader
 - ASTM G14-04** – Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)

These documents may be purchased through the Reference Standards Australia website:

<https://www.standards.org.au/>

- 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>

- The following APAS documents are referenced in this document:
 - AP-D001 Rules Governing How APAS® Operates
 - AP-D123 Restrictions on Ingredients in Product Formulations
 - AP-D152 APAS® Participating Manufacturers and Resellers
 - AP-D177 Rules Governing How Product Manufacturers participate in APAS®
 - AP-D181 Volatile Organic Compounds (VOC) Limits



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- 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

- The binder may typically include ambient temperature or heat cured epoxy coatings, thermal bonded ceramics and other proprietary formulations.
- Any change of formulation will void potable water approvals if such approvals are held.

5.2 Volatiles

- Where volatiles are present in the product, they shall typically be comprised of hydrocarbons.
- For VOC content restrictions, refer to APAS document AP-D181.

5.3 Pigmentation

- The pigmentation shall be chosen to impart the properties detailed in clause 8, Table 1 below.

5.4 Colour

- Products approved under this specification are normally available in a limited range of colours.

6 PRODUCT APPROVAL REQUIREMENTS

6.1 General Requirements

- 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

- The product shall comply with **all** the requirements of clause 8, Table 1 below.
- All products intended for use in contact with drinking water must comply with clause 7, Appendix A.
- The manufacturers own quality control schedule of tests and limits shall be allowed subject to the approval of the Executive Officer (EO), APAS.
- On request, the EO may request the results of the tests for a batch and compare these with previous batches.
- Density and non-volatile content by weight (NVCW) figures for each production batch of the approved product shall be within $\pm 3\%$ of the actual (not theoretical) figures quoted in the original product approval submission (APAS document AP-D139).
- 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

- The manufacturer's Safety Data Sheet (SDS) must be studied closely prior to using the product and complied with during use of the product.
- Since the products covered by this specification may contain hydrocarbon solvents, the paint may be flammable and should be stored away from all sources of heat or ignition.
- 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.
- 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.
- 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.



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7 APPENDIX A

Guidelines for Approval of Coating Systems for Use in Potable Water

- 7.1 APAS requires that all products intended for use in contact with potable water shall be approved for such an end use by an appropriate authority.
- 7.2 Such approval is indicated by having a suffix **P** after the specification number e.g. 0173**P**. The issued certificate of product approval will clearly identify the appropriate exposure condition.
- 7.3 In order to gain product approval, the appropriate evidence of suitability needs to be supplied by one of two methods:
- A NATA-endorsed test report from an approved authority indicating compliance with AS/NZS 4020 **Products for use in contact with drinking water** (refer to 7.4 below for approved testing authority), or
 - Details of a technical case history of at least 6 years duration indicating satisfactory performance in contact with drinking water. A letter from the asset owner shall be supplied stating:
 - the name of the product used, and
 - the nature of its use in a potable water application and
 - the period during which it has been in continuous use and
 - how well it has been performing
- 7.4 The APAS recognised testing laboratory for AS/NZS 4020 in Australia is:

SA Water House

250 Victoria Square
Adelaide SA 5000

T: +61 1300 653 366

Email: awqccsu@sawater.com.au



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8 TABLE 1: PERFORMANCE PROPERTIES

TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Preliminary Examination	103.1	To be readily reincorporated. Shall be free of gel and foreign matter.
Viscosity	214.x	Method and result to be recorded. The viscosity shall be within $\pm 5\%$ of stated value.
Application Properties - Brushing - Rolling - Spraying	205.1 205.3 205.2 or 205.4	Using only the appropriate methods, the products shall show satisfactory application properties and the dry film shall be free of defects.
Surface Dry Condition	401.1	Maximum 7 hours.
Hard Dry Condition (Mechanical Thumb Test)	401.6	Maximum 24 hours.
Recoating Time		To be stated.
Colour - Visual comparison	601.1	Colour match not required except where the colour achieved is indicative of adequate mixing of a two-component product when an approximate match shall be achieved.
Finish	603.1	Shall be free of wrinkling or orange peel and have a uniform colour and appearance.
Reincorporation after Storage	211.2	To comply with all the preceding requirements after 18 months storage at ambient temperature.
Degree of Settling	211.1	Settling shall not fall below 6.
Coating Continuity	AS 3894.1	High voltage (brush) method shall be used for this test. Test voltage shall be as recommended by the coating manufacturer. There shall be no holidays. Test not applicable to metallic coatings.
Durability	457.1	No integrity failure.
Impact Resistance	ASTM G14-04	≥ 2.0 J.
Efficiency Enhancement		Where this feature is claimed for a coating, verifiable independent test results must be provided.
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 .



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TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Adhesion	408.5	1.5 Mpa.
Abrasion Resistance	ASTM D4060-19	Using CS17 wheels with a 1000g load and 1000 cycles, determine the physical mass loss. Calculate the volume loss using the formula: $V = M[100\rho_s - \rho(100 - NVM)] / [\rho \times \rho_s \times NVM]$ Where: V = volume loss in mL M = mass loss in mg ρ = density (g/L) of wet product ρ_s = density (g/L) of nominal solvent NVM = solids content of product (%) The volume loss shall be reported.
Water Absorption	AS 3862	When tested for 100 days at $23 \pm 2^\circ\text{C}$, water absorption shall be $\leq 5\%$ by mass.
Cathodic Dis-bondment	AS 3862	When tested in accordance with Appendix M of the standard for 28 days, average radial dis-bonded length shall be $\leq 15\text{mm}$.
Degree of Cure	AS/NZS 3894.4	Minimum Barcol 80.



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9 APPENDIX B

Document History

Status: Current
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Document Version No.:	Date Published:	Summary of Changes:
9	02-09-2021	<ul style="list-style-type: none">• General format changes• Updated background information in clause 2• Updated SUSMP information• Updated APAS website information
8	26-11-2020	<ul style="list-style-type: none">• 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	07-10-2003	<ul style="list-style-type: none">• Deleted reference to GPC numbering and incorporated a general format update
6	09-03-2001	<ul style="list-style-type: none">• Initiated the second stage of the move to new specification numbering with prominence given to the new number (previously GPC-C-173)• Cavitation test requirement was removed• Abrasion resistance reporting was changed