Technical Report

QUV Accelerated Weather Testing

TR-0002302-8 | QUV Accelerated Weathering Performance Testing	**Date:** 21 December 2023
Assessment of Actflex 929 Grey and Actflex Ultra FC Mid Grey	**Document Number:** TR-0002302-8

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
Actflex Ultra FC	1000 Hrs	-0.83	0.00	-0.06	0.83	No colour change Visually
Actflex 929 / Ultra FC (24 Hrs)	1000 Hrs	-0.44	-0.07	-0.06	0.45	No colour change Visually
Actflex 929	1000 Hrs	26.15	0.24	2.16	26.25	Change to white - chalky

The following conclusion is drawn from the results.

- Actflex Ultra FC Mid Grey Polyaspartic topcoat has had no visual change in colour or gloss
- Actflex 929 Grey is a moisture cure polyurethane that changes colour and chalks after 1000 hours of QUV accelerated weathering (ASTM D154 Cycle 1).
- None of the samples experienced high levels of DFT loss.

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Introduction

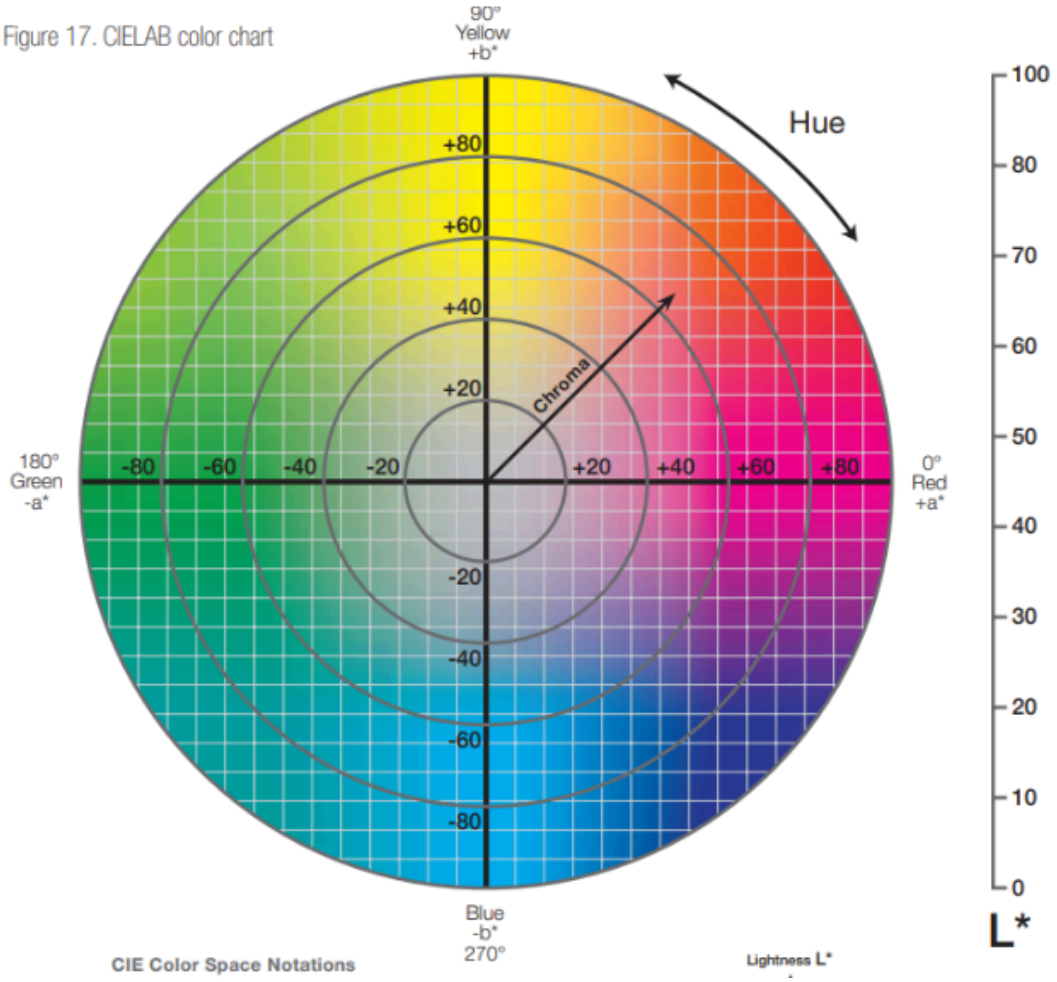
This technical report assesses the colour change, gloss change, and DFT loss after 1000 hours of accelerated weathering to ASTM D154 Cycle 1. The QUV testing assesses Actflex 929 Grey and Actflex Ultra FC Mid Grey.

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.

Figure 17. CIELAB color chart



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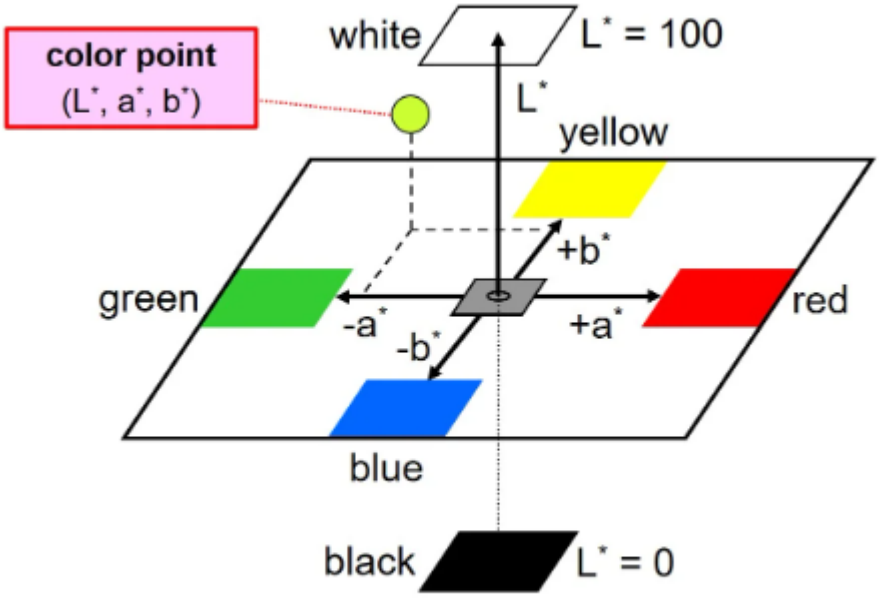
CIELAB is a three-dimensional system that triangulates and precisely defines any colour point. The initial colours of all the samples are scanned to create the standard reference. The samples are rescanned after weathering (250, 500, 750, and 1000 Hours of weathering in the QUV) to determine the changes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

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Panel Preparation

System 0006/01 (Actflex Ultra FC Mid Grey)

Actflex Ultra FC Mid Grey	100µm DFT	

System 0007/01 (Actflex 929 Grey/Actflex Ultra FC Mid Grey/24 Hours)

Actflex 929 Grey	500µm DFT	24 Hour recoat
Actflex Ultra FC Mid Grey	100µm DFT	

System 0008/01 (Actflex 929 Grey)

Actflex 929 Grey	500µm DFT	

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Results

Actflex Ultra FC Mid Grey

System 0006/01 (Actflex Ultra FC Mid grey)

Actflex Ultra FC Mid Grey has not visually changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). The Spectrophotometer has detected a darkening of the colour however, at this point, it can not be detected visually. The gloss and dry film thickness have not significantly changed.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Actflex Ultra FC Mid Grey	0 Hrs	0.00	-0.01	0.00	0.01
	250 Hrs	-0.41	0.01	0.02	0.41
	500 Hrs	-0.55	-0.07	-0.03	0.55
	750 Hrs	-0.54	-0.02	-0.06	0.55
	1000 Hrs	-0.83	0.00	-0.06	0.83

System	QUV Hours	Gloss
Actflex Ultra FC Mid Grey	0 Hrs	95.8
	1000 Hrs	95.2

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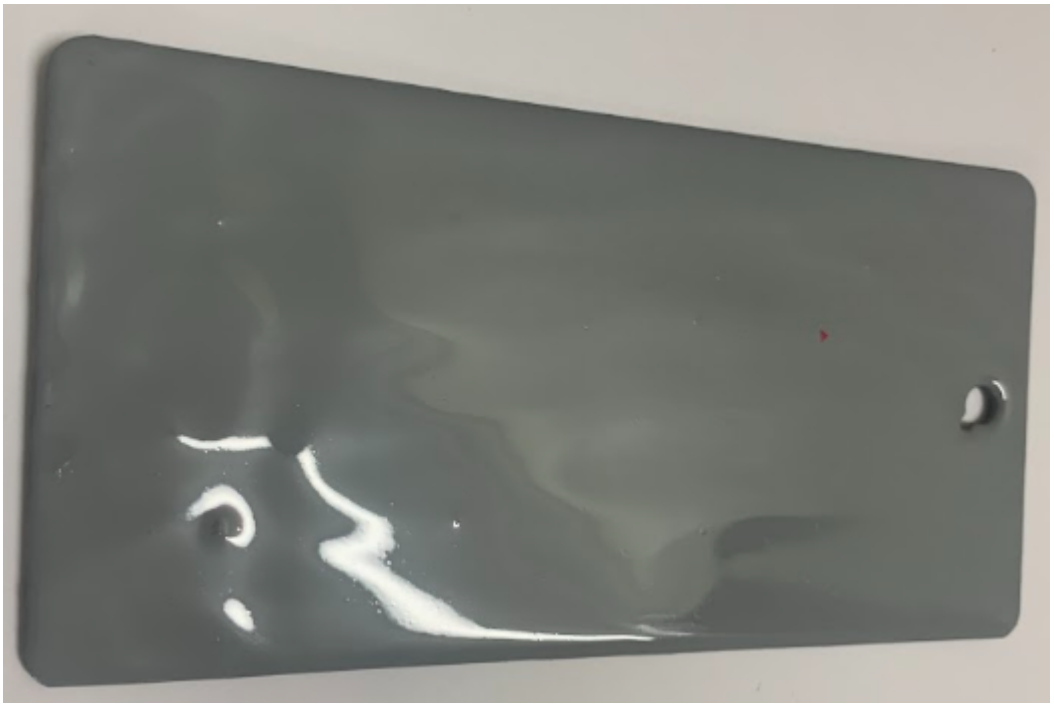
Actflex 929 Grey / Actflex Ultra FC Mid Grey - 24 Hours Recoat

System 0007/01 (Actflex 929 Grey /Actflex Ultra FC Mid Grey/24 Hrs)

Actflex Ultra FC has not visually changed colour after 1000 hours of weathering (ASTM D154 Cycle 1). The Spectrophotometer has detected a darkening of the colour however, at this point, it can not be detected visually. The gloss and dry film thickness have not significantly changed.

System	QUV Hours	dL*(D65)	da*(D65)	db*(D65)	dE*ab(D65)
Actflex 929 Grey / Actflex Ultra FC Mid Grey (Recoat 24 Hrs)	0 Hrs	0.01	0.00	0.00	0.01
	250 Hrs	-0.29	0.02	0.04	0.30
	500 Hrs	-0.49	-0.05	0.01	0.49
	750 Hrs	-0.49	-0.01	-0.06	0.49
	1000 Hrs	-0.44	-0.07	-0.06	0.45

System	QUV Hours	Gloss
Actflex 929 Grey / Actflex Ultra FC Mid Grey	0 Hrs	95.4
	1000 Hrs	95.1



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Actflex 929 Grey

System 0008/01 (Actflex 929 Grey)

The Actflex 929 Grey has significantly changed colour after 1000 hours of QUV accelerated weathering (ASTM D154 Cycle 1). The grey colour is visually lightened and has a chalk appearance on the surface. The spectrophotometer detected the colour changing to a lighter colour. The significant shift to a lighter colour 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)
Actflex 929 Grey	0 Hrs	-0.01	0.00	0.00	0.02
	250 Hrs	21.44	-0.39	2.94	21.65
	500 Hrs	25.85	0.14	2.18	25.94
	750 Hrs	25.99	0.19	2.20	26.09
	1000 Hrs	26.15	0.24	2.16	26.25

System	QUV Hours	Gloss
Actflex 929 Grey	0 Hrs	27.0
	1000 Hrs	1.0

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Conclusion

The following conclusions are drawn from the above results.

- Actflex Ultra FC Mid Grey Polyaspartic topcoat has had no visual change in colour or gloss
- Actflex 929 Grey is a moisture cure polyurethane that changed colour and chalked after 1000 hours of QUV accelerated weathering (ASTM D154 Cycle 1).
- None of the samples experienced high levels of DFT loss.

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