

MARINE GLASS COATING CATALOGUE

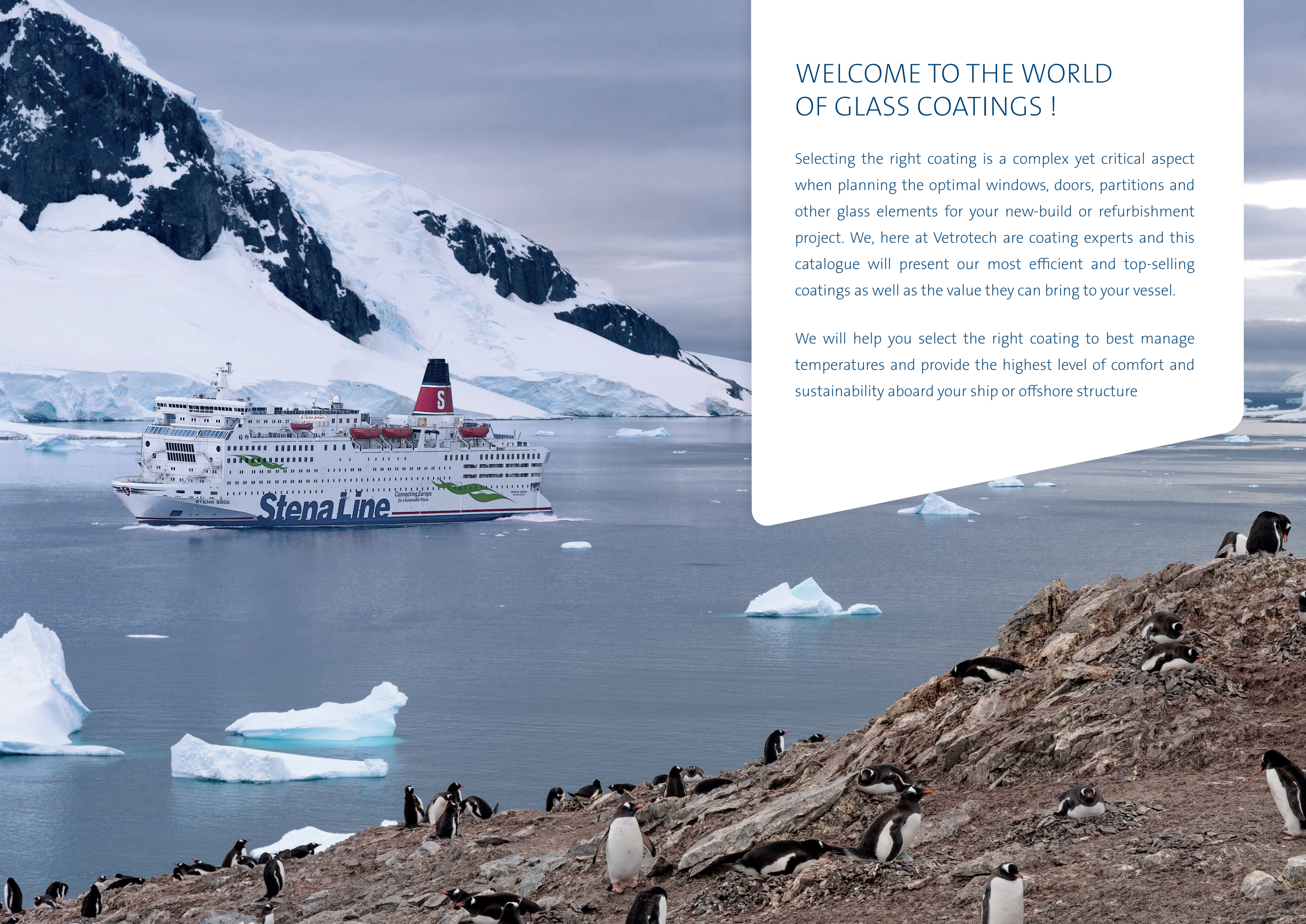
Temperature control for more comfortable
and sustainable vessels



WELCOME TO THE WORLD OF GLASS COATINGS !

Selecting the right coating is a complex yet critical aspect when planning the optimal windows, doors, partitions and other glass elements for your new-build or refurbishment project. We, here at Vetrotech are coating experts and this catalogue will present our most efficient and top-selling coatings as well as the value they can bring to your vessel.

We will help you select the right coating to best manage temperatures and provide the highest level of comfort and sustainability aboard your ship or offshore structure





THE BALANCING ACT

Ample numbers of windows and viewing areas, especially on passenger vessels, are of utmost importance. Having natural light stream onto the ship will help passengers and crew feel more comfortable and can help increase the internal aesthetics of a vessel. It is this natural light that should not be sacrificed in the name of temperature control. Maximizing natural light while minimizing the amount of heat transfer is the name of the game! Selecting the optimal glazing solution will therefore depend on three major factors: light transmittance, U-value and G-factor.

LIGHT TRANSMITTANCE

The benefits of natural light aboard your ship or offshore structure are numerous. Aside from comfort, having the right level of light can also reduce energy consumption and improve productivity and the overall sense of well-being.

There is an easy way to look at the light transmittance values presented with the products in this catalogue. A low transmittance value (in %) indicates a low level of natural light streaming through the glass. This means it will be darker inside. A higher transmittance value indicates higher amounts of natural light aboard your vessel. It is always important to look at this value in relation to the U-value and G-factor.

U-VALUE, HEAT TRANSFER COEFFICIENT

Simply put, the heat transfer coefficient, referred to as the U-value, measures the rate of heat transfer through an element over a given area under standardized conditions. A smaller U-value is better at reducing heat transfer.

There are three ways heat can transfer:

► **Conduction:** Heat transfer through a solid, liquid or gaseous material via molecular contact.

Example: Touching a hot stove

Solution: To reduce conduction in windows, thermal barriers can be added, such as an air space in a double glazed unit.

► **Convection:** The transfer of heat through the movement of liquids or gas.

Example: radiator putting warm air out of the top and pulling cooler air in on the bottom

Solution: To reduce convection in windows, add slow-moving gasses to the air space (i.e. argon) This minimizes the convective currents within the window and reduces the heat transfer rate across the panes.

► **Radiation:** The transfer of heat through space without relying on an intervening medium.

Example: The heat from a campfire warming your body

Solution: To reduce radiation in windows, add coatings that deflect the heat!

The U-value, which can range between 5 (poor) and 0.5 (highly efficient) and can be affected by:

- **Glass make-up:** monolithic, laminated, double or triple glazed units
- **Coating:** non-coated or type of coating
- **Spacer material and size:** standard steel spacer or stainless steel ranging from 6mm to 16mm
- **Cavity filling:** air, argon and krypton gas possible

WE ARE HERE TO HELP!

While the three factors, light transmittance, U-value and G-factor are the main elements to be balanced, other influencing factors include color, reflection and versatility.

No matter your needs, we are here to help. Exact values and the performance of our insulated glazing units can be calculated and offered to you in a data sheet, executed in our certified calculation program CALUMEN III. The sheet provides a summary of values at all times, for you and your customers.

While temperature control is important, we also do not want to sacrifice aesthetic values. Tell us your pain points and we will work with you to find the best solution.

G-FACTOR, SOLAR FACTOR

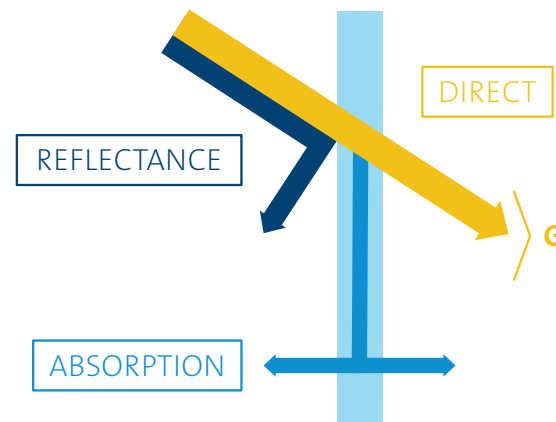
The solar factor, often referred to as the G-factor, is the percentage of total solar radiant heat energy transmitted through glazing. It represents the sum of energy transmitted directly, plus energy absorbed and re-emitted to the interior. The lower the G-value of the glass, the better it will be at reducing heat transfer.

There are three types of radiation in the solar spectrum.

- Rays that can be seen by the naked eye (50%)
- Ultraviolet rays (5%)
- Infrared rays (45%)

Ultraviolet and infrared rays are invisible, but all three emit energy and therefore act as heat sources.

An example: Glass with a G-value of 42% allows 42% of solar radiation heat through the glazed unit. The majority of this 42% is directly transmitted, with a small portion being transferred by the radiant heat absorbed by the glass and emitted into the interior. The remaining 58% is reflected to the outside, either directly or through absorption followed by the re-emission outwards.



► Selectivity:

The term 'selectivity' describes the performance of a solar control glazing to allow visible light to pass through while at the same time preventing solar energy from penetrating the interior.

A glass with a selectivity of 2 lets through twice as much light as energy, e.g. Light transmittance = 60% and G-Value = 0.28, or 28%.

If the ratio is higher than or equal to 2, the glazing unit is considered to have high selectivity; lots of natural light with limited solar heat transfer.

3 MAIN PRODUCT FAMILIES

All products presented in this catalogue are sealed double glazed units. The values (light transmittance, G-factor, U-value, etc.), stem from tests conducted on double glazed units with the following make-up: 6mm glass with a 15mm spacer and a second 6mm glass, sealed together.

The locations for which your ship is set to sail will play a major role in the glass coating selection. We have three product families that address various needs:

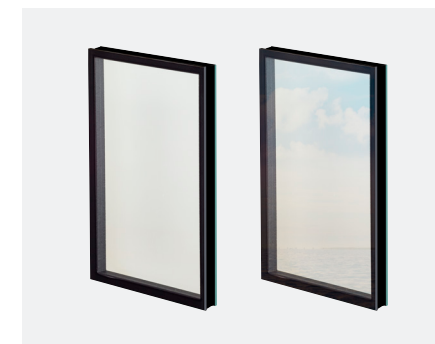
THERMAL INSULATION COATINGS (LOW-E GLASS) CLIMAPLUS PLANITHERM (XN, ONE, ECLAZ)

The main function of thermal insulation glass is to aid in the preservation of the internal climate. For example, these coatings help keep the warm air generated inside a ship from escaping. The same holds true for the cool air produced by HVAC systems. Choosing one of our three main Climapplus Planitherm coatings will help you best manage temperatures on board your vessel.



Climapplus Planitherm ONE

Planitherm ONE is the darkest toned thermal insulation glass, going in the direction of a touch of bronze. It is characterized by a high light transmittance and the best U-Value of the family at 1,0. The darker tone also makes this an interesting coating for sun protection as it produces a lower G-factor.



Climapplus Planitherm XN

Planitherm XN has a 10% higher light transmittance compared to ONE and is noticeably more neutral in color.

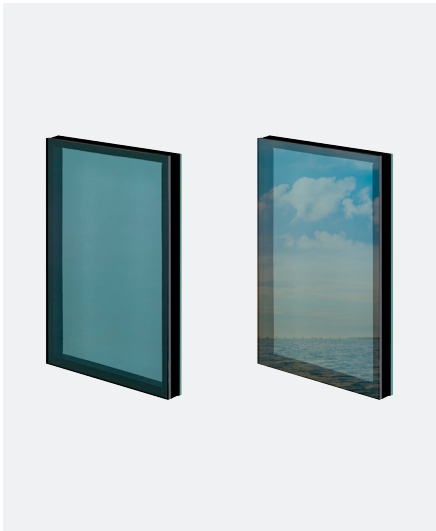


Climapplus Planitherm Eclaz

Planitherm Eclaz is the most color neutral thermal insulation unit from the product family. It also has the highest light transmittance value. When placed next to a DGU without a coating, it is difficult to notice a difference.

SUN PROTECTION COATINGS (CLIMAPLUS KM)

For ships sailing in sunny, hot regions, ample protection from the sun through the use of coatings is a must in order to keep temperatures down and reduce the usage of HVAC systems. With our sun protection product family, thermal insulation is a nice side-effect, however solar gain will be reduced in winter months, blocking out heat that could otherwise help reduce the heating costs on board. Therefore, it is important to understand where the ship will be sailing. Furthermore, these sun protection coatings add some additional aesthetic value as they are darker in color and have higher light reflection values.



Climaplus KM 32/1

KM 32/1 is a dark toned, highly reflective sun protection glass. This is our most effective solar reflective glass (G-factor 17%), which comes at the expense of natural light transmission.

- **Light Transmission:** 19%
- **U-value** = 1,1
- **G-factor** = 17%
- **Reflection outside (R_{le}%):** 32%
- **Reflection inside (R_{le}%):** 26%
- **Outer pane thickness:** 6-10mm



Climaplus KM 33/1

The KM 33/1 coating is the second darkest toned glass in this product family. The grey outer appearance is also highly reflective. The darker tint consequently produces a relatively low G-factor of 28% while letting in 33% natural light.



Climaplus KM 34/1

The KM 34/1 coating is more neutral in color with a hint of light grey tint and casts the smallest amount of light reflection outside. It has an average selectivity value of 1.2, letting in 46% of natural light with a G-factor of 38%.



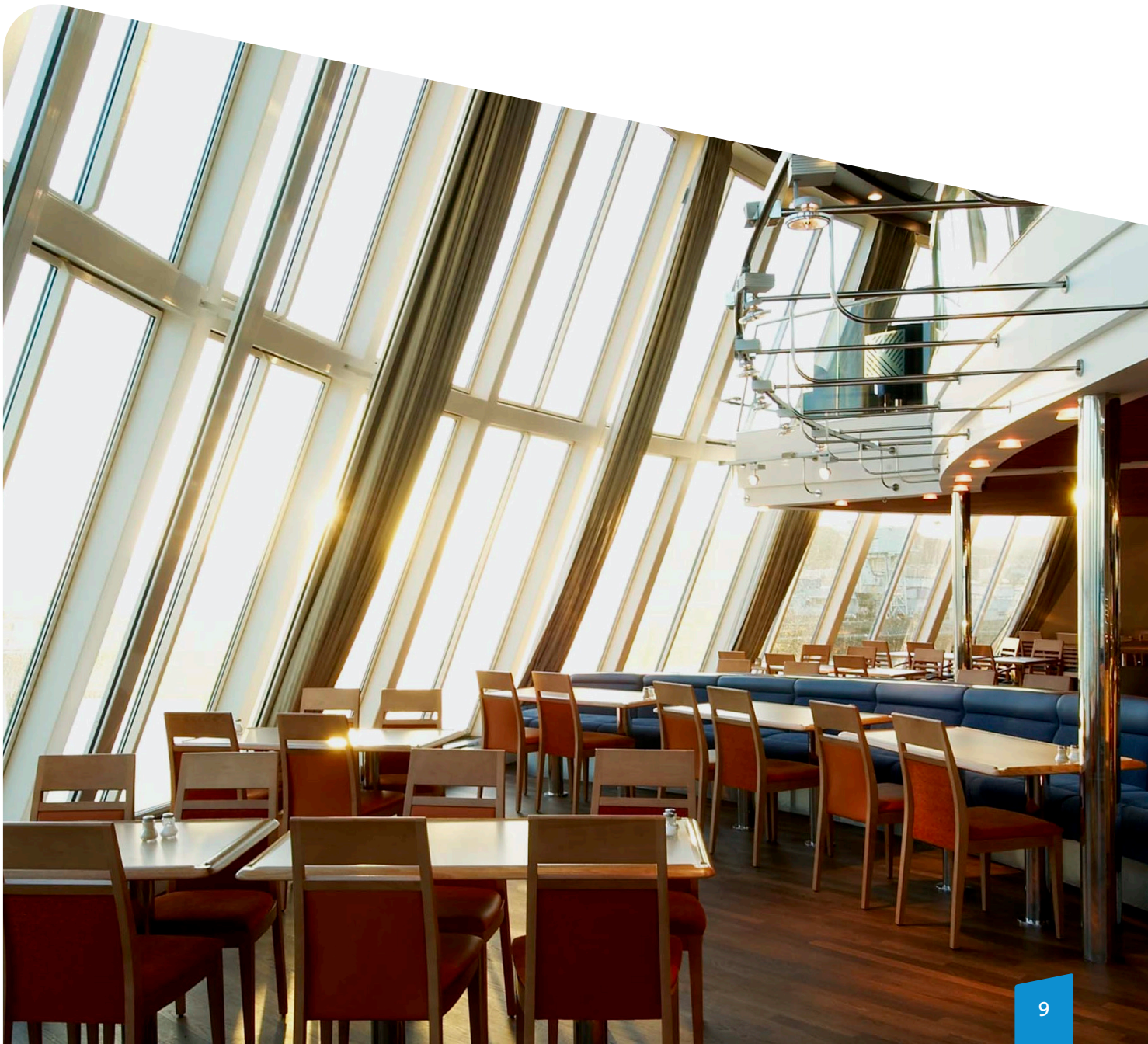
Climaplus KM 35/1

The KM 35/1 coating is more neutral in color with a hint of greenish bronze. This allows for more natural light, at the expense of a higher solar factor (48%).



Climaplus KM 30/1

The KM 30/1 coating is known for its bright silver tint, a feature that can add to the overall aesthetics of the exterior of a vessel. The neutral/silver appearance allows for ample light transmittance while producing a G-factor of 52%.



THERMAL INSULATION AND SUN PROTECTION (CLIMAPLUS KM ULTIMATE)

The Climaplus KM Ultimate product family prevents excessive temperature increases by reducing solar radiation, with minimal compromise on natural light transmittance. It is the perfect high-performance option for applications that require toughened glass as well as effective solar control properties. On the other side of the seasonal spectrum, choosing Climaplus KM Ultimate will mean less heating loss from within the ship, keeping the internal environment warm during the winter. In summary, this product family offers the most efficient Low-e coating and the highest selectivity values (ratio light transmission to solar factor).



Climplus KM Ultimate 20/1 – (15)

KM Ultimate 20/1 together with KM Ultimate 24/1, offers the highest level of natural light transmittance at 70%. It comes across as neutral in color when viewed from the outside, with a touch of aqua blue mixed in. With a selectivity value of 1,9, it represents another highly efficient option.



Climplus KM Ultimate 21/1 – (9)

KM Ultimate 21/1 is more bronze in color with a hint of blue, and allows more natural light transmittance (61%) than KM Ultimate 22/1 (52%) which comes at the expense of a somewhat higher G-Value of 34%.



Climplus KM Ultimate 22/1 – (8)

KM Ultimate 22/1 is the second-darkest toned coating in this product family giving off a grey/green tone when viewed from the exterior.



Climplus KM Ultimate 23/1 – (7)

KM Ultimate 23/1 is one of the most selective products we offer, allowing 60% light transmittance while deflecting 72% of solar heat back outside. It is slightly darker toned compared to KM Ultimate 24/1, with a touch of bronze/green when viewed from the exterior.



Climplus KM Ultimate 24/1 – (1)

KM Ultimate 24/1, together with KM Ultimate 20/1, offers the highest level of natural light transmittance at 70%. The color is quite neutral with a touch of bronze.



Climplus KM Ultimate 25/1 – (6)

KM Ultimate 25/1 is the darkest toned glass coating in the Ultimate family, coming across as a blue/green color when viewed from the outside. However, in terms of selectivity, it is quite efficient, boasting a 2.2 value, the second highest in this product group.



BENEFITS OF USING COATINGS AT A GLANCE

There are many benefits associated with using high performance coatings in both double and triple glazed units:

- Supreme solar protection
- Excellent energy-saving qualities
- Ultimate thermal insulation: keep the interior cool in the summer and warm in the winter
- Minimize demand on HVAC systems
- Create a more comfortable atmosphere on board
- Increase sustainability by reducing energy costs/HVAC usage
- Can be combined with Stadip® Marine to offer multiple additional benefits
- Noise reduction through the use of IGUs
- Used as protection for intumescent fire resistant glass, increasing lifespan of overall unit

► Endless Possibilities:

Combine the comfort and energy saving attributes of our coatings with other performance enhancements and products to create the most comfortable marine experience possible:

- **Fire resistance with Contraflam**
- **Enhanced sound reduction with STADIP Marine SILENCE**
- **Increased safety and security with VETROGARD**
- **Beautiful decorative and aesthetic qualities**

PLEASE NOTE

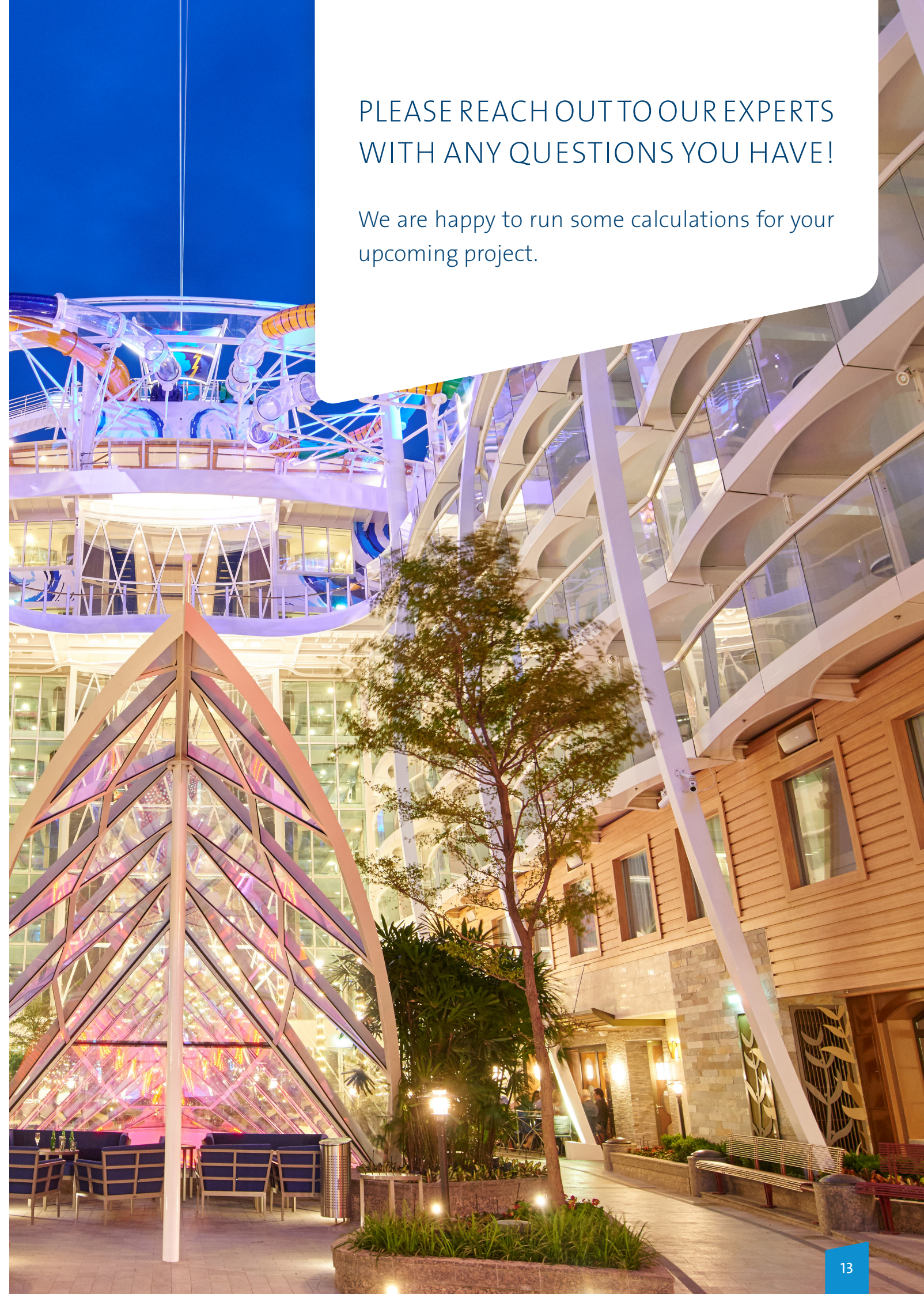
The glass samples photographed in this catalogue aim to provide you with a general idea of the color ranges and degree of reflection for each coating. While browsing, it is important to keep in mind that the glass color impressions will differ depending on the angle they are viewed, weather conditions, and other external factors. Furthermore, if viewing digitally, even computer monitor settings will impact the color impression.

The values prevented are specific to the tested sample size. Light transmittance, G-factor and U-value will vary depending on the specific overall unit make-up you select.

Despite these variables, we hope you find this catalogue helpful in your search to find the right glass coating for your marine glass needs.

PLEASE REACH OUT TO OUR EXPERTS WITH ANY QUESTIONS YOU HAVE!

We are happy to run some calculations for your upcoming project.





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