



## Thermal toughening with ARTISTA®

“Thermal toughening of fused glass panes” has been a subject of great interest to users for some time.

For this reason, SCHOTT has been working with professional toughening companies for some time with regard to performing tests. Initially, at least, these efforts did not meet with success. Quite frequently the panes burst as soon as they were placed into the toughening furnace.

In cases where they were able to withstand this initial shock without experiencing damage, many of them then fell prey to the conditions inside the cooling station, however. Finally, the sheets that had stood up to the toughening process basically exploded, when they were placed on the glass rack.

Every possible theory on how the design could be manipulated to help withstand toughening was refuted later during actual practice.

Finally, the breakthrough was made during a series of tests on applications that involved ARTISTA® Glass Frits. The stability that was achieved with the panes and the breakage results were extremely convincing!

Apparently, the thin layer of color on top of the cover glass that results from the frits does not differ as much from the clear glass environment, with regard to its thermal characteristics, as a 3 mm thick color glass would.

As a result, several ARTISTA® Thin Glasses that would allow for this type of testing to continue were produced at the next possible occasion.

Blue squares were fully fused with 6 mm thick panes of ARTISTA®. Following the appropriate processing of the edges, they were thermally toughened. All of the values that were obtained on nominal bending strength were significantly higher than those called for by the respective norms that apply to toughened safety glass.



The presumption that the key to success lies in the thickness of the colored glass layer was, thus, confirmed.



## Recommendations on the application

As described above, certain rules must be adhered to in order to successfully achieve toughening of fused ARTISTA® panes:

- The thickness of the colored layer should not exceed 1.8 mm. This means that overlapping of thin glasses is not permitted!
- The surface of the fused area should be prepared in a “fully fused” manner.
- When using thin glasses, the surface area should be selected in such a way that the formation of larger bubbles can be ruled out completely. (In our initial tests, no bubbles were observed under squares with edges 5 cm in length). For this reason, linear applications do not pose any difficulties.
- Bubbles may result, even when frits are used. For this reason, we recommend that the grain sizes “medium” and “course” should be used in one single layer.
- The temperatures inside the toughening furnace should be set 20 to 25°C lower than with float glass

The materials that are included in the ARTISTA® product line and can be used to make thermally toughened panes are:

- Clear glass in sheets (color number 0189) in thicknesses of 6, 8, 10 or 12 mm
- Thin glasses that are 1.65 mm thick +/-0,15 and are available in 10 different colors\*
- Glass Frits in 28 colors and 4 different grain sizes



ARTISTA® Frits



ARTISTA® Thin Glass

\* The thin glasses Orange 8047 and Red 8110 just take on their final color after the fusing process!

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