

## YACHT STANDARD and FORMGLAS SPEZIAL® FAMILY

Often used within our industry, the term ‘YACHT STANDARD’ relates to materials and designs for super yachts, but has no defined specification. Terms like ‘superyacht’ standard and ‘megayacht’ standard are used without meaning. At Tilse GmbH, we think that ‘yacht standard’ should stand for the highest possible quality. This quality level must be applied in throughout the design, materials selection and manufacturing processes.

With the product family *FORMGLAS SPEZIAL*® we have achieved this quality, and continue to re-examine it again every day. *FORMGLAS SPEZIAL*® products were especially designed for super yachts to achieve these levels of highest possible quality.

At the materials selection stage, at Tilse GmbH, we choose the float glass with the highest possible optic, and plane parallelism and free from all possible imperfections. Cutting and grinding of the edges are done with highest precision.

All glass panels are produced individually after detailed 3D measurement on board. During manufacture, edge cutting and treatment are achieved with the highest possible precision and fitting accuracy.

The treatment of the edge of a bent glass panel is completed after the bending process, using our highly skilled and experienced craftsmen. Here, it is very important that no offset of the compound glass occurs. For example the visible edges of windshields with inclined installation angle receive a grinding mitre.

After this process the individual panes are completely chemically toughened and are then joined to form the required glass laminate with our special bonding resin.

This resin has been specially developed for both plane and bent glasses not only to achieve a bonded glass laminate free of tension, but also to achieve the highest UV protection for the vessel’s interior (wood, clothes, colours etc.) with an optimal long term temperature resistance, without any yellowing.

The result is a 100% UV absorption up to 361 nm and upon request up to 400 nm can be achieved. No other bonding material can achieve such a UV absorption. Our resin is long term temperature resistant extremes of temperature (up to 100°C down to –40°C). In addition, the resin is humidity resistant, important in the aggressive seawater environment.

After extensive testing we choose this special resin over the more usual PVB foil, as specified by many of our competitors. This resin, without the PVB foil achieves better results and thus offers the best possible protection against UV light.



**TILSE Industrie- und Schiffstechnik GmbH**

Projektierung – Planung – Produktion von FORMGLAS

Sottorfallee 12 - D-22529 Hamburg

Tel:+49 40 561014 Fax:+49 40 563417 E-mail: tilse@tilse.com

Agent:

Compound glass with a PVB foil has a significantly lower temperature resistance (normally up to max. 73°C). Furthermore, the use of a PVB foil, requires manufacture under pressure (eg. Autoclave or Vacuum) and resulting in 'locked in' stress. In general, these locked in stresses, significantly reduce the maximum load that a window panel may carry.

The use of our special resin bonded laminated glass panels is more expensive than a similar panel manufactured with a PVB foil. However this additional expense may be easily offset by the damage to the vessels interior from the additional UV exposure. For example, after a recent refit where the owner had to spend several hundred thousand EURO's for the repair of the interior which was damaged by UV light, the owner decided to replace the windows with Tilse GmbH's *FORMGLAS SPEZIAL*®

Our competitors often imply that we only favour our resin because we cannot offer a PVB foil. In fact for the construction and architecturally applications we do offer PVB as there is no demand for yacht standard.

With our special bonding resin compound we achieve 3 to 5 times higher safety margins, not only under surface pressure tests but also under local impact tests.

The yacht building industry often still uses ESG (single safety glass) or compound glass made out off ESG. ESG panes are thermally toughened and under this process the surface becomes distorted due to the pressure applied during the bending process (waves up to 0,3 mm). This distortion leads to local shading or changes in colour occur which become visible from both sides under sunlight. To us at Tilse GmbH, these types of defects are far from acceptable, and hence we do not supply ESG glass.

Detailed information on our products of the *FORMGLAS SPEZIAL*® family is shown on the respective datasheets.

Hamburg, 03.12.2007

We reserve the right to change and/or update the products without any notice

