Summary

- At 40C (and based on previous testing at 50C also) – no movement or flow after 280 hours
- After 65 & 280 hours at 80C some wrinkling and perhaps slight flow noted – not conclusive but likely
- At 100C some wrinkling and definite flow of PIB only materials, downwards under gravity.
- This downward flow does however apparently cease after ca 25% of material has moved & somewhere around 60 hour mark
- For finished and laminated PIB samples NO FLOW / MOVEMENT detected at 100C. Appear less likely to move – presumed a function of the mesh but unknown as of today.
- It appears that cold flow is NOT therefore occurring due to Mativ products in 'normal' conditions

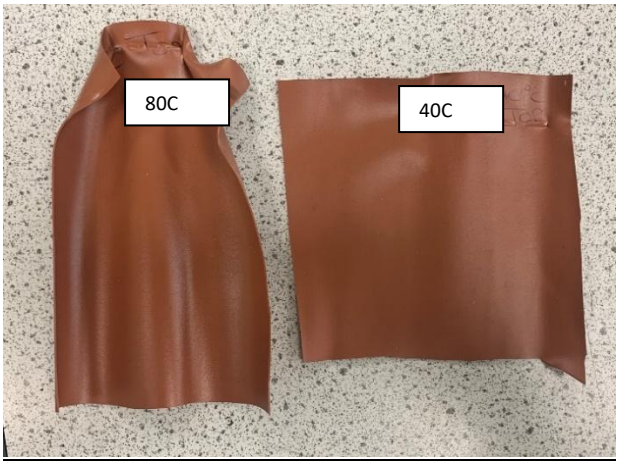
New Ageing Work

In this test, the materials were hung at 180° at the required temperature
They were then 'aged' and tested over the period of time referred to.

Sample suspended under its own weight

Measurements completed over length of sample 1-6

Appearance Post Temp exposure



Note the contraction / folding over shown by the sample exposed to higher temps

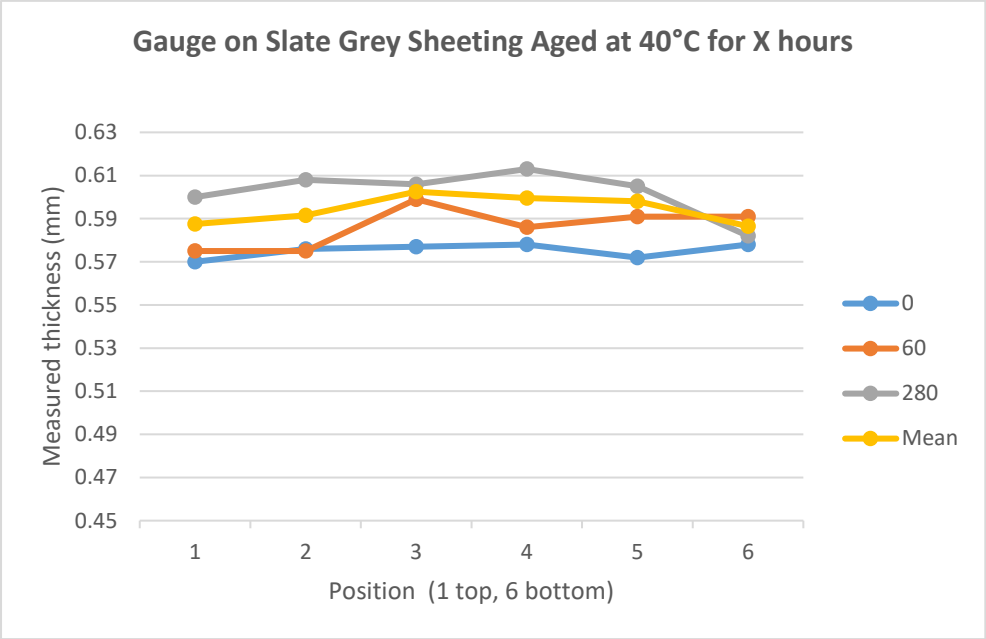
100C is similar to 80C above in appearance

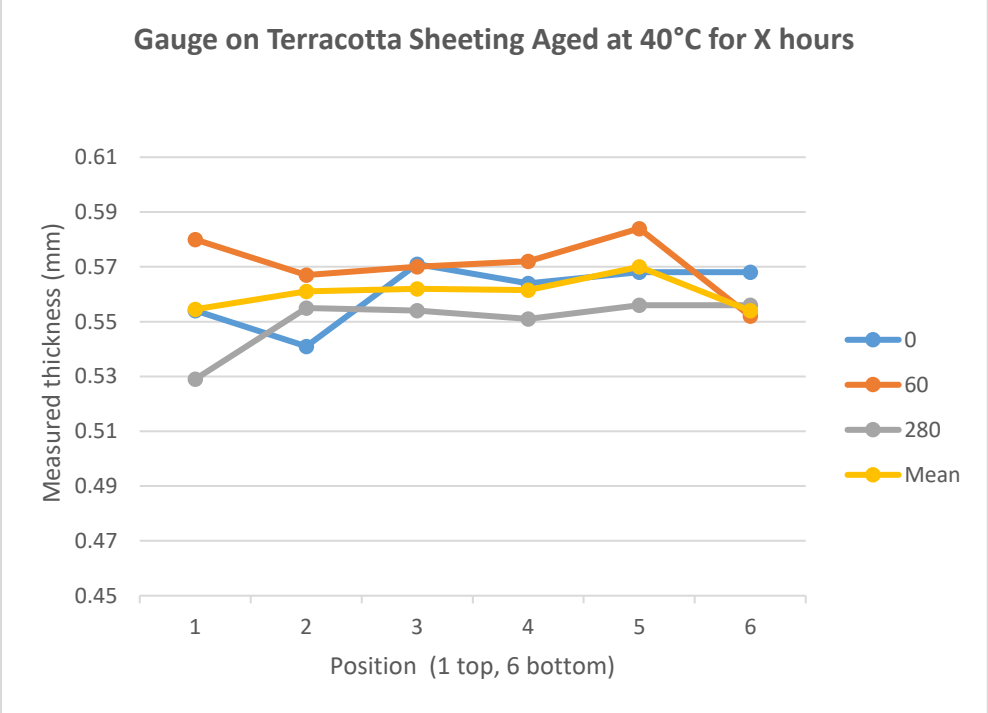
Data:

X & Y scales have been kept constant to show variation changes and trends over time / temp exposure
Profile of Terracotta & Slate grey samples measured at 3 points (0, 60 and 280 hour's exposure)

40°C

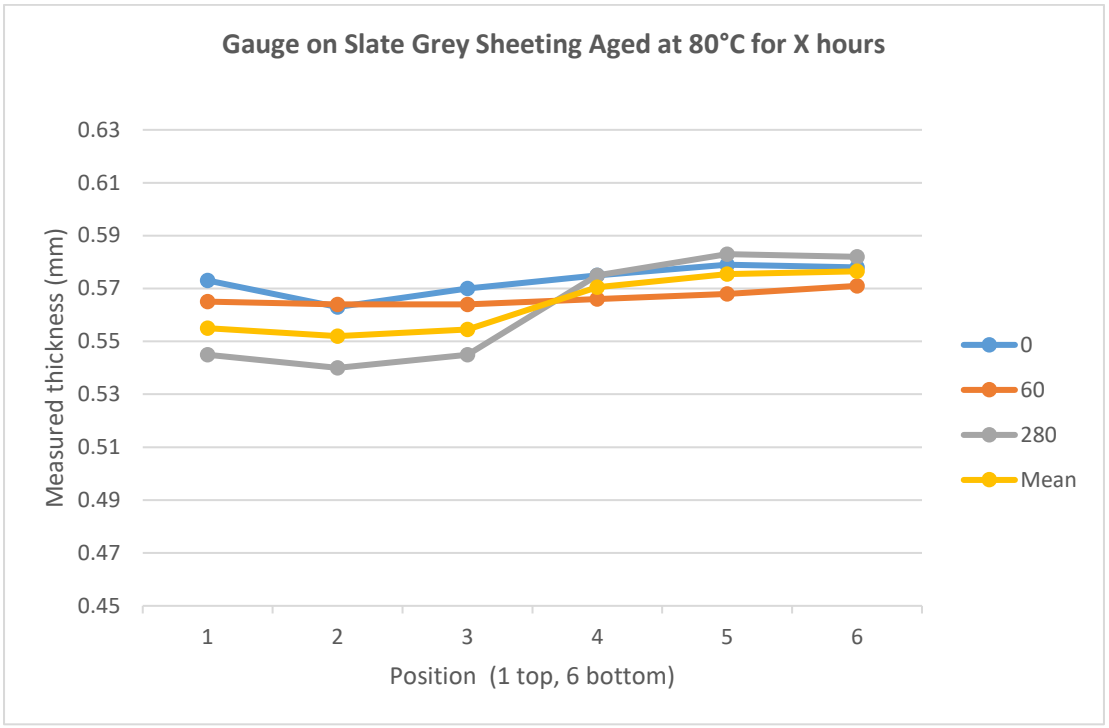
- No shifts in thickness – no flow noted. As per 50C measured and shown earlier in the development process
- No cracking or deformation of the sheeting, no colour change noted

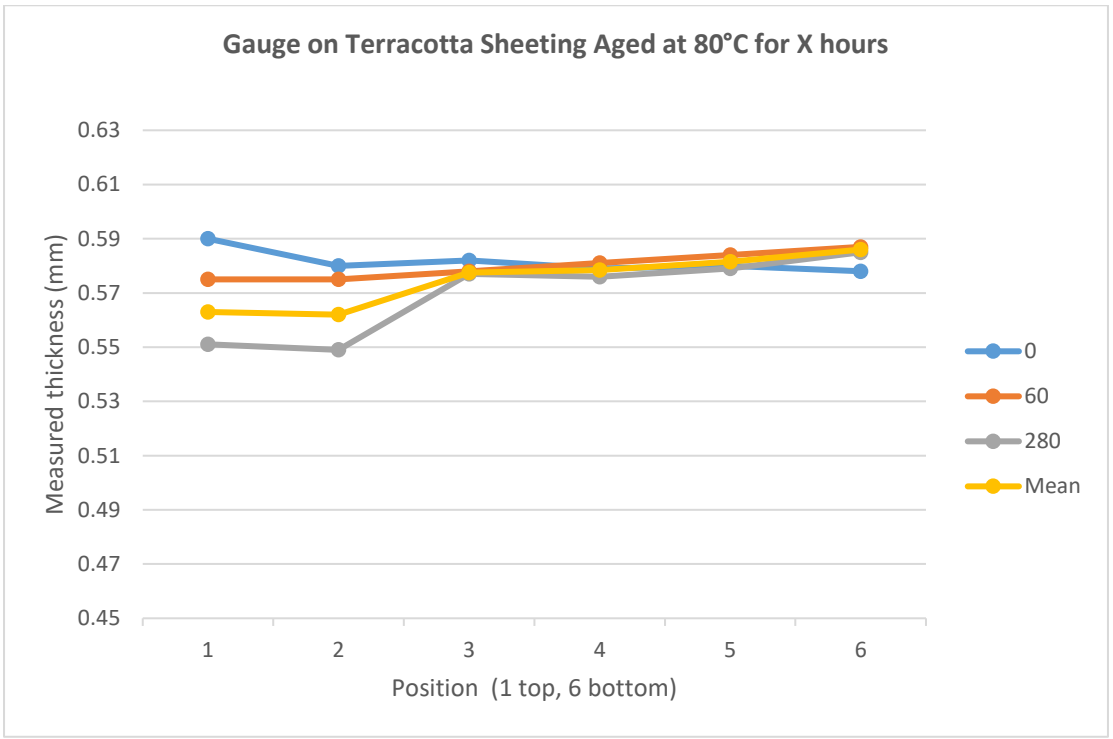


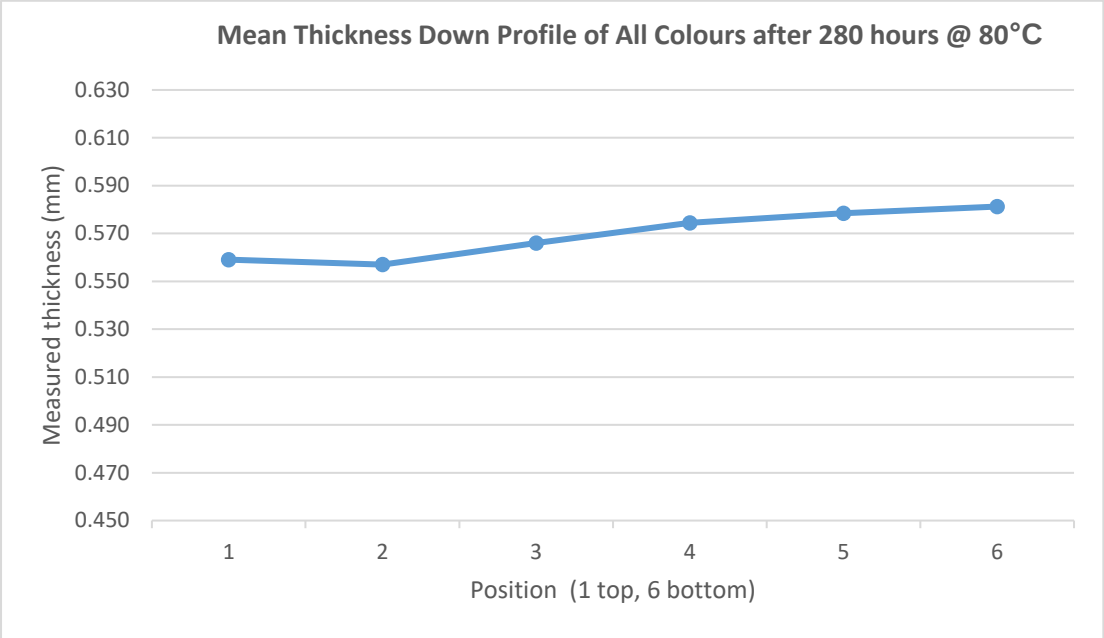


80°C

- Some evidence of flow, if all colour data considered together – although any overall trend is very small, it is probably existent (fig 5 below) – increase of approx. 0.02mm or 3.5% of gauge downwards over length of material assessed



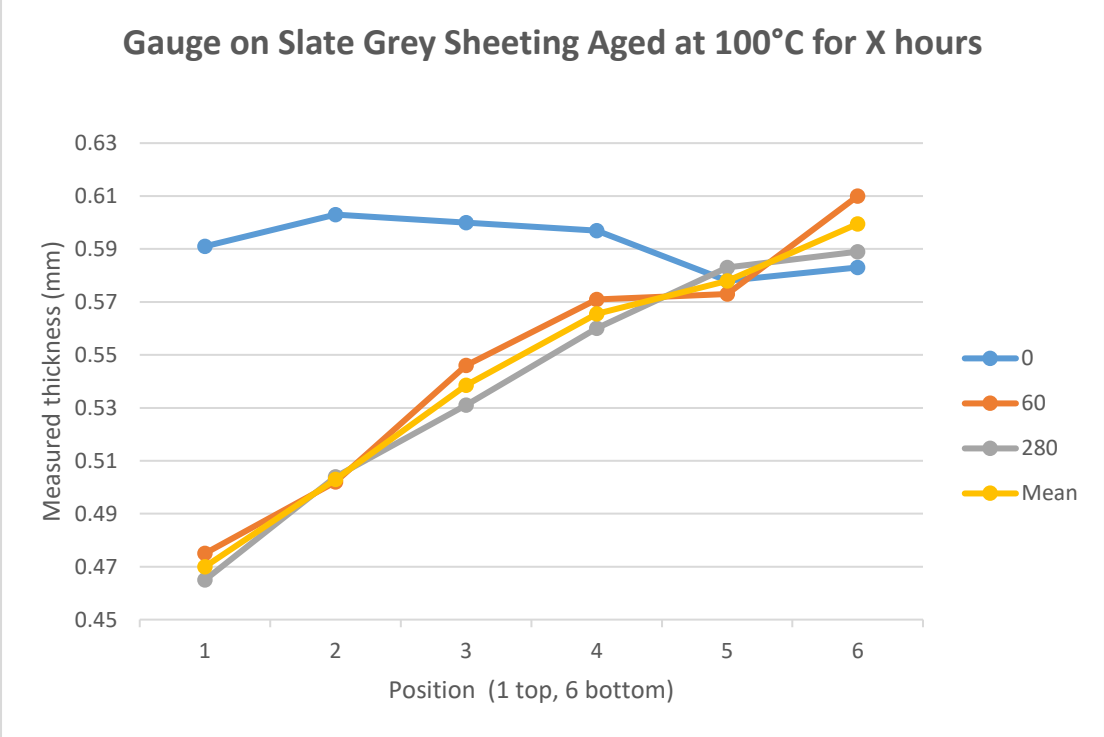




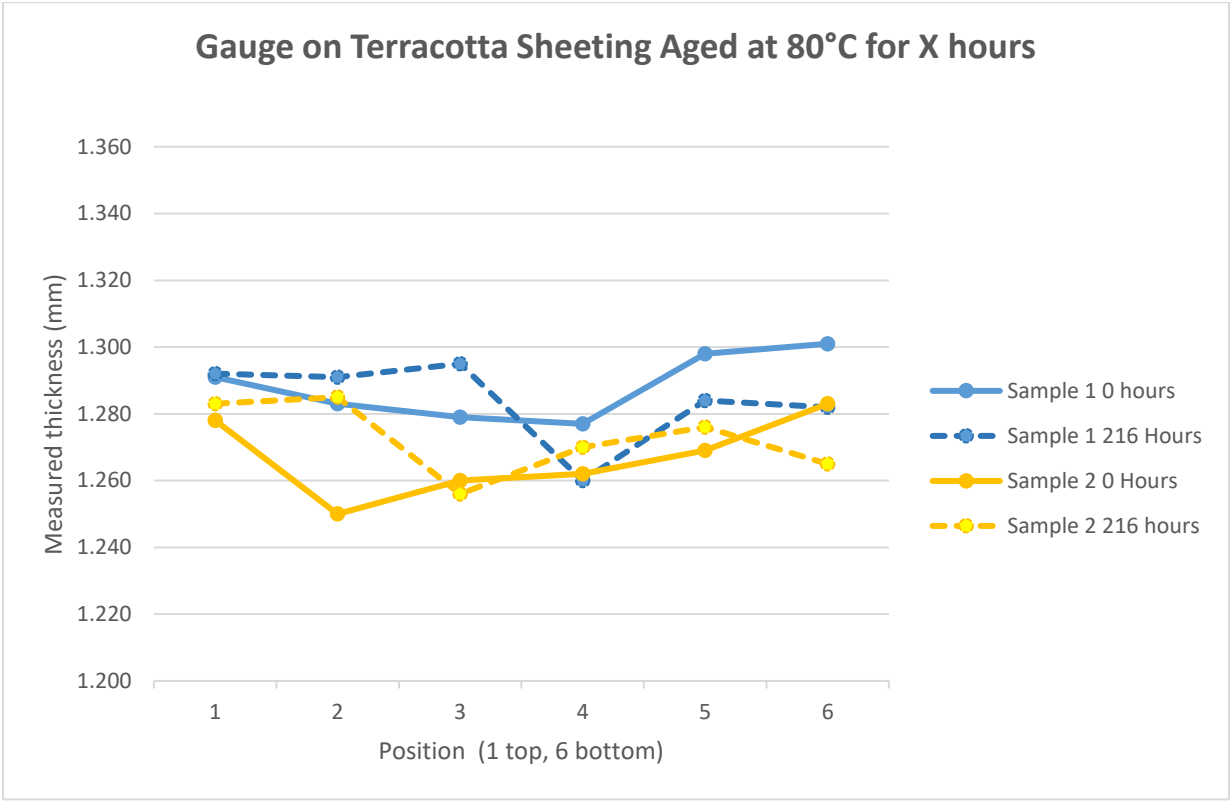
(fig 5)

100°C

- Flow occurs in first 60 hours…however rate appears to tail off after that and flow ceases.



Note how the profile is the same for 60 hours as 280 hours.
Also note though a 'flow' of around 0.15mm over the time observed…*ca* 25% of the original thickness



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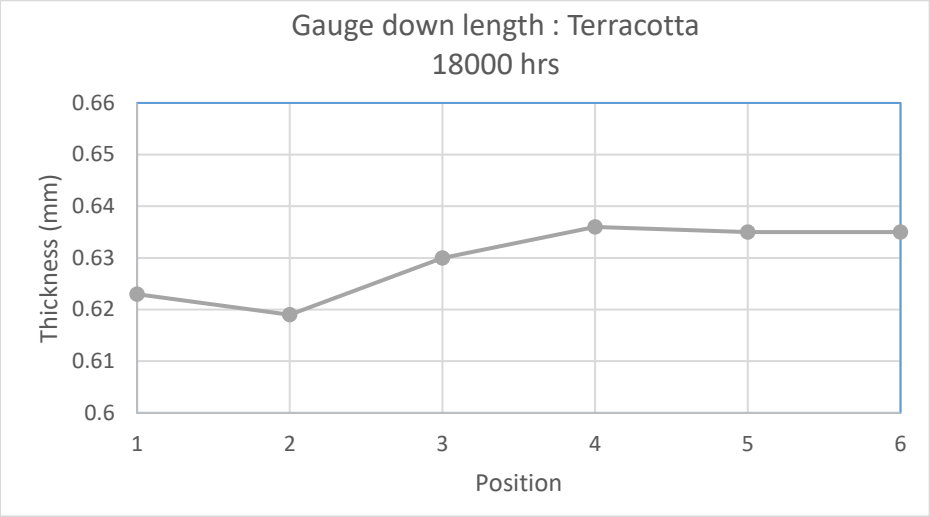
G.Henstock
R&D Manager
18/10/23

Appendix 1: 18000-hour Final test Update

The above testing is (roughly) equal to 24+ years on an 8hr cycle for UV @ 50C and a 2hr cycle of water
All samples are now used up.

For Terracotta PIB

18000Hrs



No evidence therefore for flow over a 24-year equivalent period

Ageing	Tensile Strength (N/cm) Scapa test method as per CoA	Spec (N/cm)	Elongation (%)	Spec (%)
Unaged	4.5	>2.1	520	>400
5500 Hours	2.7	>1.1	570	n/a
18000 Hours	2.4	>1.1	550	n/a

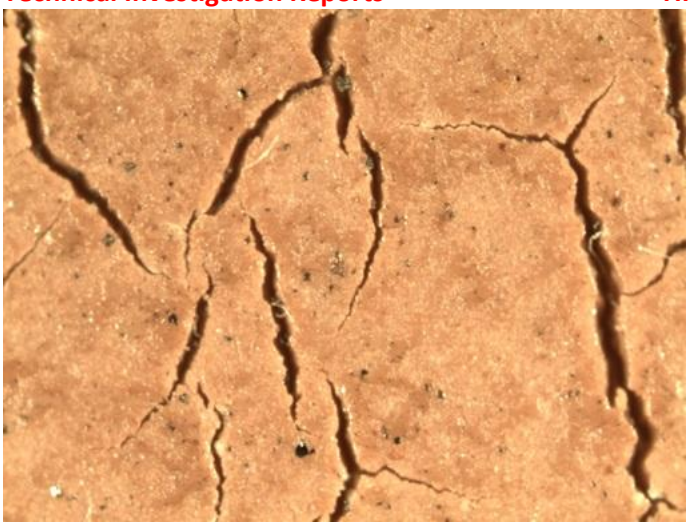
A further slight reduction in strength over the 5500 hours figures but minimal…. appears, as would be intuitive, that the majority of any impact on strength is in the early stages of UV ageing.

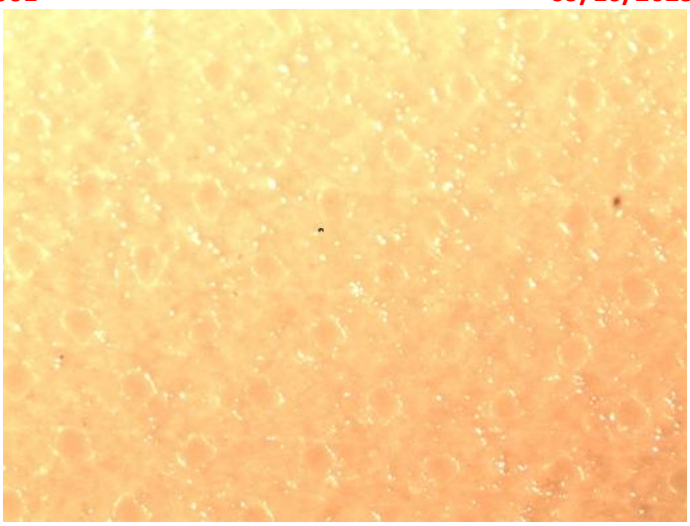
Visual Appearance

There are some surface cracks and slight discoloration as would be expected after 24 years in UV HOWEVER none of the cracks are beyond superficial and the unexposed side is completely unaffected.

Microscopy Image both at same magnification (10x):

18000 Hours Exposed side Virgin Terracotta





18000 Hours sample - Both taken no magnification on standard phone camera.

Front (UV Exposed)

Reverse (Not exposed) same sample

Some cracks and discolouration (as seen on 10x magnification photo above) but the colour change is largely felt to be continued application of water leading to dirt build up.
Reverse side remains PRISTINE. Zero Water penetration possible. Zero discolouration. The LDPE film on the back was indeed as per original and easily peeled off the reverse of the sample.
No ageing impacts therefore noted through the whole sample thickness – surface effect only

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G.Henstock
02/08/24