

Polyester Powder Coating Testing

TEST SUMMARY

AkzoNobel indr09-191-19872



Coating Testing for MicroLouvre™ K700 Metal Fabric

TABLE OF CONTENTS

SECTION		PAGE
1	Purpose of Test	3
2	Summary	3
3	Scope of Test	4
4	Description of Test Specimen(s)	4-7
5	Test Evidence	
	a) QUV Accelerated Weathering	8
	b) Neutral Salt Spray Performance	8
	c) Humidity Exposure	9
	d) General Test Conclusions – all samples	9
6	Conclusion	10

1 Purpose of Test

The purpose of the testing is to confirm the correct coating product and process. MicroLouvre™ K700 metal fabric coated samples were tested in the AkzoNobel Laboratories to assess



QUV	ASTM G154 3138 Bulbs	Accelerated Weathering Test
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ISO 9227	Corrosion Test in Artificial Atmospheres	Neutral Salt Spray Test
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ISO 6270	Paints and varnishes (Determination of resistance to humidity)	Humidity Test
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2 Summary

MicroLouvre™ K700 metal fabric coating is rated $R_p = 10$, in accordance with EN ISO 10289:2001.

Note:

This is the highest possible protection rating after ISO 9227 salt spray testing according to EN ISO 10289:2001 (method of rating corrosion protection on inorganic coated metallic substrates). The Current production sample of MicroLouvre™ K700 metal fabric with coating MN204E (#5), was tested for 500 hours and produced the result of 'No Effect' passing the accelerated weathering tests.

3 Scope of Test

In order to establish the most appropriate testing for what is a unique product AkzoNobel's testing procedures were adopted, namely the QUV ASTM G154 3138 Bulbs test for Accelerated Weathering Test, the ISO 9227 Corrosion Test in Artificial Atmospheres for the Neutral Salt Spray Test and the ISO 6270 Paints and varnishes (Determination of resistance to humidity) Humidity Test.

4 Description of Test Specimens

Eight sheets of powder coated MicroLouvre™ / Koolshade samples were cut into three giving a total of 24 samples for testing.

Sheets #4 - #8 were coated in AkzoNobel Interpon A2202 MN204E (Black)

AkzoNobel Interpon A2202 MN204E (Black) is the standard production coating for MicroLouvre™ / Koolshade Pre-Treatment

Sheets #4 & #5 were not subjected to any pre-treatment

Sheets #6 - #8 were subjected to a surfactant wash.

Coating Thickness

Sheets #4 - #8 all had a typical coating thickness of 75 -100µm.

Stoving Temperatures

Stoving temperatures remained constant at 200°C (392°F)

Stoving Times

Stoving times were varied by 0.05m/min to determine and prove optimum stoving times.

Sheet #4 had a stoving time of 0.25m/min, Sheet #5 had a stoving time of 0.20m/min

Sheet #5 is the standard finish for MicroLouvre™ Metal Fabric. The 3 pieces of Sheet #5 are referenced

RGA4000.KOO1M	QUV Testing
RGA4000.KOO1N	NSS Testing
RGA4000.KOO1O	Humidity Testing

Note:

Sheets #1 - #3 were coated in RAL 1033 (Yellow) to 150µm, for a specific lamination application. Stoving times and temperatures as directed.

4 Description of Test Specimens (cont.)

Fig 1 Samples identification

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Number: indr09-191-19872
Lab book ref:RGA4000.KOO1



Date: 1st September 2009

MicroLouvre: QUV, Neutral Salt Spray and Humidity Testing

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Samples:

Eight sheets of powder coated louvre cut into three to give twenty four sections: -

Panel Code	Koolshade Sheet	Powder	Test
RGA4000.KOO1A	1	RAL 1033	QUV
RGA4000.KOO1B	1	RAL 1033	NSS
RGA4000.KOO1C	1	RAL 1033	Humidity
RGA4000.KOO1D	2	RAL 1033	QUV
RGA4000.KOO1E	2	RAL 1033	NSS
RGA4000.KOO1F	2	RAL 1033	Humidity
RGA4000.KOO1G	3	RAL 1033	QUV
RGA4000.KOO1H	3	RAL 1033	NSS
RGA4000.KOO1I	3	RAL 1033	Humidity
RGA4000.KOO1J	4	MN204E	QUV
RGA4000.KOO1K	4	MN204E	NSS
RGA4000.KOO1L	4	MN204E	Humidity
RGA4000.KOO1M	5	MN204E	QUV
RGA4000.KOO1N	5	MN204E	NSS
RGA4000.KOO1O	5	MN204E	Humidity
RGA4000.KOO1P	6	MN204E	QUV
RGA4000.KOO1Q	6	MN204E	NSS
RGA4000.KOO1R	6	MN204E	Humidity
RGA4000.KOO1S	7	MN204E	QUV
RGA4000.KOO1T	7	MN204E	NSS
RGA4000.KOO1U	7	MN204E	Humidity
RGA4000.KOO1V	8	MN204E	QUV
RGA4000.KOO1W	8	MN204E	NSS
RGA4000.KOO1X	8	MN204E	Humidity

Table 1: Summary of Test Part Details


Fig: 1

4 Description of Test Specimens (cont.)

Coatings

Figure 2: AkzoNobel Interpon A2202 MN204E Data Sheet

Akzo Nobel Powder Coatings BV



Product Data Sheet

AkzoNobel Powder Coatings
**Interpon A2202
MN204E**

Product Description	Interpon A2202 powders can be used for pillars and appliqué, roof racks, grille guards, bumpers, hitches, mirror housings, and wiper arms all require protection from the environment as well as being visually harmonious with the overall design of a vehicle. Interpon A2202 powders are standard durable and answer to the requested performance level specified by the OEMs.		
Powder Properties	Chemical type	Polyester	
	Area of usage	Automotive trim parts	
	Particle Size	Custom manufactured	
	Appearance	Smooth, matt	
	Colour	Black	
	Gloss (60°)	18 ± 3 GU	
	Density (g/cm³)	1,55 ± 0,05	
	Stoving schedule	12 minutes at 200°C (time at object temperature)	
	Application	Electrostatic	
	Storage Stability	under dry, cool (<25°C) conditions, at least 24 months from production date	
Test Conditions	The results are based on mechanical and chemical tests which (unless otherwise indicated) have been carried out under laboratory conditions and are given for guidance only. Actual product performance will depend upon the circumstances under which the product is used.		
	Substrate	Steel panels, Aluminium	
	Pretreatment	Bonder (LH) iron phosphate, Bonder (722/W/OF)	
	Film Thickness	60 µm	
	Cure Schedule	12 minutes at 200°C	
Mechanical Tests	Adhesion	DIN EN ISO 2409	Gt 0A
	Ericksen Cupping	DIN EN ISO 1520	≥ 6 mm
	Impact	ASTM D 2794	≥ 20 Ip (reverse)
Corrosion Tests	Salt Spray	DIN EN ISO 9227	240 h corrosion creep < 2 mm from scribe
	Humidity Test	DIN EN ISO 6270-2	240 h no blistering
Exterior Durability	Artificial Testing	QUV-B > 50% gloss retention after 200 h	
Pre-treatment	Steel surfaces to be coated must be clean and free from grease. For maximum protection it is essential to pre-treat components prior to the application of Interpon A2202. Iron Phosphate and Zinc Phosphate of ferrous metals improve corrosion resistance. Aluminium parts require a chromate or chromate-free conversion pre-treatment.		
Application	Interpon A2202 powders can be applied by manual or automatic electrostatic spray equipment. It is recommended that for consistent application and appearance product be fluidized during application. Unused powder can be reclaimed using suitable equipment and recycled through the coating system		

Interpon®

Fig: 2

4 Description of Test Specimens (cont.)

Figure 3: AkzoNobel Interpron 610 Data Sheet

Interpron 610 Family of products includes Interpron A2202 MN204E

Akzo Nobel Powder Coatings Limited



Interpron 610 Product Performance

Interpron 610 is a series of polyester based powder coatings designed for the exterior environment, offering excellent light and weather resistance from a single coat finish on a variety of substrates. Interpron 610 powders are available in a wide range of colours in gloss, satin, matt, metallic and textured effects and can be custom matched to the user's requirements.

Design Life Expectancies of up to 15 years for Interpron 610 products have been given within the ExtraLife Coating System Program for a C3 external environment (i.e. Urban and Industrial atmospheres with moderate Sulphur dioxide pollution + Coastal areas with low salinity). Note that during the life of the coating it is necessary to ensure the coating is maintained and cleaned regularly to ensure that the decorative and protective properties of the coating are retained. (guidelines can be given on request).

AkzoNobel refrains from giving specific guarantees for Interpron 610 on external surfaces as there are many factors beyond our control. Properties like "retention of original gloss", "chalking" and "fading" are very dependent on the environment and different buildings may be subjected to a wide variation in conditions (geographic orientation, air temperatures, surface temperatures, hours of sunshine, UV intensity, levels of atmospheric pollution, levels of ozone, humidity, rainfall, prevailing wind direction, proximity to coast, proximity to highway and so on).

In the case of adhesion and/or corrosion, there are similarly a large number of environmental factors which may influence the performance versus a guarantee (proximity to salt water, air temperatures, humidity, rainfall, pollution, acid rain etc.).



Fig: 3

5 Test Evidence

5 (a) QUV Test

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Aim:

To assess the QUV, neutral salt spray, and humidity resistance.

Test Methods:

QUV - ASTM G154 QUVB 313B bulbs
Neutral salt spray - ISO 9227
Humidity - ISO 6270

Results:

QUV

Panel Code	Sheet	Powder	100 hour	200 hours	500 hours	1000 hours
RGA4000.KOO1A	1	RAL 1033	No effect	No effect	No effect	No significant colour change
RGA4000.KOO1D	2	RAL 1033	No effect	No effect	No effect	No significant colour change
RGA4000.KOO1G	3	RAL 1033	No effect	No effect	No effect	No significant colour change
RGA4000.KOO1J	4	MN204E	No effect	No effect	No effect	No significant colour change
RGA4000.KOO1M	5	MN204E	No effect	No effect	No effect	No significant colour change
RGA4000.KOO1P	6	MN204E	No effect	No effect	No effect	Chalking and gloss loss observed
RGA4000.KOO1S	7	MN204E	No effect	No effect	No effect	Chalking and gloss loss observed
RGA4000.KOO1V	8	MN204E	No effect	No effect	No effect	Chalking and gloss loss observed

Table 2: QUV Performance

5 (b) Neutral Salt Spray Test

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Neutral Salt Spray

Panel Code	Sheet	Powder	250 hours	500 hours
RGA4000.KOO1B	1	RAL 1033	No effect	Green corrosion on ~ 25% cross overs
RGA4000.KOO1E	2	RAL 1033	Couple of green spots at cross overs	Green corrosion on ~ 15% cross overs
RGA4000.KOO1H	3	RAL 1033	Couple of green spots at cross overs	Green corrosion on ~ 15% cross overs
RGA4000.KOO1K	4	MN204E	No effect	Green corrosion on ~ 5% cross overs
RGA4000.KOO1N	5	MN204E	No effect	No corrosion
RGA4000.KOO1Q	6	MN204E	No effect	Couple of green spots at cross overs
RGA4000.KOO1T	7	MN204E	No effect	Couple of green spots at cross overs
RGA4000.KOO1W	8	MN204E	No effect	Couple of green spots at cross overs

Table 3: Neutral Salt Spray Performance

5 Test Evidence (cont.)

5 (c) Humidity Exposure

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Humidity

Panel Code	Sheet	Powder	250 hours	500 hours	750 hours	1000 hours
RGA4000.KOO1C	1	RAL 1033	No effect	No effect	No effect	No effect
RGA4000.KOO1F	2	RAL 1033	No effect	No effect	No effect	No effect
RGA4000.KOO1I	3	RAL 1033	No effect	No effect	No effect	No effect
RGA4000.KOO1L	4	MN204E	No effect	No effect	No effect	No effect
RGA4000.KOO1O	5	MN204E	No effect	No effect	No effect	No effect
RGA4000.KOO1R	6	MN204E	No effect	No effect	No effect	No effect
RGA4000.KOO1U	7	MN204E	No effect	No effect	No effect	No effect
RGA4000.KOO1X	8	MN204E	No effect	No effect	No effect	No effect

Table 4: Humidity Exposure Performance

Table 5: Relative ranking of salt spray performance

Humidity

All parts tested show good resistance to humidity.

5(d) General Test Conclusions – all samples

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Conclusion:

QUV

Panels prepared from Sheets 6, 7, and 8 appear to have chalked and faded worse than the other black panels from sheets 4 and 5. The yellow panels all retain a bright appearance after exposure.

Neutral Salt Spray

Corrosion occurs more readily on the yellow sections (RAL1022) compared to the black with green spots seen on parts from sheets 2 and 3 after 250 hours exposure. No corrosion is seen on the part from sheet 1 or any of the black parts after 250 hours.

After 500 hours there is some differentiation this can be ranked: -

Panel Code	500 hours	Performance Ranking
RGA4000.KOO1B	Green corrosion on ~ 25% cross overs	Worst
RGA4000.KOO1E	Green corrosion on ~ 15% cross overs	6 th
RGA4000.KOO1H	Green corrosion on ~ 15% cross overs	6 th
RGA4000.KOO1K	Green corrosion on ~ 5% cross overs	5 th
RGA4000.KOO1Q	Couple of green spots at cross overs	2 nd
RGA4000.KOO1T	Couple of green spots at cross overs	2 nd
RGA4000.KOO1W	Couple of green spots at cross overs	2 nd
RGA4000.KOO1N	No corrosion	Best

6 Conclusion

Production for MicroLouvre™ K700 metal fabric with coating MN204E (Sheets #5) shall be the standard coating application and stoving duration.

Coating thickness to remain 75 - 100µm.

Specific line speed for stoving should be no more than 0.22m/min and no less than

0.18m/min @ 200°C surface temp.

MicroLouvre™ K700 metal fabric coating is rated Rp = 10 or the highest possible protection rating after ISO 9227 salt spray testing according to EN ISO 10289:2001 (method of rating corrosion protection on inorganic coated metallic substrates).