

Advantages of laminate versus capstock

What is a laminate and how is it different from capstock?

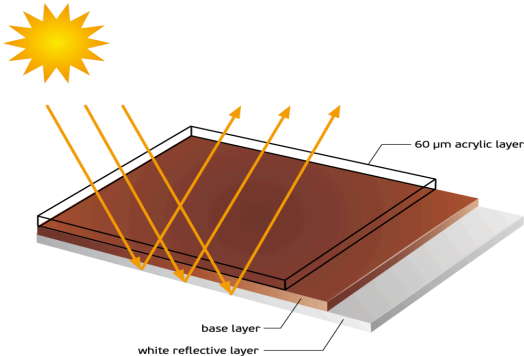
skai Cool Color Plus is a multilayer construction with the top layer being a transparent high-grade weather resistant PMMA (Polymethyl methacrylate) overlay with a thickness of $> 2 \frac{1}{3}$ mil (60 micron).

This PMMA overlay laminate ensures to a vast extend the extraordinary weathering resistance and color stability of the laminate.

The construction is followed with a pigmented vinyl center layer, which is pigmented in the respective color and with the unique Cool Color IR reflective pigments, a patented technology.

The final layer of the laminate is a highly pigmented full IR reflective vinyl bottom layer laminate.

The several layers together result in a final thickness of the laminate of about 9-10 mil (220 – 250 micron) depending upon ticking/embossing.



This is also one of the decisive features of the laminate and why it outperforms capstock, because due to its multifunctional layers it achieves the highest Heat Build Up reduction and offers thanks to the different embossing's also a very high scratch resistance.

Thanks to the bottom vinyl layer of the skai laminates by Continental it achieves a perfect bond to the substrate, especially onto vinyl, but also many other substrates.

Its semirigid formulation makes it very easy to adapt and wrap around even the most challenging shapes without the risk of a memory effect.

Weathering resistance and performance

skai Cool Color Plus laminates have gone through more than a total of 35 years of real time weather testing at independent and professional test facilities in many world climates, including Arizona, Florida, Australia, and several more locations.

They have also gone through thousands of hours of accelerated weather testing in reference the severest industry tests requirements.

The skai Cool Color Plus laminates surpass the North American AAMA specifications, as well as the more restricted European RAL specifications.

In the accelerated weathering Xenon-Arc test, they regularly **exceed the 20.000 hours mark and still fulfill color hold guidelines** (detailed information is available per color), which surpasses the AAMA testing standards significantly and besides its excellent fading resistance and color stability it will also withstand chipping, cracking and whitening.

skai exterior laminates are being used now since more than 35 years on a global scale, and they perform since then excellently, therefore their quality is backed with an up to **10-year non-prorated, limitless transferable, full replacement warranty in North America** (*the warranty is stated in a separate document*)

And as the performance is already documented since more than 35 years out in the global market - the life expectancy is by far longer

skai Cool Color Plus laminates have stood up to each climate, extreme heat and cold, and all forms of testing with proven strength and excellent weather resistance.

Capstock, after years of weathering, tends to whiten / chalk, which means that in a worst-case scenario one can end up with a fenestration product with an inhomogeneous appearance depending upon the intensity of sun exposure onto the different parts.

Heat Build Up reduction

Staying “cool” and reducing the risk of deformation and dilatation is a crucial component for the successful performance of a window, even in the severest climates, this is where the skai Cool Color Plus laminates are the product of choice to achieve the highest performing level.

The skai Cool Color Plus laminates are engineered with the patented Cool Color Pigment technology which reflect up to 80% of the NIR radiation (Near Infrared) and therefore as a result keeps the laminate and the window beneath up to 30 degree Fahrenheit cooler than any other Non Cool Color surface and as a result of this achieves the lowest Heat Build Up in the market.

This performance is tested and proven in reference to the ASTM standards and used to be measured regarding the ASTM D4803 but nowadays the **TSR value** is the measurement of choice as it is more precise and also comparable between finishes.

The skai Cool Color Plus laminates achieve the highest TSR values and Heat Build Up reduction in comparison to other finishes.

We offer our customer and potential customers to measure the TSR value of their current surface finish and benchmark it against our laminates in our TSR measuring equipment and provide a comprehensive test report.

Maintenance friendly

skai Cool Color Plus laminates have an excellent resistance to normal dirt and environmental pollutants and are very easy to clean and maintain.

If the product does need to be cleaned it can be done with simple household cleaners – or often with just a damp cloth.

And even if there are more severe contaminations or surface blemishes, there are endorsed cleaners that will remove them without harm.

Surface Finish

The embossed finish of skai Cool Color Plus laminates is not only an aesthetical feature but also a decisive technical advantage.

The various embossing of the laminates give the surface a very rich look and finish. Besides the currently very popular stipple emboss finish for solid colors, there are also numerous other embossing available, such as the classic wood ticking or a brushed finished for the metallic commercial Metbrush designs.

The embossing also lends the finish a much stronger scratch resistance. This superior scratch resistance prevails through the life of the product. From the point the window frame is laminated, assembled, warehoused, transported, installed and then for the life of the product at the installation site.

Touch Up in case of damage through installation or by the user is very easy and if made correctly nearly invisible and weathers very similar to the laminate itself.

Capstock does not offer a variation in embossing, and is usually in a smooth flat finish, hence they are significantly more sensitive to scratching and marring, and field repair (touch up) on a capstock surface is significantly more difficult and in the majority of the cases still very visible.

Some of the disadvantages of capstock regarding surface finish are:

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| <i>Die Lines</i> | <i>- Longitudinal depression or protrusion visible on the top of the capstocked profile</i> |
| <i>Gouge</i> | <i>- Small pit marks on the surface of the capstocked profile</i> |
| <i>Dull Surface</i> | <i>- Lack of consistency of same level of gloss across all sections of a capstocked profile</i> |
| <i>Orange Peel</i> | <i>- Irregular surface reassembling the peel of an orange</i> |
| <i>Scuff marks</i> | <i>- due to its flat surface it scuffs easily, and these scuffs streaks are very challenging or even not able to be removed</i> |

Color / Design portfolio and cost efficiency / flexibility (MTO)

The entire global stock program of the skai Cool Color and Cool Color Plus laminates offers more than 150 different colors and designs of laminates.

Laminates, due to their extensive variety stock colors and designs offer an excellent portfolio of color choices and quick color changes thanks to the profile lamination process, which gives the profile extruder and / or window manufacturers the advantage to adjust fast and efficiently to individual custom orders (MTO) and JIT deliveries by maintaining a low inventory at the same time.

Capstock on the contrary has a significant initial investment for the special extrusion dies, and as it is a continuous inline process during extrusion, color and shape changeovers take a long time, the production is therefore usually in high quantities which demands a long pre planning and leads to a significant inventory of finished material, which is a significant cost factor (cashflow / binded capital)

This in conjunction with the higher scrap rate during capstock extrusion and slower extrusion speed (about 20% slower than a standard extrusion run without capstock) and a shorter lifetime of the extrusion dies leads usually to a higher overall cost than laminate.