

ORGANIC ZINC-RICH COATING FOR THE LONG-TERM PROTECTION OF STEEL

1 SCOPE

This specification applies to one- or two-pack organic zinc-rich coatings for application to steel structures on which optimum surface preparation can be achieved or in situations where frequent maintenance is impractical.

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 covers organic zinc-rich coatings for application to steel structures on which optimum surface preparation can be achieved or in situations where frequent maintenance is impractical.
- Complying products may be either one or two-pack products. The traditional two-pack products are intended for use as a primer in a full coating system. The one-pack products may be used either as a primer for a mixed system (primer plus other type of topcoat) or a one-product system not requiring top-coating to achieve the listed performance properties.
- Sub-class AP-S2916/1 products have a zinc content between 85% and 94% by mass and are typically applied at 65 – 75 μm DFT.
- Sub-class AP-S2916/2 products typically have zinc content in excess of 94% by mass and may be applied at builds between 60 and 180 μm DFT.
- Both sub-classes of products are intended for the long-term protection of steel principally in atmosphere. However, some products may also be suitable for immersion service – refer manufacturer's data sheets. The APAS approval of such products is indicated by the appropriate suffix: S for saltwater immersion, F for fresh water immersion and P for potable water immersion.
- Depending on the system chosen, a service life in excess of 10 years under Category C (Medium) atmospheric corrosivity conditions (refer AS 2312.1, Table 6.3) can be expected.
- Where surface preparation is likely to be marginal and surface tolerant coatings are required, reference should be made to APAS specification AP-S0156.
- The manufacturer's product data sheet or technical data sheet should confirm that the exposure conditions to which the coating system is to be exposed is within the capabilities of that system.

3.2 Sub-Classes

- This specification incorporates the following subclasses:
 - 2916/1:** Primer – one- or two-pack products intended for use as the primer in a coating system
 - 2916/2:** Durable topcoat – single pack products that may be used either as a primer (for other types of topcoats) or as a durable single product system

3.3 Basis of this Specification

- Paints complying to sub-class AP-S2916/1 of this specification are based on AS/NZS 3750.9 with the following modification:
 - Exterior durability requirement is increased from 48 to 72 months
- There are no known equivalent or near-equivalent specifications or standards for sub-class AP-S2916/2 product types.
- Products approved under sub-class AP-S2916/1 comply with Paint Reference Number (PRN) C02 of AS 2312.1. Systems using a primer that complies with this specification are referenced in Table 6.3 of AS 2312.1.
- Products approved under sub-class AP-S2916/2 do not conform to any PRN of AS 2312.1 at this time.

4 REFERENCED DOCUMENTS

- The following standards are referenced in this document:
 - AS/NZS 1580** – Paints and related materials: Methods of test
 - AS 2312.1** – Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings – Part 1: Paint Coatings
 - AS/NZS 3750.9** – Paints for steel structures – Organic zinc-rich primer
 - ASTM D5894-16** – Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)

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

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- 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
- vii. AP-S0156 Epoxy Mastic High Build Two-Pack Coating for Rusted Steel

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) The binder composition is not restricted by this specification. Sub-class AP-S2916/1, however, will typically be an organic entity such as epoxy.

5.2 Volatiles

- a) The volatile portion shall be typically comprised of hydrocarbons.
- 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 7, Table 1 below.

5.4 Colour

- a) Products approved under this specification are normally only available in grey. The standard of decorative properties of these coatings is expected to be low.

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 7, Table 1 below.
- b) **CLASS II** (Interim) certification may be granted provided that the following minimum conditions are met:
 - i. All properties in clause 7, Table 1 (with the exception of Resistance to Weathering and Final Accelerated Weathering and/or Resistance to Immersion) have been tested for and shown to comply with stated requirements, **and**

- ii. Appropriate case histories of at least 4 years duration complying with APAS document AP-D192 clause 17, Appendix B, are supplied.

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) As products covered by this specification typically contain solvents, the paint is considered flammable and should be stored away from all sources of heat or ignition.
- c) 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.
- d) Care should be taken to avoid contact with the skin using protective clothing and barrier cream. All pumping equipment should be adequately earthed. It is anticipated that most of these products would be applied by operators in well ventilated spray booths or in the field by operators with adequate safety equipment.
- e) 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.
- f) The product shall comply with all requirements of clause 6.3 and 6.4 of APAS document AP-D192.



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7 TABLE 1: PERFORMANCE PROPERTIES

TEST	AS/NZS 1580 METHOD	REQUIREMENTS
For EACH Component		
Preliminary Examination	103.1	Shall be free of coarse particles, gel and foreign matter.
Storage Stability	AS/NZS 3750.9 2.4.3	A sample stored for 12 months at ambient temperature shall be readily incorporated to produce a uniform, lump-free mixture suitable for application.
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 .
Wet Paint Tests		
General Requirements	AS/NZS 3750.9	Shall comply with all the requirements of clause 2 Material Requirements (clause 2.6.5 Resistance to Weathering has been modified as per below). All results shall be reported. NOTE: For one-pack products, the following clause shall not apply: 2.5.4 Pot-life assessment.
Volume Solids	Theoretical Calculation	To be recorded.
Thinning or Mixing Properties	208.1	Using 10% of manufacturers recommended thinner, there shall be no signs of incompatibility.
Application of Aged Sample	205.2 or 205.4	A sample of the product which has been stored at routine conditions for 12 months, when mixed and sprayed according to manufacturer's instructions, shall produce a uniform finish typical of product type.
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 .
Dry Film Tests (65 - 75µm DFT)		
Specular Gloss (60°)	602.2	To be recorded.
Impact Resistance	406.1 Method A	2 kg mass falling from 40 cm direct impact shall show no signs of film cracking or adhesive failure.
Adhesion	408.2 Method B	Less than or equal to rating 1.



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TEST	AS/NZS 1580 METHOD	REQUIREMENTS																				
Dry Film Tests (65 - 75µm DFT) – Cont.,																						
Interim Accelerated Weathering	ASTM D5894	<p>Sub-class AP-S2916/1: After 1000 hours the ratings shall be:</p> <table style="width: 100%; border: none;"> <tr><td>Checking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Cracking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Blistering</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Flaking and Peeling</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Visible corrosion</td><td style="text-align: right;">≤ 0</td></tr> </table> <p>Sub-class AP-S2916/2: After 2000 hours the ratings shall be:</p> <table style="width: 100%; border: none;"> <tr><td>Checking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Cracking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Blistering</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Flaking and Peeling</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Visible corrosion</td><td style="text-align: right;">≤ 0</td></tr> </table>	Checking	≤ 0	Cracking	≤ 0	Blistering	≤ 0	Flaking and Peeling	≤ 0	Visible corrosion	≤ 0	Checking	≤ 0	Cracking	≤ 0	Blistering	≤ 0	Flaking and Peeling	≤ 0	Visible corrosion	≤ 0
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Resistance to Weathering	457.1 481.1.7 481.1.8 481.1.9 481.1.10 481.3	<p>After 72 months exposure at all 3 atmospheric exposure sites (listed in APAS document AP-D192, clause 12), the ratings shall be:</p> <table style="width: 100%; border: none;"> <tr><td>Checking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Cracking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Blistering</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Flaking and Peeling</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Visible corrosion</td><td style="text-align: right;">≤ 0</td></tr> </table>	Checking	≤ 0	Cracking	≤ 0	Blistering	≤ 0	Flaking and Peeling	≤ 0	Visible corrosion	≤ 0										
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Resistance to Immersion - Salt and Fresh Water For 2916F and 2916S approvals only	481.1.7 481.1.8 481.1.9 481.1.10 481.3	<p>After 48 months exposure at an appropriate site, the ratings for the coating shall be:</p> <table style="width: 100%; border: none;"> <tr><td>Checking</td><td style="text-align: right;">0</td></tr> <tr><td>Cracking</td><td style="text-align: right;">0</td></tr> <tr><td>Blistering</td><td style="text-align: right;">0</td></tr> <tr><td>Flaking and Peeling</td><td style="text-align: right;">0</td></tr> <tr><td>Corrosion</td><td style="text-align: right;">≤ 1</td></tr> </table>	Checking	0	Cracking	0	Blistering	0	Flaking and Peeling	0	Corrosion	≤ 1										
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Final Accelerated Weathering	ASTM D5894	<p>Sub-class AP-S2916/1: After 2000 hours the ratings shall be:</p> <table style="width: 100%; border: none;"> <tr><td>Checking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Cracking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Blistering</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Flaking and Peeling</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Visible corrosion</td><td style="text-align: right;">≤ 1</td></tr> </table> <p>Sub-class AP-S2916/2: After 4000 hours the ratings shall be:</p> <table style="width: 100%; border: none;"> <tr><td>Checking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Cracking</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Blistering</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Flaking and Peeling</td><td style="text-align: right;">≤ 0</td></tr> <tr><td>Visible corrosion</td><td style="text-align: right;">≤ 0</td></tr> </table>	Checking	≤ 0	Cracking	≤ 0	Blistering	≤ 0	Flaking and Peeling	≤ 0	Visible corrosion	≤ 1	Checking	≤ 0	Cracking	≤ 0	Blistering	≤ 0	Flaking and Peeling	≤ 0	Visible corrosion	≤ 0
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8 APPENDIX A

Document History

Status: Current
Version: 10
Date Published: 14-09-2021

Document Version No.:	Date Published:	Summary of Changes:
10	14-09-2021	<ul style="list-style-type: none">• General format changes• Updated background information in clause 2• Updated SUSMP information• Updated APAS website information
9	15-12-2020	<ul style="list-style-type: none">• Addition of Appendix A 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• Defined aged sample requirement in clause 7, Table 1• Removal of Note 2 and inclusion of this information (Class II certification) into clause 6.2 b)• Inclusion of VOC Content requirement to Table 1 Performance Properties• Addition of "People + Product = Protection" to Footer
8	20-06-2007	<ul style="list-style-type: none">• Introduced sub-classes in 1.2• Clarified testing requirements to allow Interim approvals
7	17-11-2003	<ul style="list-style-type: none">• Deleted reference to GPC numbering and incorporated a general format update
6	11-05-2001	<ul style="list-style-type: none">• Incorporated the changes made to APAS document D192 and reflected in clauses 3 and 4• Initiated the second stage of the move to new specification numbering with prominence given to the new number (previously GPC-C-29/16)