



The world
of security glass



Marine Glazing

advanced glazing for safety at sea



GLASS FOR MARINE APPLICATIONS

Glass products manufactured by Hard Glass have been supplied for years in the field of sailing and motor boats.

Several well-known motoryachts are equipped with Hard Glass flat and curved laminated windows, thermally or chemically toughened, also with polycarbonate insert or electrically heating system.

Working closely with shipyards Hard Glass can meet customers' desires while guaranteeing the designers' projects.

The company follows the supply of glazing starting from projects, offering expertise and competence in cooperation with certification offices and designers, planning the right windows suitable for different projects up to the installation of the glass panels on board with qualified personnel.

Flat and curved glass windows for marine applications are laminated glass panels made up of two or more layers of thermally or chemically toughened glass sheet laminated together through different types of interlayers according to projects and rules specifications.

The very long experience in glass bending and lamination processes can satisfy Hard Glass customers with the most complex laminated glass shapes.

Hard Glass transparencies offer the best solution for: high impact resistance performances, lightweight, aesthetic, ballistic performances according to EN1063 classes Br1 to Br6 low spall and no spall.

Main Features:

- CHEMICAL TOUGHENING
- THERMAL TOUGHENING
- XIR ANTI SOLAR FILM
- HEATING ELEMENTS
- CERAMIC PRINTING (solid, fade away)
- WIDE RANGE OF COLOURED INTERLAYERS AND GLASS SHEETS
- EDGE PROTECTION





Hull no. 132 and 133 manufactured by Italian Shipyard CRN Ancona

MULTIFLOAT - THERMALLY OR CHEMICALLY TOUGHENED LAMINATED GLASS

Laminated glass combines characteristics of strength, resilience, and safety with its traditional qualities of transparency, inalterability and duration.

Hard Glass produces MULTIFLOAT in a range of different versions to cover the widest needs of the marine industry. The different types of interlayers adopted permit Multifloat to offer the best performance at the most heavy pressures required from notation societies, reducing thickness and weight of yacht glazing.

MULTIFLOAT produced by HARD GLASS achieves the necessary safety levels because its modular structure permits adaptation to the plans of the installer. The total thickness and composition of the laminate may be selected on the basis of the type and degree of protection required.

BOW GLASS - CURVED LAMINATED SAFETY GLASS

Different type of complex shapes are possible:

CYLINDRICAL with constant radius

CYLINDRICAL LINK with one or more flat parts

CYLINDRICAL linking a number of radiusses

SINOUS and OPPOSITE CURVES

CONICAL (portion of conical surface)

SPHERICAL (portion of spherical dome)

Chemical tempering allows to realize almost any curved shape adding reinforcement to the glass sheets and making these glass panels suitable for all those applications where aesthetic and safety must be accompanied by an excellent mechanical strength.



AB YACHTS 140

LAMINATED GLASS INTERLAYERS

PVB interlayers PVB laminated glass is usually manufactured by combining two or more annealed or heat treated glass sheets bonded with one or more of PVB interlayers and subjected to heat and pressure, in order to ensure perfect adhesion between the constituent elements. If the glass is broken fragments tend to adhere to the PVB interlayer thereby reducing the risk of injury from falling glass and helping to resist further impact or weather damage. PVB membrane has good tenacity performance and when the laminated glass breaks due to violent force, the PVB will absorb large amount of impact energy and disperse it rapidly. Therefore, it is hard to break the laminated glass and the shape of the glass may be maintained even if being broken. Furthermore, personnel inside and outside the buildings will not be hurt by the glass fragment.

SGP interlayer SentryGlas® ionoplast interlayers help create lighter, safer laminated glass that is opening up new levels of performance. For glass that's more than glass Originally created for specialty markets such as high-security glazing and hurricane windows, SentryGlas® ionoplast interlayers now are being specified wherever architects or engineers need a material that can make a difference in glass performance.

DG41® interlayer DG structural interlayer is a tough, resilient film produced from plasticized polyvinyl butyral (PVB). It is designed specifically as an interlayer for applications where increased interlayer rigidity and high glass adhesion are required relative to standard glazing interlayers. DG provides superior structural capacity versus standard PVB interlayers and is designed with ease of processing in mind. DG also offers design flexibility as it is compatible with other coloured pvb interlayers.

POLYCARBONATE CORE Polycarbonate is known as a high-performance plastic technopolymer that offers amazing elasticity, resistance to pressure, and is almost completely unbreakable. Continual research adopted for safer glazing and reduced thickness allows HARD GLASS GUARDIAN sheets to offer the best performances for several application, from architecture to armoured vehicles



Ferretti 700



Santorenzo 78

PRODUCTS AND SERVICES

Development and Design

We offer a full range of advice and technical support during all phases of design and construction of the project, we also develop custom solutions for special requirements.

On-site 3D Measuring and Drawing

Our technicians make the 3D measurements on board with the portable 3D digitizing system .

Production

Acquired experience and sophisticated technologies have enabled **Hard Glass** to specialize in the production of special glazing for different applications such as automotive, architecture, marine, special vehicles, and become a leader in the sector.

The Company's premises in Villafranca Padovana occupy 14,000 square meters, 6,000 of which are dedicated to production. **Hard Glass** is capable of offering its clients a complete range of qualified and innovative products in the widest compositions, shapes and sizes.

Quality assurance

The final inspection of every piece of glass takes place in-house by our qualified staff. Before the glass leaves our premises, each glass panel is inspected.

Testing

All quality and strength tests like impact, strength, hydrostatic and durability tests regarding to International Marine Standards are conducted in Hard Glass in-house testing laboratory.

Classification

we determine glass strength in our in-house research and development through various testing procedures. Our technical department also carries out the classification and certification procedures on your behalf in order to get the approval of glass.

Shipment and Installation

Shipment and installation of the glazing products are essential for every project. We can supply installing team who are specialized in mounting and sealing marine glazing systems according to marine specifications.





Riva 38



Ferretti 450



SANLORENZO 86



MAIORA 36 DP



MCY 96



ADRIASAIL 80



Benetti Andreas L



FERRETTI 780



FERRETTI 850

REFITTING

Hard Glass offers to shipyards and shipowners the possibility to change original glazing. A skilled staff can take original glass shapes and measurements on board, remove old glazing and install new glazing manufactured by the company, granting utmost quality of the new windows.

Glass refitting services are offered both for motoyachts > 24 meters according to ISO 12216 standards and for larger yachts according to International Standards and Registers.





CALORIT - ELECTRICALLY HEATED GLASS PANELS

CALORIT provides the best response that Hard Glass is capable of giving for the satisfaction of all specific requirements, ensuring the greatest visibility under any weather conditions. Heated CALORIT panels are laminated windows made up of two or more sheets of tempered glass with electrically conductive micro-wires (CALORIT F) or electrically-conductive couche (CALORIT C) insert, joined together through pvb interlayers.

CALORIT FEATURES

CALORIT panels can be:

- flat
- bent
- transparent
- tinted
- reflecting glass plates

CALORIT F is a heated panel formed by two or more plates of annealed or toughened glass that contain numerous, fine electric wires that are almost imperceptible to the human eye.

The defogging system inside the laminated glass panel provides perfect transparency and ensures visibility under all weather conditions.

CALORIT F proves very useful in several fields, such as building applications, special transport vehicles, trains, boats and ships, cold store cabs, snow vehicles.

Thanks to the possibility to choose thickness of the glass panel, colour, shape (flat or bent) and electric performances, CALORIT F can be supplied for lots of applications. Our technical staff is at the customer's disposal to develop CALORIT F glass panels that can satisfy any needs according to the applications desired.

The main characteristics of electrically heated glass panels CALORIT C can be summarized as follows:

Laminated toughened glass heated by depositing of electrically-conductive couche. The conductive couche instead of wired net completely avoids any optical distortion due to heating elements.

Current supply: CALORIT C glass panels can be fed within a range from 24 to 440 volts. Heating power (watt/dm²) of the glass panels is granted according to the customer's needs and to the requirements of international standard ISO 3434. Each glass panel is equipped with its own regulation device, which permits to maintain temperatures at the required level and to avoid overheating of the glass surface itself.

Electrically heated glass panels CALORIT C are being supplied to the most important ships built throughout Europe and all over the world.



Grand Princess FINCANTIERI



Emerald Princess FINCANTIERI



Sun-Princess FINCANTIERI



Silver Muse FINCANTIERI



M/V Chenega DEREKTO SHIPYARDS



MSC Seaside FINCANTIERI

TECHNICAL CHARACTERISTICS CALORIT C

Maximum sizes	2400 x 4500 mm
Thicknesses	7 to 50 mm according to sizes
Voltage	da 24 V a 440 V - CC
Power	da 2 W/dm ² a 21 W/dm ²
Glass plates	Annealed, thermally toughened, clear , reflective, coloured
Shape	flat and bent

TECHNICAL CHARACTERISTICS CALORIT F

Maximum sizes	2000 x 3200 mm
Thicknesses	6 to 50 mm according to sizes
Voltage	da 12 V a 220 V - CC
Power	da 1,5 W/dm ² a 5 W/dm ²
Sheets	Float glass, scratch resistant polycarbonate sheets
Glass plates	Annealed, thermally or chemically toughened, clear, reflective, coloured
Shape	flat and curved



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