



SILOXANE AND POLYSILOXANE COATINGS FOR THE LONG-TERM PROTECTION OF STEEL AND MASONRY

1 SCOPE

- This specification applies to siloxane and polysiloxane coatings for application to steel and masonry surfaces on which optimum surface preparation can be achieved.
- This document has been prepared in a manner compliant with the requirements of AS/NZS ISO/IEC 17065.
- APAS® is a trademark registered with IP Australia, owned by CSIRO, the Scheme Owner, and protected under applicable laws. Use of the trademark or the Certification Scheme is prohibited unless prior approval in writing is obtained from CSIRO via the APAS Secretariat.

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 DEFINITIONS AND ACRONYMS

3.1 Definitions

The definition of terms used in this document and in the Certification Scheme can be found in APAS Document AP-D001. In addition, the following definitions shall apply:

- Polysiloxane:** Also known as polymerised siloxanes, are a polymer with a silicon-oxygen backbone.
- Siloxane:** A compound containing alternate silicon and oxygen atoms in either a linear or cyclic arrangement usually with one or two hydrogen atoms or organic groups attached to each silicon atom.

3.2 Acronyms

The following acronyms appear in this document:

APAS	Australian Paint Approval Scheme
AS	Australian Standard
AS/NZS	Australian Standard / New Zealand Standard
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DFT	Dry Film Thickness
IEC	International Electrotechnical Commission
IP	Intellectual Property
ISO	International Organisation for Standardization
mm	Millimetres
PDS	Product Data Sheet
SDS	Safety Data Sheet
TDS	Technical Data Sheet

µm	micrometres
WFT	Wet Film Thickness
WHS	Workplace Health and Safety

4 DESCRIPTION AND GUIDE FOR USERS

4.1 General Information and Requirements

- This specification applies to siloxane and polysiloxane coatings for application to steel and masonry surfaces on which optimum surface preparation can be achieved.
- Products can be one or two-pack, and either solventborne or waterborne. Solventborne products tend to be available in semi-gloss and gloss versions whereas waterborne tend to be flatter in appearance, so not used where high gloss is a requirement. Application is typically by spray but can also be applied by brush and roller.
- Polysiloxanes can be applied directly to epoxy mastic, epoxy two-pack, moisture-cured urethane primers and zinc-rich primers but proper precautions must be adhered to in relation to surface preparation and application as per the manufacturer's Product Data Sheet (PDS) or Technical Data Sheet (TDS). Polysiloxanes are not compatible with acrylic latex primers.
- These types of materials are not recommended for use in immersion service or in splash / spillage of strong acids, alkalis or solvents.
- The manufacturer's TDS or PDS should be consulted to confirm that the exposure conditions to which the coating system is to be exposed is within the capabilities of that system.

4.2 Sub-Classes

- This specification incorporates the following sub-classes:
 - 2920/1:** Topcoats primarily for corrosion resistance
 - 2920/2:** Topcoats primarily for atmospheric durability and gloss retention
 - 2920/3:** Other specialised application topcoats e.g., high temperature resistance

4.3 Basis of this Specification

- This specification is not based on any known standard or specification.
- Organic polysiloxane paints approved under this specification are described under Paint Reference Number (PRN) C37 of AS 2312.1.

5 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 pretreatment of surfaces – Abrasive blast cleaning of steel



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- iii. **AS 2312.1** – Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings – Part 1: Paint Coatings
- iv. **ASTM G85-19** – Standard Practice for Modified Salt Spray (Fog) Testing
- v. **ASTM G154-16** – Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Non-metallic Materials
- vi. **ISO 12944-9** – Paints and Varnishes – Corrosion Protection of Steel Structures by Protective Paint Systems – Part 9: Protective Paint Systems and Laboratory Performance Test Methods for Offshore and Related Structures
- vii. **ISO 16474-3** – Paints and Varnishes – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV lamps
- viii. **ISO 9227** – Corrosion tests in artificial atmospheres – Salt spray test
- ix. **AS/NZS ISO/IEC 17065** – Conformity assessment: Requirements for bodies certifying products, processes and services
- x. **MIL-PRF-23236 Revision D** – Coating Systems for Ship Structures – Revision D

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

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

- xi. **The Poisons Standard June 2022**: Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) No. 36, 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/F2022L00730>

- b) The following APAS documents are referenced in this document:
 - i. AP-D001 Rules Governing How APAS® Operates
 - ii. AP-D114 Rules Governing APAS® Recognition as a Testing Authority
 - iii. AP-D123 Restrictions on Ingredients in Product Formulations
 - iv. AP-D152 APAS® Participating Manufacturers and Resellers
 - 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-S0091 Enamel in Pressure Pack

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/>

6 COMPOSITIONAL AND COLOUR REQUIREMENTS

6.1 Binder

- a) Although not restricted by this specification, typically the binder shall be either a pure siloxane or a modified siloxane (polysiloxane), available as either a one or two-pack product.
- b) The modifications can be organic or inorganic in nature and are typically, but not limited to, acrylic, urethane or epoxy.

6.2 Volatiles

- a) Although products are typically high solids, low VOC, the volatile portion can either be comprised of hydrocarbons or oxygenated solvents (solventborne products) or water (waterborne products).
- b) For VOC content restrictions, refer to APAS document AP-D181.

6.3 Pigmentation

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

6.4 Colour

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

7 PRODUCT APPROVAL REQUIREMENTS

7.1 General Requirements

- a) The product and its application for approval shall comply with this specification and the relevant requirements of APAS document AP-D192 during the life of the approval.
- b) Tin and steel panels utilised as part of the testing within clause 8, Table 1 must comply with the requirements of AS 1580.104.1.
 - i. Tin panels must be cleaned and abraded accordingly as per AS 1580.105.1 and AS 1580.105.2.
 - ii. Steel panels must be cleaned according to AS 1580.105.1 and abraded according to AS 1627.4.

7.2 Technical Requirements

- a) The product shall comply with **all** the requirements of clause 8, Table 1 below.
- b) **CLASS II** certification **may** be granted provided that the following minimum testing conditions are met:
 - i. All properties in clause 8, Table 1 (with the exception of Resistance to Weathering) have been tested for and shown to comply with stated requirements, **and**
 - ii. Accelerated Durability testing must be performed in accordance with Appendix A and by an independent 3rd party testing provider (in line with the requirements set out in APAS document AP-D114).



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7.3 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 may contain solvents, the product may be 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.
- e) Spray application of product should be carried out in compliance with local WHS spray painting regulations in consultation with the SDS for the required respiratory and personal protective equipment.
- 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.



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8 TABLE 1: PERFORMANCE PROPERTIES

TEST	AS/NZS 1580 METHOD	REQUIREMENTS
For EACH Component		
Preliminary Examination	103.1	The material under test shall be: <ul style="list-style-type: none">• Readily reincorporated.• Free of coarse particles, surface skin and foreign matter.• Is not gelled / thixotropic. Record any ullage present (% of total container capacity). Report results.
Density	202.1 or 202.2	State method and report results.
Non-Volatile Content	301.1	Report results.
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 of each component under test is still required .
Wet Mixed Paint Tests – ALL Sub-classes		
Preliminary Examination	103.1	The material under test shall be: <ul style="list-style-type: none">• Readily reincorporated.• Free of coarse particles, surface skin and foreign matter.• Is not gelled / thixotropic. Report results.
Volume Solids	301.2	To be within $\pm 5\%$ of stated manufacturers specification. Report results.
Thinning or Mixing Properties	208.1	Using 10 % of manufacturers recommended thinner, there shall be no signs of incompatibility. Report results.
Viscosity	214.x	State specific method and report results.
Application	205.2 or 205.4	When sprayed to the manufacturer's recommended WFT onto a suitably prepared 500x500 mm steel panel: <ul style="list-style-type: none">• The resultant film shall be free of coarse particles, foreign matter and show no defects.• The spray gun shall show no signs of clogging during the film application. Report results.



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TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Wet Mixed Paint Tests – <u>ALL</u> Sub-classes (Cont.,)		
Storage Properties	211.1	When stored at 25 °C for 18 months , the aged sample shall: <ul style="list-style-type: none">• Exhibit a settling rating > 6.• Be easily reincorporated with manual stirring. Report results.
Aged Application	205.2 or 205.4	When stored at 25 °C for 18 months , the aged sample shall: <ul style="list-style-type: none">• Be applied by spray application onto a suitably prepared 500x500 mm steel panel and produce a film equivalent in appearance to the initial application test panel (refer to Application). State method and report results.
Pot Life	214.x	Using the same method stated in Viscosity, the pot life shall be tested and be: <ul style="list-style-type: none">• ≥ 2 hours.• Exhibit satisfactory spraying properties with film produced free from defects such as sags, pinholes, runs, etc. Re-state method and report results. NOTE: This test is only applicable to two (or more) component products.
Dry Film Tests – <u>ALL</u> Sub-classes		
Surface Dry Time	401.1	When applied to and tested on a suitably prepared 100x150 mm tin panel, shall be ≤ 4 hours. Report results.
Hard Dry Time	401.6	When applied to and tested on a suitably prepared 100x150 mm tin panel, shall be ≤ 12 hours. Report results.
Curing	403.1	When applied to and tested on a suitably prepared 125x100 mm tin panel, after 7 days curing at standard conditions, the film shall withstand a load of 1500 g. Report results.
Flexibility	402.1	When product is sprayed directly onto a suitably prepared 100x50 mm tin plate panel and air dried at standard conditions for 28 days, there shall be no cracking, loss of adhesion or separation of the coats when bent around a 6 mm mandrel and examined at 10 X magnification. Report results.



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TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Dry Film Tests – ALL Sub-classes (Cont.,)		
Direct Impact Resistance	406.1	<p>When applied to and tested on a suitably prepared metal panels, an impact of 5 Joules shall not produce any cracking, chipping or lifting of the film. Report results.</p> <p>NOTE: A minimum of four test panels must be prepared and tested – two with application of the product only (DFT > 50 µm) and two with the intended product system as per the manufacturers PDS or TDS. The metal substrate type (conforming to AS 1580.104.1) and thickness shall be reported as well as the product DFT on each panel.</p>
Adhesion	408.5	<p>When applied to and tested on a suitably prepared steel panel of 3mm thickness (Class 2 ½ blast cleaned) for the manufacturer's recommended system (with total coating thickness not to exceed 150 µm DFT), not less than 3 MPa mild steel after 7 days curing at standard conditions. Report results.</p>
Specular Gloss	602.2	<p>When applied to and tested by draw down on a suitably prepared 150x100mm glass panel:</p> <p style="margin-left: 20px;">Gloss: ≥ 80 % on a 60° head. Semi-gloss: ≥ 40 % on a 60° head. Low Gloss: ≥ 15 % on a 60° head.</p> <p>Report results.</p>
Colour	601.1	Approximate Match. Report results.
Finish	Visual	When sprayed onto a suitably prepared 500x500 mm steel panel, the sprayed finish shall be smooth and free of defects, uniform in visual colour and gloss and typical of the product. Report results.
Recoating Properties	404.1	When a film that has been cured for 7 days at standard conditions is then resprayed with another coat of the same product at the recommended wet film build and air dried for a further 28 days at standard conditions, will show no wrinkling, lifting or cracking or other defect in the original coat. Report results.
	402.1	No cracking, loss of adhesion or separation of the coats when bent around a 6 mm mandrel. Report results.
	403.1	Shall withstand a 1500 g load. Report results.
	408.2	Adhesion rating shall not be greater than 0. Report results.
Edge Retention	AP-S2920 Appendix C	Average ratio shall not be less than 70 % with no single reading less than 50 %. Report results.
Resistance to Weathering	457.1	After 72 months exposure at all 3 atmospheric exposure sites (listed in APAS document AP-D192, clause 12), all suitably prepared steel panels shall exhibit ratings not greater than those nominated in the accelerated durability test below except that gloss retention shall be not less than 75 % of original value and colour change shall be not greater than ΔE of 1.5 (white or off-white only). Report results.



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TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Dry Film Tests – Sub-class 2920/1 ONLY		
Accelerated Durability	AP-S2920 Appendix A 481.1.5 481.1.7 481.1.8 481.1.9 481.1.11 481.1.12 481.3 408.5	After 4200 hours (approx. 25 cycles) at the specified exposure, suitably prepared steel panel ratings shall not be greater than the following: Gloss change ≥ 50 % of original gloss shall be retained Checking 0 Cracking 0 Blistering 0 Chalking 0 Colour change 0 Corrosion 0 Adhesion ≥ 50 % of original value NOTE: Secondary prepared and un-scribed panel(s) is to be included in this testing for the measurement of degree of gloss and colour change for use if the scribed panel(s) is exhibiting too much rust staining to be tested adequately. Preference is given to the test panel, but the secondary panel(s) is included for this reason. Report results.
Resistance to Weathering	481.3	Additional to the Resistance to Weathering requirements above, the creep from the scribe shall be ≤ 3 mm. Report results.
Resistance to Graffiti	AP-S2920 Appendix B	When tested according to Appendix B, there shall be no softening, marking or marring of the film after removal is complete. All graffiti shall be easily removed. Report results.
Resistance to Chemicals		Using a suitably prepared steel panel with test material applied at the manufacturer's recommended film thickness, add a drop each of 10 % nitric acid, 10 % sulphuric acid and 10 % sodium hydroxide to the surface. When left for 24 hours at standard conditions under a watch glass, shall have no effect on the film surface. Report results.
Resistance to Solvents		Using a suitably prepared steel panel with test material applied at the manufacturer's recommended film thickness, add a drop each of solvents methoxy propanol (monopropylene glycol methyl ether), white spirit, xylene and butyl acetate. When left for 24 hours at standard conditions under a watch glass, shall have no effect on the film surface when inspected 60 minutes after removal from exposure. Report results.



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TEST	AS/NZS 1580 METHOD	REQUIREMENTS																
Dry Film Tests – Sub-class 2920/2 ONLY																		
Accelerated Durability	AP-S2920 Appendix A 481.1.5 481.1.7 481.1.8 481.1.9 481.1.11 481.1.12 481.3 408.5	<p>After 4200 hours (25 cycles) at the specified exposure, suitably prepared steel panel ratings shall not be greater than the following:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Gloss change</td> <td style="text-align: right;">≥ 75 % of original gloss shall be retained</td> </tr> <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>Chalking</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Colour change</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Corrosion</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Adhesion</td> <td style="text-align: right;">≥ 50 % of original value</td> </tr> </table> <p>NOTE: Secondary prepared and un-scribed panel(s) is to be included in this testing for the measurement of degree of gloss and colour change for use if the scribed panel(s) is exhibiting too much rust staining to be tested adequately. Preference is given to the test panel, but the secondary panel(s) is included for this reason. Report results.</p>	Gloss change	≥ 75 % of original gloss shall be retained	Checking	0	Cracking	0	Blistering	0	Chalking	0	Colour change	0	Corrosion	0	Adhesion	≥ 50 % of original value
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Adhesion	≥ 50 % of original value																	
Resistance to Graffiti	AP-S2920 Appendix B	When tested according to Appendix B, there shall be no softening, marking or marring of the film after removal is complete. All graffiti shall be easily removed. Report results.																
Dry Film Tests – Sub-class 2920/3 ONLY																		
Accelerated Durability	AP-S2920 Appendix A 481.1.5 481.1.7 481.1.8 481.1.9 481.1.11 481.1.12 481.3 408.5	<p>After 4200 hours (25 cycles) at the specified exposure, suitably prepared steel panel ratings shall not be greater than the following:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Gloss change</td> <td style="text-align: right;">≥ 50 % of original gloss shall be retained</td> </tr> <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>Chalking</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Colour change</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Corrosion</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Adhesion</td> <td style="text-align: right;">≥ 50 % of original value</td> </tr> </table> <p>NOTE: Secondary prepared and un-scribed panel(s) is to be included in this testing for the measurement of degree of gloss and colour change for use if the scribed panel(s) is exhibiting too much rust staining to be tested adequately. Preference is given to the test panel, but the secondary panel(s) is included for this reason. Report results.</p>	Gloss change	≥ 50 % of original gloss shall be retained	Checking	0	Cracking	0	Blistering	0	Chalking	0	Colour change	0	Corrosion	0	Adhesion	≥ 50 % of original value
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Colour change	0																	
Corrosion	0																	
Adhesion	≥ 50 % of original value																	
Heat Resistance (if applicable)	406.1 402.1 601.4 602.2	<p>Using suitably prepared metal panels (tin or steel, as applicable), a 250 µm DFT film of the paint system (primer(s) and topcoats) shall be heated for 2 hours at 200 °C then allowed to come to room temperature for 60 minutes. Report results.</p> <p>Impact Resistance: Not less than 50 % of original figure.</p> <p>Flexibility: No cracking around a 6 mm mandrel.</p> <p>Colour Change: Shall be not greater than ΔE of 1.5.</p> <p>Gloss Change: Not less than 75 % of original.</p>																



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APPENDIX A

Accelerated Durability Tests – UV / Neutral Salt Spray

General:

- a) **CLASS II** approval [refer to APAS document AP-D192, clause 7.2 b)] may be given on the basis of satisfactory performance of the accelerated durability test defined below.

NOTE:

- All testing must be performed by an independent 3rd party testing provider (in line with the requirements set out in APAS document AP-D114) with a full report of testing provided.
- This test is based on ISO 12944-9 – Annex B (Cyclic Ageing Test).

Apparatus / Preparation:

- a) Panels: Adequately prepared (degreased and grit-blasted) mild steel of suitable size (i.e., 150 x 75 x 3mm) coated in the applicant full coating system (including primer and/or intermediate coats) according to manufacturer's recommendations with total coating thickness not to exceed 150 µm DFT and cured for a minimum of 7 days at standard conditions. Triplicate panels are required plus one unexposed control. The exposure panels shall be scribed according to Appendix A of ISO 12944-9 through to base metal and at least 10 mm away from the panel edge.
- b) Fluorescent UV-Condensation exposure chamber e.g., QUV incorporating UVA lamps (complying with ISO 16474-3).
- c) Salt fog/dry cabinet complying with ISO 9227 e.g., Q-FOG.
- d) Freezer capable of maintaining -20 ± 2 °C.
- e) Microscope.

Exposure Conditions:

- a) The test panels are exposed to alternating cycles of 72 hours in the QUV chamber (Friday AM to Monday AM) followed by 72 hours in the Q-FOG chamber (Monday AM to Thursday AM) followed by 24 hours in a freezer at -20 ± 2 °C.
- b) Settings for the QUV shall be:
- 4 hours UV (using UVA-340 lamps) at 60 ± 3 °C, followed by
 - 4 hours condensation at 50 ± 3 °C.
- c) Settings for the Q-FOG shall be:
- 1 hour salt fog at 25 °C, followed by
 - 1 hour dry off at 35 ± 2 °C.
- d) The cycle shall be repeated until the required number of hours has been achieved.



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APPENDIX B

Method for Assessing Protection Against Graffiti

General:

- a) All panel conditioning, coating application, curing and graffiti removal shall be carried out under standard drying conditions.

Panel Preparation:

- a) Apply the coating (system) to a mild steel panel 300 x 150 mm, according to the coating manufacturer's instructions and allow to cure for 7 days.
- b) Apply black spray pack enamel (approved to APAS specification AP-S0091) at a nominal dry film thickness of 30 µm to approximately 20 % of the panel area and allow to dry for 96 hours.
- c) Using a broad tip (approx. 1 cm wide) solvent based felt tip marking pen, apply several approx. 1 cm wide stripes to a clean section of panel close to the spray paint.

Assessment:

- a) Attempt to remove the markings using the thinning solvent for the product (or a nominated graffiti remover) in accordance with the manufacturer's instructions.
- b) Rinse panel free of remover and graffiti residues with water, wipe dry. The coating shall exhibit complete removal of the markings and no discernible effect on the graffiti barrier.
- c) Condition the test panel examined for a further 2 hours ± 5 minutes and repeat steps Panel Preparation b) to Assessment b), ensuring the **graffiti** is applied to the same area of the test panel as previously.
- d) Repeat step c) above to provide a test sequence comprising 3 complete cycles of graffiti application and removal.



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APPENDIX C

Edge Retention Test

General:

- a) Products with high surface tension properties and too much flow, can cause issues with product **running away** from sharp edges. The resulting low film builds at these sharp edges can reduce the protecting properties of the coating, resulting in premature breakdown of the coating.
- b) Edge retention becomes critical in two coat systems offering long term service e.g., 15-25 years, compared to typical 3 or 4 coat systems. Consequently, edge retention is a critical parameter in the evaluation of siloxane and polysiloxane coatings.
- c) Evaluation of edge retention must be carried out on the recommended system, not the coating on its own, as the creep from bare metal is not necessarily the same as from a primer/intermediate coat.

NOTE: This test is based on US Navy specification MIL-PRF-23236D.

Apparatus:

- a) Aluminium extrusion 60 mm sides, approx. 180 mm long and approx. 3 mm cross-section. The extrusion angle shall be 90 ± 3 degrees. Radius of curvature at the bend shall not be greater than 1.0 mm. These extrusions are available as **off the shelf** items.
- b) Microscope with attachments capable of measuring dry film builds of less than 20 μm .

Procedure:

1. Sample Preparation:

- a) Using a rag wetted with a suitable hydrocarbon solvent, wipe the angle clean of any contaminants.
- b) Using 80 grit emery paper, abrade both flat faces of the angle including the ridge. Clean off any residue using the rag in 1 a) above.
- c) Prepare the paint sample for spraying according to the manufacturer's directions.

2. Paint Application:

- a) Using a conventional spray gun, and with the long side of the angle vertical, within one minute spray square onto each face sufficient paint to achieve the manufacturer's recommended wet film thickness on each flat face. The final pass shall be made to the sharp edge of the extrusion. The aim is to achieve the correct dry film thickness (DFT) on both flat faces and to determine the resulting DFT on the edge.
- b) Immediately after application of the correct amount of paint, transfer the aluminium angle to the drying area and allow curing to take place in a vertical orientation for a period of seven days in standard conditions.

3. Dry Film Thickness (DFT) Determination:

- a) Using a band saw or a hacksaw, cut the angle into nine samples approx. 20 mm in length.
- b) Using either polyester or epoxy casting resin, cast groups of 3 angle sections together, resulting in 3 casts with 3 sections in each cast.
- c) Grind the cold mounts using either fine emery paper or a polishing machine to yield a surface from which the film builds can be measured.
- d) Using a microscope with a calibrated graticule, on each section, take two (2) DFT measurements on each flat surface and one reading on the peak. Calculate and record the average DFT_{flat} of each section. Repeat for the other 8 sections.
- e) For each section, calculate the ratio:

$$\frac{DFT_{\text{peak}}}{DFT_{\text{flat}}}$$

Express ratio as a percentage.



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APPENDIX D

Document History

Status: Current
 Version: 10
 Date Published: 15-06-2022

Document Version No.:	Date Published:	Summary of Changes:
10	15-06-2022	<ul style="list-style-type: none"> • Full Technical Review • Inclusion of clause 3 - Definitions and Acronyms • ISO 20340 superseded by ISO 12944-9 • Updated SUSMP • Updated clause 7.1 for requirements of test panels • Updated clause 7.2 for CLASS II accreditation requirements • Updated clause 8, Table 1 requirements for: <ul style="list-style-type: none"> - Flexibility and Heat Resistance from a 12 mm to a 6 mm diameter mandrel (more stringent requirement) in line with requirements of Recoating Properties; standardise cure times for testing involving mandrel to 28 days under standard conditions for uniformity of testing - Updated Accelerated Durability in line with material types for Gloss requirements (2920/1 and 2920/3 sub-classes do not require the same level of gloss retention as 2920/2); inclusion of secondary panel for comparative gloss and colour changes if scribed panel has too much rust staining - Direct Impact Resistance requirements for number or panels, maximum DFT test material & intended system and reporting of panels - Adhesion – inclusion of a requirement for total coating thickness not to exceed 150µm DFT - Gloss – inclusion of semi-gloss and low-gloss requirements - Colour – inclusion of colour match requirements - Resistance to Chemicals & Solvents – increased timeframe for material contact to increase the stringency of test • Update of Appendix A in line with ISO 16474-3 (UVA lamps) and ISO 9227 (neutral salt spray requirements); additional requirement added for testing to be performed by an independent 3rd party testing provider • General format changes
9	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
8	21-12-2020	<ul style="list-style-type: none"> • Addition of Appendix D 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	21-12-2005	<ul style="list-style-type: none"> • Updated for allowing acrylic, urethane or epoxy modified siloxanes • Tightened up the testing requirements • Removed reference to GPC and incorporated a general format update
6	23-05-2001	<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-29/20)