SPECIFICATION AP-S0061

NON-SKID EPOXY COATING FOR SHIPS DECKS

1 SCOPE

a) A two pack, polyamide or amine adduct cured, solvent borne, epoxy compound for use on metal decks of ships to reduce the tendency of vehicles to skid.
b) While it is primarily intended for use on weather decks, it may also be used on interior decks.
c) Available in Black, N42 Storm Grey, N63 Pewter and 3 PC 69 Australian Army Olive Drab.

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) Apply on abrasive blast cleaned steel (AS 1627 Part 4, Class 3), abrasive blast cleaned or etch primed aluminium, or aluminium sprayed steel, as applicable.
b) Apply the compound by brush, roller, or conventional spray. The performance of the coating is likely to be superior over an abrasive blast cleaned surface and therefore application to an etch primed substrate should only be favoured where abrasive blast cleaning is not practicable.
c) The mixing ratio of Part A to Part B shall be 1:1, 2:1, 3:1 or 4:1 by volume.

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 an AS/NZS 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
iii. **BS 2451** – Specification for Chilled Iron Shot and Grit

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

iv. **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 an epoxy resin and a curing agent consisting essentially of a polyamide or amine adduct resin.

5.2 Volatiles

a) For VOC content restrictions, refer to APAS document AP-D181.

5.3 Pigmentation

a) Products shall consist of appropriate colouring pigments.

5.4 Anti-skid Ingredient

a) The anti-skid ingredient shall be a non-metallic grit of a particle size distribution similar to that of Grit Grade No. G39 of BS 2451.

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 13, 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) 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 paint contains solvent, the wet paint is flammable and should be stored away from all sources of heat or ignition. Care should be taken to avoid contact with the skin by the use of protective clothing and barrier cream.
d) Component 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. A full-face air fed respirator should be used when spraying. All pumping equipment should be adequately earthed.
e) If painting interior spaces, doors should be propped open, or ventilation assisted as the vapours are heavier than air.
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 Salt Water and Thermal Shock

a) Prepare the test panel as specified in Table 1, Note 2, and cure as specified in Table 2.
b) Immerse the panel in a solution of 4% sodium chloride in distilled water for 48 hours.
c) Immediately after immersion, subject the panel to two complete cycles of alternate exposure to a temperature of -10 ± 3°C for 24 hours, followed by a temperature of 80 ± 5°C for 24 hours.

8 APPENDIX B

Test Method for Resistance to Oil

a) Prepare the test panel as specified in Table 1, Note 2, and cure as specified in Table 2.
b) Immerse the panel for approximately 75% of its length in oil complying with OMD 112 for a period of 24 hours at a temperature of 50 ± 5°C.
c) After the immersion period, withdraw the panel from the oil, and wash free from oil with mineral turpentine. Allow to dry and examine.

9 APPENDIX C

Test Method for Resistance to Aviation Fuel

a) Prepare the test panel as specified in Table 1, Note 2, and cure as specified in Table 2.
b) Take two 1 L containers and prepare as follows:
   i. Fill one container to a depth of 50mm with Avgas.
   ii. Fill one container to a depth of 50mm with Avtur.
c) Place a panel in each container and seal providing a small breathing hole. Allow to stand at 16 - 26 °C for a period of 24 hours.
d) Remove the panels and wash free of fuel and water with ethanol. Allow to dry and examine.

10 APPENDIX D

Test Method for Resistance to Detergent Solution

a) Prepare the test panel as specified in Table 1, Note 2, and cure as specified in Table 2.
b) Immerse the panel for approximately three-quarters of its length in a 1% solution of a detergent [previously DEF (AUST) 159][1] in distilled water, for a period of 1 hour at a temperature of 16-26°C.
c) After the immersion period, withdraw the panel from the detergent solution, rinse in running water and examine.

NOTE 1: Replacement is subject to agreement.

11 APPENDIX E

Test Method for Impact Resistance

a) Prepare the test panel as specified in Table 1, Note 2, and cure as specified in Table 2.
b) Age the panel for 4 days in an oven at 60 ± 2°C.
c) Drop a steel ball weighing 430g (47.5mm diameter) from a height of 1.8m on to the coated side of the panel (direct impact) with the panel supported on a wooden block 25 mm thick and containing a 60cm diameter hole at the impact area.
d) Repeat the test in another area on the uncoated side of the panel (reverse impact).

12 APPENDIX F

Test Method for Anti-skid Properties

a) Prepare the test panel as specified in Table 1, Note 2, and cure as specified in Table 2.
b) Prepare two test blocks, 50 x 100 mm of rubber and leather. The rubber shall be a vulcanised compound with a hardness range of 60-80 Durometer "A" and the leather shall be vegetable-tanned sole leather sanded smooth with O grade abrasive paper.
c) The measurement of coefficients of friction is carried out with contact surfaces:
   a. Dry
   b. Wet with 4% sodium chloride in distilled water
   c. Oiled with oil complying with OMD 112
d) Apply a load of 150 g uniformly over the test block and determine the force required to equal the static and dynamic frictional forces by attaching a spring balance to the block and pulling balance and block across the test panel. Note the force when the block is just on the point of moving (Static Friction) and when moving with constant velocity (Dynamic Friction).
e) Repeat three times for each combination of surfaces.

$$\mu = F/R$$

where: μ= coefficient of friction
F = frictional force (N)
R = weight of block plus load (N)

13 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.
Flash Point	AS 2106	15°C minimum.
Consistency	214.1	Method and result to be recorded.
Keeping Qualities	101.4	To be no gelation and the consistency is to be within ±5% of the original value after 12 months storage under routine conditions.
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		
Non-volatile Content by Volume (Volume Solids)	301.2	Minimum 70%. • Volume solids may be determined theoretically from raw material data except where solid constituents incorporate sealed air voids.
Thinning or Mixing Properties	208.1	Satisfactory with 10% DMS137 solvent.
Pot Life	-	A 500 mL sample shall retain satisfactory application properties after being kept for 4 hours in an open container at 23 ± 2°C and the viscosity shall not differ from the original by more than 5%.
Application Properties - Brushing - Rolling - Spraying	 205.1 205.3 205.2	Shall show satisfactory application properties and the dry film shall have a uniform appearance.
Surface Dry Condition	401.1	Maximum 8 hours.
Hard Dry Condition		Maximum 24 hours.
Colour - Visual Comparison	601.1	To be an approximate match.
Specular Gloss	602.2	≥ 50.
Finish	603.1	The non-skid particles to be spread uniformly and well embedded in the film.
Infra-red Reflectance	-	Australian Army Olive Drab to be 22% minimum.

NON-SKID EPOXY COATING FOR SHIP DECKS

TEST	AS/NZS 1580 METHOD	REQUIREMENTS
Mixed Product Testing (Cont.,)		
Resistance to Salt water and Thermal Shock	Clause 7, Appendix A	To show no signs of cracking, blistering, separation from the panel nor any corrosion of the steel.
Resistance to Oil	Clause 8, Appendix B	To show no blistering, wrinkling nor other defects and not more than a slight change in gloss or colour.
Resistance to Aviation Fuels	Clause 9, Appendix C	To show no blistering, corrosion nor other defects and no more than slight softening or colour change.
Resistance to Detergent	Clause 10, Appendix D	To show no softening, staining, streaking nor appreciable change in colour.
Resistance to Impact	Clause 11, Appendix E	No flaking to occur over an area of 300 mm^2 in impact area when scraped with a sharp knife and the extremities of the scraped area shall be tightly adherent.
Anti-skid Properties	Clause 12, Appendix F	Coefficient of friction values not to be less than those stated in Table 2.
Resistance to Outdoor Weathering	457.1	After 12 months at a marine site there is to be no erosion, checking, cracking, rusting, flaking nor blistering. Minimum ratings: Chalking 2/3 Colour change 1/2 Discolouration 3
Recoating Properties a) after 4 hours curing b) after 5 days weathering	404.1	To be no lifting, cracking, wrinkling nor other defects after 7 days. With no pre-treatment. After first swabbing with MIBK
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.**

NOTE:

1: In the tests above, the dry film thickness per coat shall be 0.75 to 1.25mm.

2: Tinplate panels shall be prepared in accordance with AS/NZS 1580.105.2. Mild steel test panels (18 gauge) shall be prepared by abrasive blast cleaning in accordance with AS.1627, Part 4, Class 3, followed by cleaning with a stiff bristle brush.

3: All panels shall be coated according to the appropriate schedules laid down in Appendix A.

14 TABLE 2: PANEL PERFORMANCE TESTS

Test Name	Test Method	Test Panel	Minimum Size (mm)	Drying Period	
				1st coat	2nd coat
Surface Dry Condition	401.1	Tinplate	100 x 50	-	-
Hard Dry Condition		Tinplate	100 x 50	-	-
Resistance to Salt Water and Thermal Shock	Appendix B	Mild steel	150x100	24 hours	7 days
Resistance to Oil	Appendix C	Mild steel	150x100	24 hours	7 days
Resistance to Detergent	Appendix D	Mild steel	150x100	7 days	-
Resistance to Aviation Fuels	Appendix E	Mild steel	150x100	7 days	-
Resistance to Impact	Appendix F	Mild steel	150x100	24 hours	7 days
Anti-skid Properties	Appendix G	Mild steel	150x100	7 days	-
Resistance to Outdoor Weathering	457.1	Mild steel	300 x 150	24 hours	7 days
Recoating Properties	404.1	Mild steel	300 x 150	a) 4 hours b) 5 days	- -

15 TABLE 3: COEFFICIENTS OF FRICTION

Coefficient of Static Friction				Coefficient of Sliding Friction		
Condition				Condition		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.75	0.75	-	0.50	0.50	-
Rubber	1.00	0.90	0.70	0.80	0.80	0.40

16 APPENDIX G

Document History

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Document Version No.:	Date Published:	Summary of Changes:
9	27-08-2021	• General format change to clause 6.2 • Updated background information in clause 2 • Updated SUSMP information • Updated APAS website information
8	10-11-2020	• Addition of Appendix G 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	22-04-2003	• Deleted reference to GPC numbering and incorporated a general format update
6	15-01-2001	• Initiated the second stage of the move to new specification numbering with prominence given to the new number (previously GPC-C-61)