

Technical Report

QUV Accelerated Weather Testing

TR-0002302-6 QUV Accelerated Weathering Performance Testing	Date: 21 December 2023
Assessment of Aromatic Polyurea, Hybrid and Polyurethane	Document Number: TR-0002302-6

[Executive Summary](#)

[Introduction](#)

[Assessment](#)

[Panel Preparation](#)

[Results](#)

[Metalox-P2 / Elaston-W80 White - 24 Hours Recoat](#)

[Tufflon-P80 White](#)

[Polytuff-21 White](#)

[Tufflon-P90 Mid Grey](#)

[Hybron-H90 Yellow](#)

[Hybron-W90 Black](#)

[Tufflon-D60 Black](#)

[Conclusion](#)

Executive Summary

The colour change is tabulated below for all products tested after 1000 hours.

Tabulated data for the series

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)	Visual Comment
P2 / W80 White (24 Hrs)	1000 Hrs	-15.16	11.63	30.77	36.22	Darker, Redder, Yellower
Tufflon-P80 White	1000 Hrs	-13.86	9.92	26.58	31.57	Darker, Redder, Yellower
Polytuff-21 White	1000 Hrs	-19.16	15.4	18.85	30.98	Darker, Redder, Yellower
Tufflon-P90 Mid Grey	1000 Hrs	-3.49	0.36	18.42	18.75	Yellowing and s. darker
Hybron-H90 Yellow	1000 Hrs	-8.29	6.06	-1.9	10.45	Darker and redder
Hybron-W90 Black	1000 Hrs	-7.03	-0.12	2.81	7.57	Darker
Tufflon-D60 Black	1000 Hrs	0.52	0.1	0.54	0.75	No colour change.

Technical Report

QUV Accelerated Weather Testing

The following conclusion is drawn from the results.

- All aromatic polyurea, hybrid and polyurethane will change colour. The lighter the colour, the greater the yellowing. Yellow and black have significantly less colour change.
- All aromatic polyurea, hybrid and polyurethane will lose their gloss and chalk. The low gloss is consistent and looks good.
- The colour change for aromatic polyurea, hybrid and polyurethane occurs early after exposure to UV and then becomes more consistent after the initial colour change.
- None of the samples experienced high levels of DFT loss.

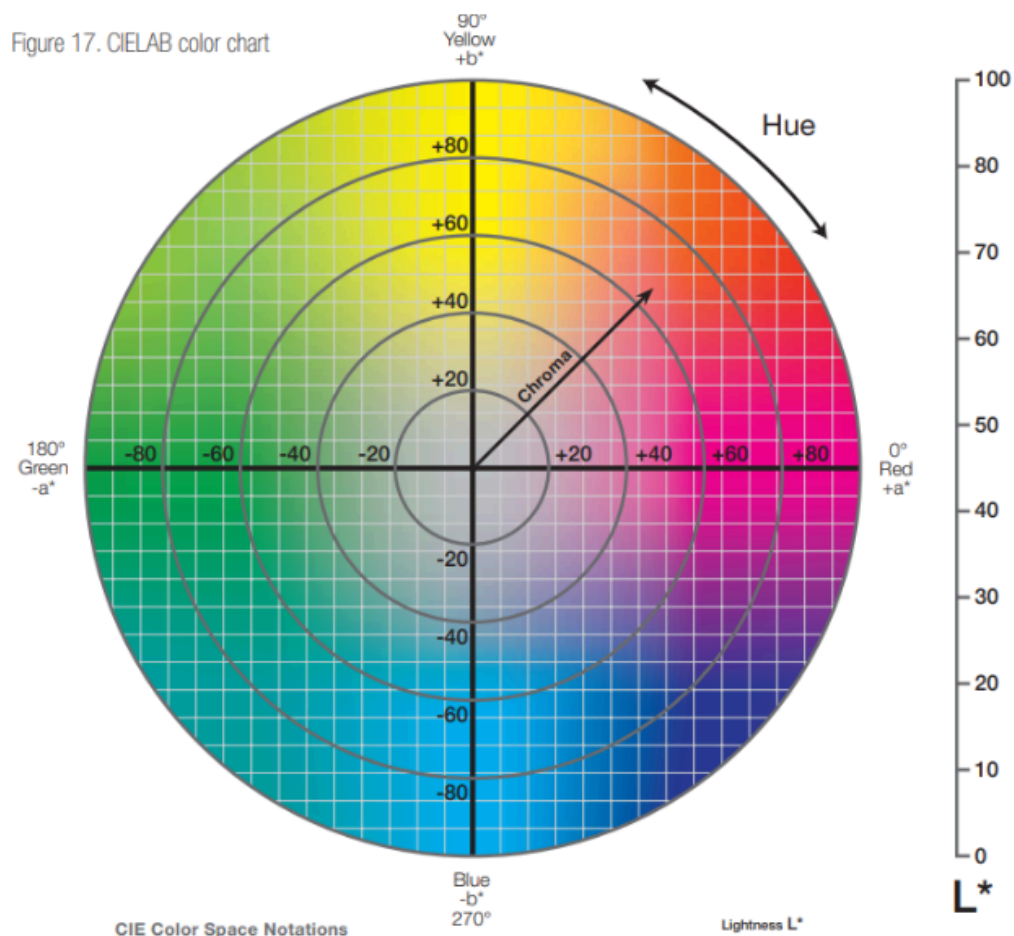
Introduction

This technical report assesses the colour change, gloss change, and DFT loss after 1000 hours of accelerated weathering to ASTM D154 Cycle 1. The list of test panels in the series is tabulated in panel preparation

Assessment

Colour

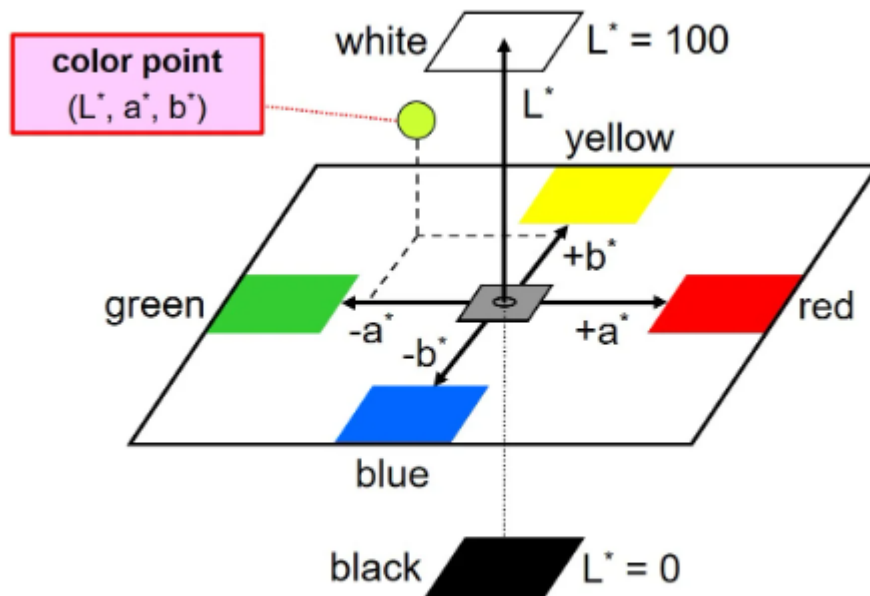
The colour will be assessed using a spectrophotometer (Konica Minolta). Any colour data will be supported by a visual assessment of a colour matcher.



Technical Report

QUV Accelerated Weather Testing

CIELAB is a three-dimensional system that triangulates and precisely defines any colour point. The initial colours of all the samples are scanned to create the standard reference. The samples are rescanned after weathering (250, 500, 750, and 1000 Hours of weathering in the QUV) to determine the changes in colour.



The 3-dimensional CIELAB color space.

CIE Colour Space Notations

dL*(D65)	difference in lightness / darkness value	"+" = lighter "-" = darker
da*(D65)	difference on the red / green axis	"+" = redder "-" = greener
db*(D65)	difference on the yellow / blue axis	"+" = yellower "-" = bluer
dE*(D65)	total colour difference value	

The d or delta describes the change in colour rather than an actual colour. The dL number indicates a change in light or dark colour. The da number indicates a change in green or red, and the db indicates a change in blue or yellow. The delta (dL, da and db) numbers indicate how the colour has changed from the original colour scan. dE is the visual difference between the two colours.

Gloss

Laboratory gloss metre used to test gloss.

Technical Report

QUV Accelerated Weather Testing

Panel Preparation

System 00014/01 (P2/W80/24 Hours)

Elaston-W80 White	3000µm DFT	
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System 00015/01 (P80)

Tufflon-P80 White	3000µm DFT	
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System 00016/01 (PT21)

Polytuff-21 White	3000µm DFT	
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System 00017/01 (P90)

Tufflon-P90 Mid Grey	3000µm DFT	
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System 00018/01 (H90)

Hybron-H90 - Yellow	3000µm DFT	
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System 00019/01 (W90)

Hybron-W90 Black	3000µm DFT	
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System 00020/10 (D60)

Tufflon-D60 Black	3000µm DFT	
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Technical Report

QUV Accelerated Weather Testing

Results

Metalox-P2 / Elaston-W80 White - 24 Hours Recoat

System 00014/01 (P2/W80/24Hrs)

The Elaston-W80 has significantly changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). The Elaston-W80 colour has gotten darker, yellower and redder visually. The significant shift in colour mainly occurred within the first 250 hours and then became a more stable colour. The gloss has dropped off to matte level.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Metalox-P2 / Elaston-W80 White (24 Hours)	0 Hrs	-0.01	0.00	-0.01	0.01
	250 Hrs	-12.89	9.18	34.52	37.97
	500 Hrs	-14.74	11.28	33.4	38.21
	750 Hrs	-15.23	11.62	33.84	38.88
	1000 Hrs	-15.16	11.63	30.77	36.22

System	QUV Hours	Gloss
Metalox-P2 / Elaston-W80 White	0 Hrs	100.0
	1000 Hrs	0.7



<https://liquimix.com/Elaston-W80>

Technical Report

QUV Accelerated Weather Testing

Tufflon-P80 White

System 00015/01 (P80)

The Tufflon-P80 has significantly changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). The Tufflon-P80 colour has gotten darker, yellower and redder visually. The significant shift in colour mainly occurred within the first 250 hours and then became a more stable colour. The gloss has dropped off to matt level.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Tufflon-P80 White	0 Hrs	0.00	0.00	0.00	0.01
	250 Hrs	-10.93	7.25	32.61	35.15
	500 Hrs	-12.97	9.51	31.69	35.54
	750 Hrs	-13.19	9.75	29.88	34.08
	1000 Hrs	-13.86	9.92	26.58	31.57

System	QUV Hours	Gloss
Tufflon-P80 White	0 Hrs	102
	1000 Hrs	0.1



<https://liquimix.com/Tufflon-P80>

Technical Report

QUV Accelerated Weather Testing

Polytuff-21 White

System 00016/01 (PT21)

The Polytuff-21 has significantly changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). The Polytuff-21 colour has gotten darker, yellower and redder visually. The significant shift in colour mainly occurred within the first 250 hours and then became a more stable colour. The gloss has dropped off to matte level.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Polytuff-21 White	0 Hrs	0.00	0.00	0.00	0.01
	250 Hrs	-16.56	13.90	28.81	36.02
	500 Hrs	-19.13	16.23	25.47	35.75
	750 Hrs	-18.60	15.72	22.52	33.17
	1000 Hrs	-19.16	15.40	18.85	30.98

System	QUV Hours	Gloss
Polytuff-21 White	0 Hrs	27.5
	1000 Hrs	1.9



<https://liquimix.com/polytuff-21>

Technical Report

QUV Accelerated Weather Testing

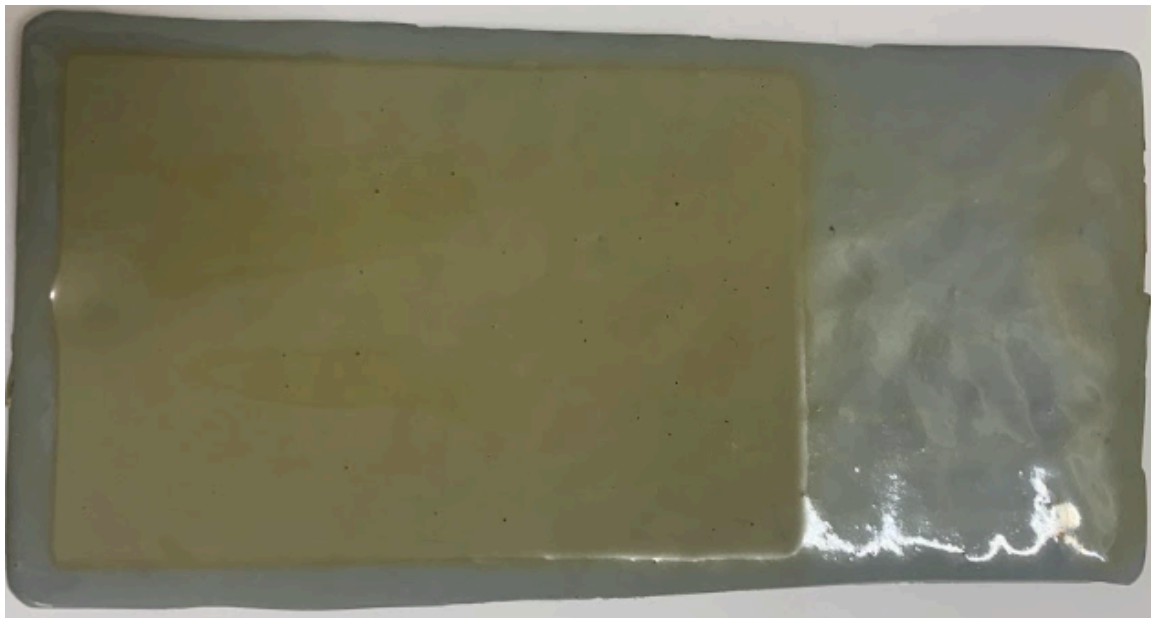
Tufflon-P90 Mid Grey

System 00017/01 (P90)

The Tufflon-P90 has significantly changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). The Tufflon-P90 colour has gotten darker and yellower visually. The significant shift in colour mainly occurred within the first 250 hours and then became a more stable colour. The gloss has dropped off to matte level.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Tufflon-P90 Mid Grey	0 Hrs	0.00	0.01	0.00	0.01
	250 Hrs	-2.97	-0.83	17.42	17.69
	500 Hrs	-3.71	0.00	19.89	20.23
	750 Hrs	-3.66	0.14	19.25	19.59
	1000 Hrs	-3.49	0.36	18.42	18.75

System	QUV Hours	Gloss
Tufflon-P90 Mid Grey	0 Hrs	85.9
	1000 Hrs	0.4



<https://liquimix.com/Tufflon-P90>

Technical Report

QUV Accelerated Weather Testing

Hybron-H90 Yellow

System 00018/01 (H90)

The Hybron-H90 has changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). The Hybron-H90 colour has darkened visually (Not a huge colour change for an aromatic hybrid). The shift in colour mainly occurred within the first 250 hours and then became a more stable colour. The gloss has dropped off to matte level.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Hybron-H90 Yellow	0 Hrs	-0.01	0.00	-0.02	0.02
	250 Hrs	-6.15	5.25	2.00	8.33
	500 Hrs	-7.00	5.39	-7.30	11.46
	750 Hrs	-8.29	6.07	-1.90	10.45
	1000 Hrs	-8.29	6.06	-1.90	10.45

System	QUV Hours	Gloss
Hybron-H90 Yellow	0 Hrs	78.0
	1000 Hrs	1.0



<https://liquimix.com/hybron-h90>

Technical Report

QUV Accelerated Weather Testing

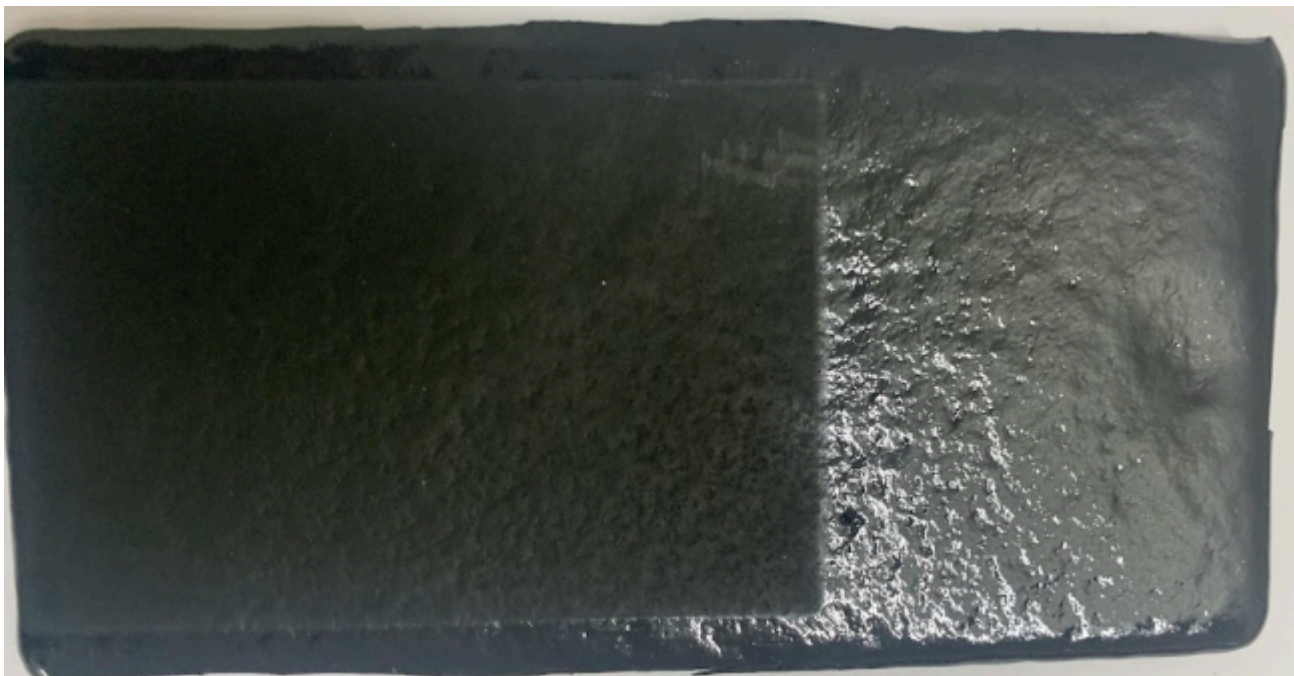
Hybron-W90 Black

System 00019/01 (W90)

Hybron-W90 has not visually changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). However, the spectrophotometer has detected a darkening of the Hybron-W90 colour. The shift in colour can not be detected visually, but the loss of gloss is very noticeable. The gloss has dropped to a matte level.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Hybron-W90 Black	0 Hrs	0.01	-0.03	-0.02	0.04
	250 Hrs	-0.02	0.04	1.27	1.27
	500 Hrs	-1.24	-0.09	1.12	1.67
	750 Hrs	-3.84	-0.19	1.10	4.00
	1000 Hrs	-7.03	-0.12	2.81	7.57

System	QUV Hours	Gloss
Hybron-W90 Black	0 Hrs	35.3
	1000 Hrs	1.0



<https://liquimix.com/hybron-h90>

Technical Report

QUV Accelerated Weather Testing

Tufflon-D60 Black

System 00020/01 (D60)

Tufflon-D60 has not visually changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). However, the spectrophotometer has detected a darkening of the Tufflon-D60 colour. The shift in colour can not be detected visually, but the loss of gloss is very noticeable. The gloss has dropped to a matte level.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Tufflon-D60 Black	0 Hrs	0.02	-0.01	-0.02	0.04
	250 Hrs	1.72	-0.06	0.36	1.75
	500 Hrs	1.85	0.10	0.63	1.96
	750 Hrs	1.02	0.14	0.61	1.20
	1000 Hrs	0.52	0.10	0.54	0.75

System	QUV Hours	Gloss
Tufflon-D60	0 Hrs	95
	1000 Hrs	10.5



<https://liquimix.com/Tufflon-D60>

Technical Report

QUV Accelerated Weather Testing

Conclusion

The following conclusions are drawn from the above results.

- All aromatic polyurea, hybrid and polyurethane will change colour. The lighter the colour, the greater the yellowing. Yellow and black have significantly less colour change.
- All aromatic polyurea, hybrid and polyurethane will lose their gloss and chalk. The low gloss is consistent and looks good.
- The colour change for aromatic polyurea, hybrid and polyurethane occurs early after exposure to UV and then becomes more consistent after the initial colour change.
- None of the samples experienced high levels of DFT loss.



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