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This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements.

Matt Gantley, *Chief Executive Officer*
United Kingdom Accreditation Service

Initial Accreditation: 8 November 2017
Certificate Issued: 25 January 2024

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Technical Report

AAMA 2605:2022 Testing

For

Futural (UK) LTD

Date Received	27 February 2023
Date lab activities	03 March 2023 – 11 April 2023
Client	Futural (UK) LTD 128 City Road, London, EC1V 2NX United Kingdom
Work Requested	AAMA 2605:2022 Testing
Samples Submitted	3mm Pre-coated Aluminium Panels
Work Carried out by	D.Corrigan Senior Technician
Approved by	Dr Ben Naden Authorised Signatory

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1 Introduction

Forty replicate coated aluminium panels were submitted by the client for testing in accordance with the requirements of AAMA 2605:2022 Sections 8.1 to 8.7 and Sections A3.0, A5.1, A5.2.1 and A5.2.2 from Appendix A of AAMA 2605:2022.

The panels were submitted with the following customer reference:-

1. **FUTURAL**

2 Results

2.1 Colour Uniformity (AAMA 2605:2022 Section 8.1)

Panel Number	DFT (µm)	L*	a*	b*
Futural - 1	34.8	47.59	-0.93	0.31
Futural - 2	38.5	47.62	-0.94	0.30
Mean		**47.61**	**-0.94**	**0.31**

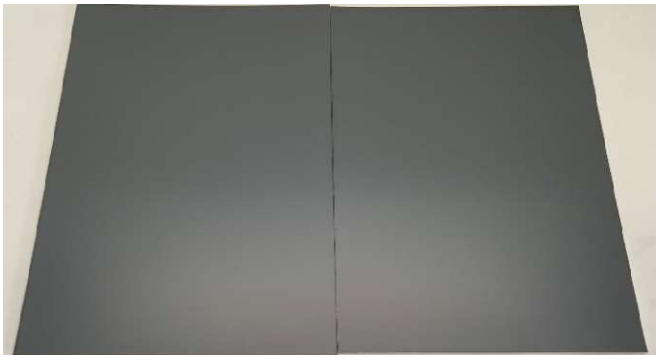

Figure 1 - Colour Panels 1 & 2

2.2 Specular Gloss (AAMA 2605:2022 Section 8.2)

Panel Number	DFT (µm)	60° Gloss (GU)
Futural - 3	37.4	28
Futural - 4	38.0	28
Mean		**28**

Figure 2 - Gloss Panels 3 & 4

2.3 Dry Film Hardness (AAMA 2605:2022 Section 8.3)

Panel Number	DFT (µm)	Grade F Pencil
Futural - 5	36.4	PASS
Futural - 6	37.8	PASS
Result		**PASS**

Figure 3 - Hardness Panels 5 & 6

2.4 Film Adhesion (AAMA 2605:2022 Section 8.4.2)

2.4.1 Dry Adhesion (AAMA 2605:2022 Section 8.4.2.1)

Panel Number	DFT (µm)	1mm spacing / 6 cuts
Futural - 11	34.4	5B
Futural - 12	33.9	5B
Result		**5B - PASS**

Figure 4 - Dry Adhesion Panels 11 & 12

2.4.2 Boiling Water Adhesion (AAMA 2605:2022 Section 8.4.2.2)

Panel Number	DFT (µm)	1mm spacing / 6 cuts
Futural - 9	35.8	5B
Futural - 10	34.2	5B
Result		**5B - PASS**

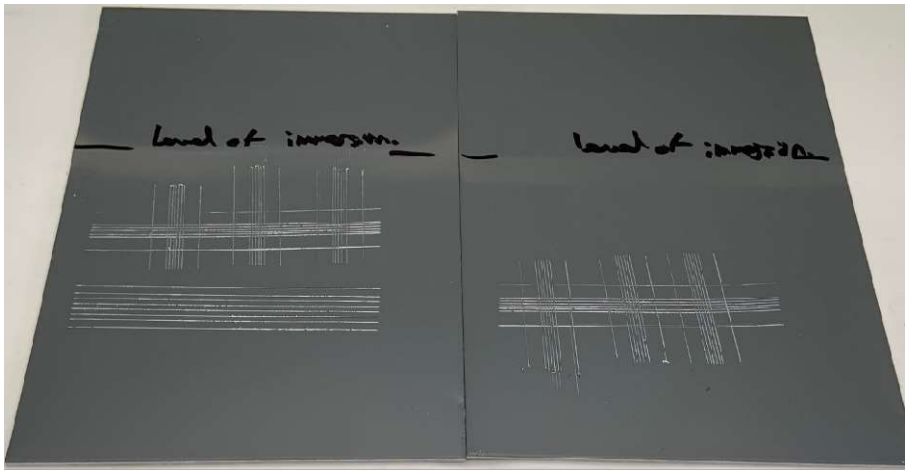

Figure 5 - Boiling Water Adhesion Panels 9 & 10

2.4.3 Wet Adhesion (AAMA 2605:2022 Section 8.4.2.3)

Panel Number	DFT (µm)	1mm spacing / 6 cuts
Futural - 7	36.2	5B
Futural - 8	33.8	5B
Result		**5B - PASS**

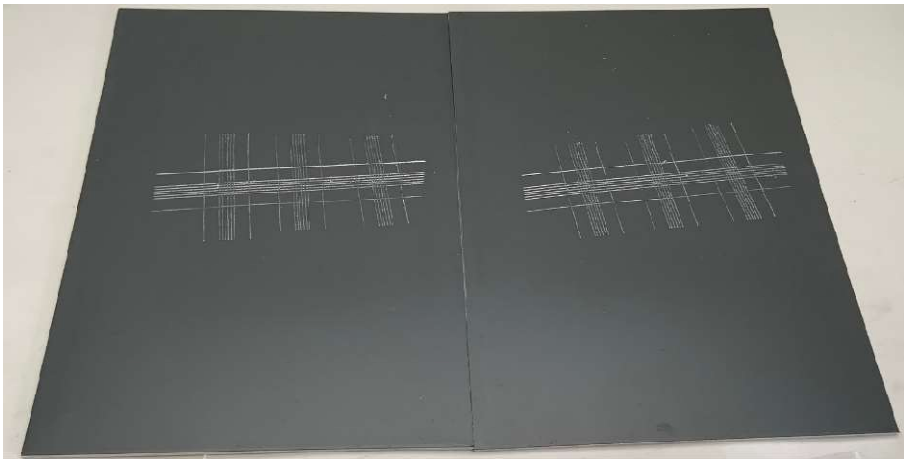

Figure 6 - Wet Adhesion Panels 7 & 8

2.5 Impact Resistance (AAMA 2605:2022 Section 8.5)

Panel Number	DFT (µm)	Impact 18N-m, 16mm indenter
Futural - 13	35.3	PASS
Futural - 14	37.6	PASS
Result		**PASS**

Figure 7 - Impact Resistance Panels 13 & 14

2.6 Abrasion Resistance (AAMA 2605:2022 Section 8.6)

Panel Number	DFT (mils)	Volume of sand used (L)	Result
Futural – 20	1.3	80.0	PASS
Futural - 21	1.3	80.0	PASS
Result			**PASS**

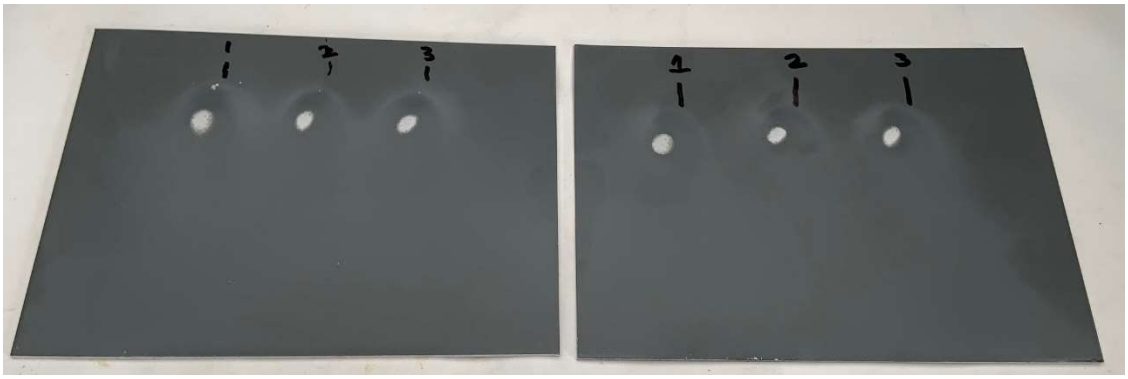

Figure 8 - Abrasion Resistance Panels 20 & 21

2.7 Chemical Resistance (AAMA 2605:2022 Section 8.7)

2.7.1 Muriatic Acid Resistance (AAMA 2605:2022 Section 8.7.1)

Panel Number	DFT (µm)	10% HCl / 15mins
Futural - 15	37.7	PASS
Futural - 16	37.5	PASS
Result		**PASS**

Figure 9 - Muriatic Acid Resistance Panels 15 & 16

2.7.2 Mortar Resistance (AAMA 2605:2022 Section 8.7.2)

Panel Number	DFT (µm)	24hrs @38°C/100% RH
Futural - 24	33.9	PASS
Futural - 25	34.1	PASS
Result		**PASS**

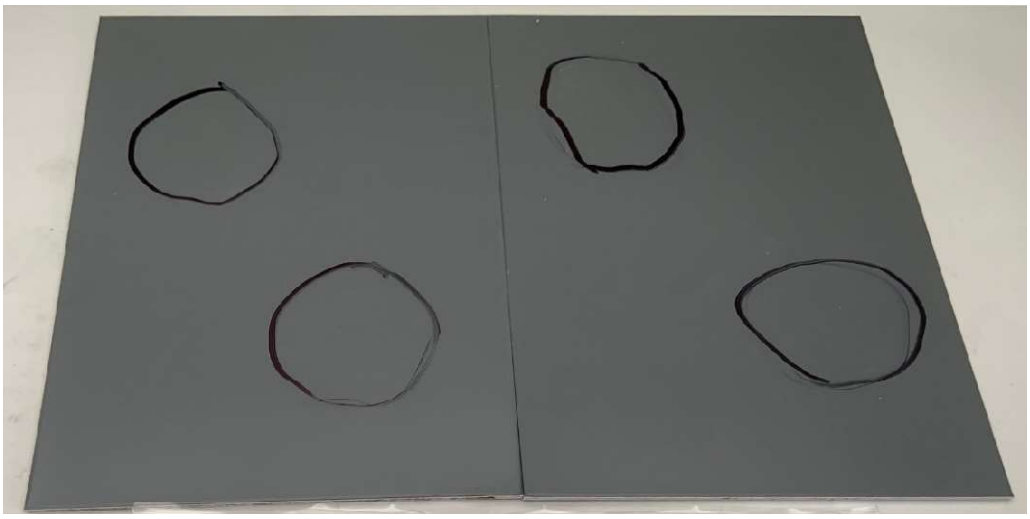

Figure 10 - Mortar Resistance Panels & 24 & 25

2.7.3 Nitric Acid Resistance (AAMA 2605:2022 Section 8.7.3)

Panel Number	DFT (µm)	ΔE (30mins @21°C)
Futural - 17	35.9	0.24
Result (ΔE ≤5.0)		**PASS**

Figure 11 - Nitric Acid Resistance Panel 17

2.7.4 Detergent Resistance (AAMA 2605:2022 Section 8.7.4)

Panel Number	DFT (µm)	Immersion, (72hrs @38°C)
Futural - 18	33.7	PASS
Futural - 19	33.9	PASS
Result		**PASS**

Figure 12 - Detergent Resistance Panels 18 & 19

2.7.5 Window Cleaner Resistance (AAMA 2605:2022 Section 8.7.5)

Panel Number	DFT (µm)	10 drops / 24 hrs
Futural - 22	33.8	PASS
Futural - 23	33.0	PASS
Result		**PASS**

Figure 13 - Window Cleaner Resistance Panels 22 & 23

2.8 Dry Film Thickness (AAMA 2605:2022 Appendix A Section 3.0)

Sample	Number of Measurements (25 panels)	Mean DFT (µm)	% < 19µm	% ≥ 23µm
Futural	125	35.3	0%	100%
Result		**PASS**		

2.9 T-Bend Test - Flexibility (AAMA 2605:2022 Appendix A Section 5.1)

Panel Number	DFT (µm)	Minimum of 2-T flexibility
Futural - 26	33.8	0-T
Result		**PASS**

Figure 14 - T-Bend Flexibility Panel 26

2.10 Direct Impact (AAMA 2605:2022 Appendix A Section 5.2.1)

Panel Number	DFT (µm)	Impact 18N-m, 16mm indenter
Futural - 13	35.3	PASS
Futural - 14	37.6	PASS
Result		**PASS**

Figure 15 - Direct Impact Resistance Panels 13 & 14 (as reported in Section 2.5)

2.11 Reverse Impact (AAMA 2605:2022 Appendix A Section 5.2.2)

Panel Number	DFT (µm)	Impact 18N-m, 16mm indenter
Futural - 27	35.2	PASS
Futural - 28	34.6	PASS
Result		**PASS**

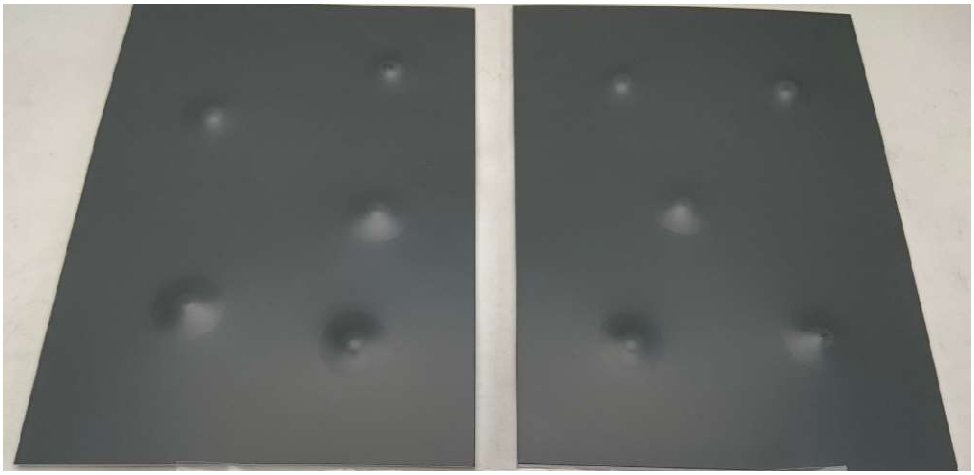

Figure 16 - Reverse Impact Resistance Panels 27 & 28

3 Test Procedures

3.1 Colour Uniformity (AAMA 2605:2022 Section 8.1)

The 1976 CIELAB colour space coordinates of the coating were measured using a Color-Eye 7000A spectrophotometer.

Colour uniformity shall be consistent with the colour range or numerical value established between the approval source and the applicator.

3.2 Specular Gloss (AAMA 2605:2022 Section 8.2)

The specular gloss of the coating was measured in accordance with ASTM D523 using an Elcometer 480 Gloss Meter using the 60° measurement angle.

Gloss values shall be within ± 5 units of the manufacturer's specification.

3.3 Dry Film Hardness (AAMA 2605:2022 Section 8.3)

The dry film hardness of the coating was assessed in accordance with ASTM D3363 using a Derwent Graphics - Grade F pencil.

Coating shall meet minimum F scratch hardness as defined by ASTM D3363.

3.4 Film Adhesion (AAMA 2605:2022 Section 8.4.2)

3.4.1 Dry Adhesion (AAMA 2605:2022 Section 8.4.2.1)

The dry adhesion of the coating was assessed in accordance with ASTM D3359 method B, using a multi cutting tool with a spacing of 1mm.

For Method B, a Level 4B classification per ASTM D3359 shall be achieved.

3.4.2 Boiling Water Adhesion (AAMA 2605:2022 Section 8.4.2.2)

The boiling water adhesion of the coating was assessed in accordance with ASTM D3359 method B, using a multi cutting tool with a spacing of 1mm.

The panels were immersed in boiling deionised water at 99°C to 100°C for 20 minutes after which they were removed and wiped dry.

For Method B, a Level 4B classification per ASTM D3359 shall be achieved.

3.4.3 Wet Adhesion (AAMA 2605:2022 Section 8.4.2.3)

The wet adhesion of the coating was assessed in accordance with ASTM D3359 method B, using a multi cutting tool with a spacing of 1mm.

The panels were immersed in boiling deionised water at 38°C for 24 hours after which they were removed and wiped dry.

For Method B, a Level 4B classification per ASTM D3359 shall be achieved.

3.5 Impact Resistance (AAMA 2605:2022 Section 8.5)

The impact resistance of the coating was assessed in accordance with ASTM D5420 using a 16 mm (5/8 in) diameter round-nosed impact tester at 18 N-m (160 in-lb) force.

Adhesive tape (as specified per ASTM D3359) 20 mm (3/4 in) wide was applied over the concave area of deformation by pressing down firmly against the coating to eliminate voids and air pockets and sharply pulled off at a right angle to the plane of the surface being tested.

There shall be no removal of film from the substrate.

3.6 Abrasion Resistance (AAMA 2605:2022 Section 8.6)

The abrasion resistance of the coating was assessed in accordance with ASTM D968. A silica sand is allowed to fall from a specified height onto a coated substrate to abrade the coating until worn through to the substrate (4mm area exposed) or a maximum amount of sand has fallen (80 litres).

If the coating is worn through to the substrate (4mm area exposed), the abrasion coefficient (A) is calculated by dividing the volume of sand (in litres) by the coating thickness (in mils).

$$\text{Abrasion Coefficient, A (Litres Per Mil)} = V/T$$

where:

V = volume of sand used in litres (1 decimal place)
T = thickness of coating in mils (1 decimal place)

3.7 Chemical Resistance (AAMA 2605:2022 Section 8.7)

3.7.1 Muriatic Acid Resistance (AAMA 2605:2022 Section 8.7.1)

10 drops of 10% (by volume) solution of muriatic acid (37% commercial grade hydrochloric acid) in deionised water was applied to the coating's surface and covered with a watch glass, convex side up @23°C.

After a 15-minute exposure, the acid solution was washed off with running tap water.

There shall be no blistering and no visual change in appearance when examined by the unaided eye.

3.7.2 Mortar Resistance (AAMA 2605:2022 Section 8.7.2)

Fresh mortar was prepared by mixing 75 g (2.6 oz) of building lime and 225 g (7.9 oz) of dry sand, both passing through a 10-mesh wire screen with sufficient water, approximately 100 g, to make a soft paste.

Portions of mortar about 1300 mm^2 (2 in^2) in area and 12 mm (1/2 in) in thickness were applied to coated aluminium specimens and the panels were immediately exposed for 24 hours to 100% relative humidity at 38°C in accordance with ASTM D2247.

Mortar shall dislodge easily from the painted surface, and any residue shall be removable with a damp cloth. Any lime residue should be easily removed with the 10% muriatic acid solution described in Section 8.7.1.2. There shall be no loss of film adhesion or visual change in appearance when examined by the unaided eye.

NOTE: *A slight staining or discoloration may be apparent on orange, yellow or metallic coatings. This should be discussed with the specifying source prior to selection of colour.*

3.7.3 Nitric Acid Resistance (AAMA 2605:2022 Section 8.7.3)

125ml of 70% ACS reagent grade nitric acid was poured into a 250ml wide-mouth beaker. The test panel was placed completely over the mouth of the bottle coating side down, for 30 minutes @23°C and relative humidity of approx. 50%.

Following the exposure, the sample was rinsed with tap water, wiped dry, and the colour change was assessed after a one-hour recovery period using a Color-Eye 7000A spectrophotometer.

There shall be not more than 5 ΔE units of colour change, when comparing measurements on the acid-exposed coated surface and the unexposed surface.

3.7.4 Detergent Resistance (AAMA 2605:2022 Section 8.7.4)

A 3% (by weight) solution of detergent as prescribed in Table 2 of Section 8.7.4.2 of AMMA 2605:2022 was prepared and two panels were immersed at 38°C for 72 hours.

After the exposure the panels were removed from the detergent solution and rinsed with tap water and the dry adhesion of the coating was assessed in accordance with ASTM D3359 method B, using a multi cutting tool with a spacing of 1mm.

There shall be no loss of adhesion of the film to the metal, no blistering and no significant visual change in appearance when examined by the unaided eye.

3.7.5 Window Cleaner Resistance (AAMA 2605:2022 Section 8.7.5)

A solution of glass cleaner, as prescribed in Table 3 of Section 8.7.5.2 of AMMA 2605:2022 was prepared and 10 drops of the glass cleaner solution was applied to the coated surface of the duplicate test panels and immediately covered with a watch glass, convex side up.

After 24hrs exposure @ 23°C, the samples were rinsed with tap water and allowed to air dry for four hours before assessing the dry adhesion of the coating assessed in accordance with ASTM D3359 method B, using a multi cutting tool with a spacing of 1mm.

There shall be no blistering or noticeable change in appearance when examined by the unaided eye and no removal of film under the tape within or outside of the cross-hatched area.

3.8 Dry Film Thickness (AAMA 2605:2022 Appendix A Section 3.0)

The total dry-film thickness was assessed in accordance with ASTM D7091.

Eighty percent (80%) of measurements on primary exposed surfaces shall meet or exceed 23 microns (0.9 mil) total film thickness and no more than 5% of the total readings, on primary exposed surfaces, shall be below 19 microns (0.75 mil) or, 83% of film thickness specified.

3.9 T-Bend Test - Flexibility (AAMA 2605:2022 Appendix A Section 5.1)

The T-bend flexibility was assessed in accordance with ASTM D4145. A coated sample of 51 mm (2 in) across the bend direction, by 152 mm (6 in) was conditioned at 23°C for 24 hours prior to testing.

Approximately 13 to 19 mm (½ to ¾ in) of the sample was secured in the jaws of a bench vice and the free end of the specimen was bent 90° in a smooth and uniform manner so that the coating was on the outside of the specimen. The bending was continued so the metal was completely bent upon itself, forming a 180° arc (0-T bend).

The bent end of the specimen was secured in the vice and the free end was bent 90°. The bending was continued around the first (0T) bend to complete a 180° bend forming a 1-T bend.

After each bend was completed, 20 mm (3/4 in.) wide pressure-sensitive tape (as specified per ASTM D3359) was applied along the coated face of the bend. The tape was rubbed flat and then removed with a rapid movement at an angle of 180° to the bend surface. The tape was examined for coating removed from the surface of the specimen (pick-off).
There shall be a minimum of 2-T flexibility with no pick-off at the area of the bend. Express the T-bend to no pick-off as the number of thicknesses around which the metal is being bent. For example, if no pick-off occurs when the metal is bent back upon itself once, the paint would take a 0-T bend.

3.10 Direct Impact Resistance (AAMA 2605:2022 Appendix A Section 5.2.1)

The impact resistance of the coating was assessed using a 16 mm (5/8 in) diameter round-nosed impact tester at 18 N-m (160 in-lb) force on the coated face of the test panels.

Adhesive tape (as specified per ASTM D3359) 20 mm (3/4 in) wide was applied over the concave area of deformation by pressing down firmly against the coating to eliminate voids and air pockets and sharply pulled off at a right angle to the plane of the surface being tested.

There shall be no removal of film from the substrate.

3.11 Reverse Impact Resistance (AAMA 2605:2022 Appendix A Section 5.2.2)

The impact resistance of the coating was assessed using a 16 mm (5/8 in) diameter round-nosed impact tester at 18 N-m (160 in-lb) force on the reverse of the coated face of the test panels.

Adhesive tape (as specified per ASTM D3359) 20 mm (3/4 in) wide was applied over the convex area of deformation by pressing down firmly against the coating to eliminate voids and air pockets and sharply pulled off at a right angle to the plane of the surface being tested.

There shall be no removal of film from the substrate.

End of Report