Pantecnica®
ENGINEERED SOLUTIONS

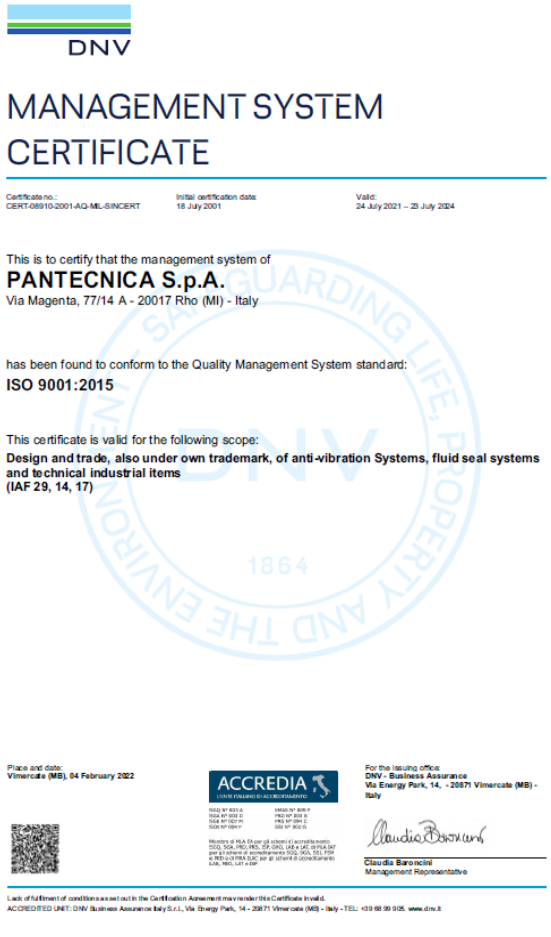
Engineered antivibration systems for on-board vibro-acoustic comfort
R&D & Innovation – Blue Technologies

MANAGEMENT SYSTEM CERTIFICATION
DNV
ISO 9001 · AS9120

Facts & Figures

Offices and Warehouse:	Rho (MI), Italia
Year of establishment:	1968
Ownership:	Fatigati Family
Employees:	32
Associated companies:	1
Turnover 2022:	≈ € 10,0 mio

Quality Management System



DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: CERT-08910-2001-AQ-MIL-SINCERT
Initial certification date: 18 July 2001
Valid: 24 July 2021 – 23 July 2024

This is to certify that the management system of
PANTECNICA S.p.A.
Via Magenta, 77/14 A - 20017 Rho (MI) - Italy

has been found to conform to the Quality Management System standard:
ISO 9001:2015

This certificate is valid for the following scope:
Design and trade, also under own trademark, of anti-vibration Systems, fluid seal systems and technical industrial items
(IAF 29, 14, 17)

Place and date:
Vimercate (MB), 04 February 2022

ACCREDIA

For the issuing office:
DNV - Business Assurance
Via Energy Park, 14, - 20871 Vimercate (MB) - Italy

Claudia Baroncini
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV Business Assurance Italy S.r.l., Via Energy Park, 14 - 20871 Vimercate (MB) - Italy - TEL: +39 68 99 905. www.dnv.it

DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 119652-2012-AQ-ITA-ACCREDIA
Initial certification date: 19 July 2012
Issue Date: 15 July 2021
Expiry Date: 18 July 2024

This is to certify that the management system of
PANTECNICA S.p.A.
Via Magenta, 77/14 A - 20017 Rho (MI) - Italy

has been found to conform to the Quality Management System standards:
EN 9120:2018 and ISO 9001:2015
(technically equivalent to AS9120B and SJAC9120:A)

and has been audited in accordance with the requirements of EN 9104-001:2013 and ACCREDIA Technical Regulation RT-18.

Type of certification structure: Single Site

This certificate is valid for the following scope:
Parts and materials marketing for aviation, space and defense industry.
Commercializzazione di parti e materiali per l'industria aeronautica, dello spazio e della difesa.

IAF Sector(s) : 29, 14, 17

Place and (re-)issue date:
Vimercate (MB), 16 July 2021

ACCREDIA

For the accredited unit:
DNV - Business Assurance
Via Energy Park, 14, - 20871 Vimercate (MB) - Italy

Zeno Beltrami
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
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50P 1968

Cluster & Associations

Member lombardia aerospace cluster

ADERENTE AL SISTEMA CONFEDERALE

ASSO FRIGORISTI SOSTENITORE

Corporate Social Responsibility

100% GREEN A2A
USIAMO SOLO ENERGIE RINNOVABILI

ONE OCEAN FOUNDATION

MANAGEMENT SYSTEM CERTIFICATION DNV ISO 9001 · AS9120

Focus on Customers' technical needs

Technical and application engineering consultancy for the design, development, production and supply of systems and components for the isolation and damping of vibrations and impacts in any type of industrial application, in addition to some specialized civil environments, and fluid sealing systems and components, also with certification of materials and process systems.

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Technical and application know-how
Antivibration systems and Blue Technologies for shipbuilding industry

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ISO 9001 · AS9120

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Technical and application know-how
Antivibration products and systems for shipbuilding industry

Mechanical vibrations, as well as shocks and structure-borne noise, are among the biggest problems for comfort on board, both in yachts and passenger ships. The wide range of anti-vibration systems offered by Pantecnica® for the nautical sector, also certified in the tear-proof version, can satisfy every application requirement to improve comfort on board.

MANAGEMENT SYSTEM CERTIFICATION
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The value of on-board vibro-acoustic comfort

In yachting world, in order to take full advantage of the many advanced technological solutions on board, it is essential to create a comfortable and welcoming environment.

Exceptional design, innovative technical details and luxurious interior fittings risk being penalized by annoying noises and vibrations originated by on-board operating auxiliary machinery.

To meet the comfort expectations of owners and their guests, it is therefore essential to adopt technologically advanced solutions to mitigate the vibro-acoustic noise.

On-board vibro-acoustic comfort: the problem

In order to achieve this ambitious objective, it is necessary to isolate and dampen the vibrations and noises originated by on-board operating auxiliary machinery, such as:

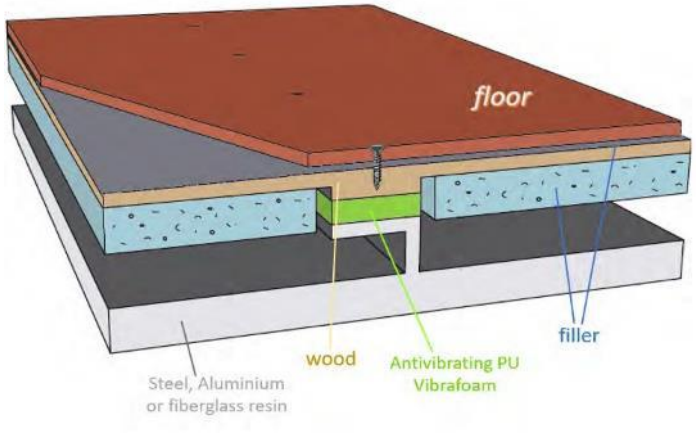
i. Structure-borne noise: any vibrating device transmits mechanical energy to every structures to which it is connected. The vibratory energy, once transmitted to the structure, propagates inside it and, due to the low level of damping typical of the materials used for the construction of the structure itself (steel, aluminum, fiberglass), it also spreads in areas very distant from the source. Once the energy reaches a panel or a flat surface, it induces vibrations in it which in turn generate pressure waves in the surrounding air, by causing noise in the environment;

ii. Airborn noise: let's imagine a device that creates noise, for example in the engine room. The walls of the device, vibrating, induce pressure waves in the surrounding air (acoustic waves), which propagate. The waves travel, and, when they reach a wall, are partly reflected and partly transmitted to adjacent rooms. The transmitted acoustic energy gives rise to what is called "airborne noise transmission".

On-board vibro-acoustic comfort: solutions

To increase the level of comfort on board of ships and yachts, Pantecnica® has gained specialized technical skills for the design and supply of effective systems against vibrations and undesired noise, mitigating both structure-borne and therefore secondary airborne noise in cabins and on deck.

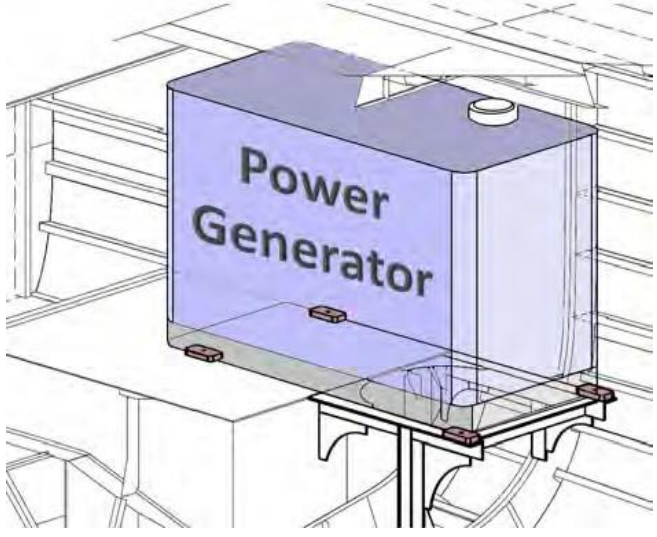
Floating Floors

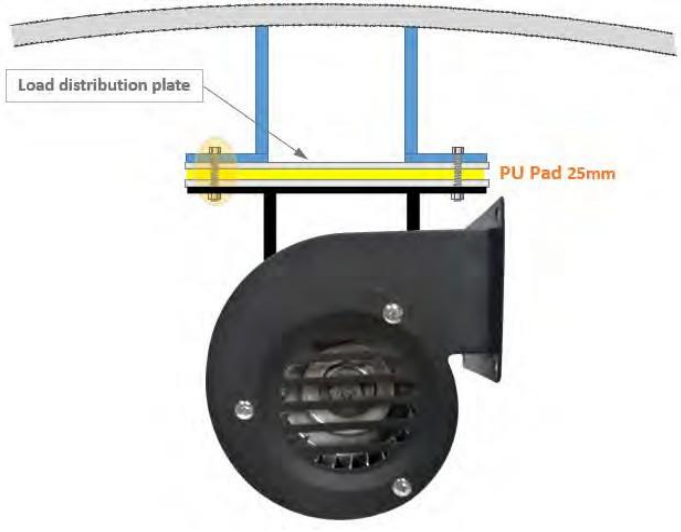


The decoupling of the inner hull from the outer one is an Important issue for yacht builders. Pantecnica® Box-in-Box systems significantly reduce vibrations and absorb structural airborne noise: the floor and sides of the hull are suspended with Vibrafoam® vibration-damping PU strips, which isolate the inner hull from the outer one. The material properties of Vibrafoam®, such as static and dynamic deformation behaviour, combined with a low compression set, are exactly what is required in ship and yacht building.

Power device suspension

Vibration isolation of on-board power supplies is a must to reduce wave propagation and increase comfort. Whenever, in addition to mechanical vibrations, you want to reduce the associated structural noise, a high-damping isolator is recommended. Vibrafoam® pads, ISOTOP® DZE mounts and ISOTOP® SE elements are high-performing solutions, as the cellular polyurethane rubber performance helps to reduce vibration energy.





Ceiling-fitting fan suspension

Fans, extractors and ventilation units can be very unpleasant when you are moored in a bay or harbour. Even when they are switched on at low power, the noise can run quickly and reach our ears, disturbing our sleep at night even when the direct noise is dampened. Responsible for the disturbance is structure-borne noise, which is very difficult to cut and isolate. A ceiling-mounted smoke extractor combined with a Vibrafoam® PU pad can improve acoustic comfort on board, preventing structure-borne noise from spreading.

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VIBRAFOAM & VIBRADYN

Vibrafoam and Vibradyn by Pantecnica® are made of two-component polyurethane rubber, and if properly sized and coupled with other necessary duly referenced solutions, they contribute to considerably attenuating the structural transmission of vibrations and noise.

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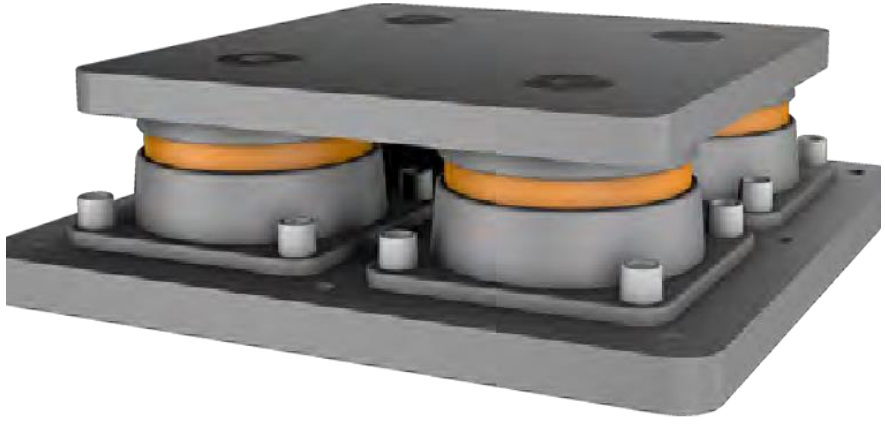
ISOTOP® DZE

The ISOTOP® DZE vibration damper consists of a cylinder mounted on a flange and a cover cap, between which viscoelastic elastomers made of Sylodyn® and Sylomer® provide insulation and vibration damping.

ISOTOP® DZE vibration damper is designed to withstand and control vertical compressive and tear stress, and within certain limits even in shear. They have natural frequencies between 6.6 and 10.3 Hz, and are also suitable for installation on yachts, superyachts, megayachts and ships.



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GUMMIMETALL® TRIFLEX - 2

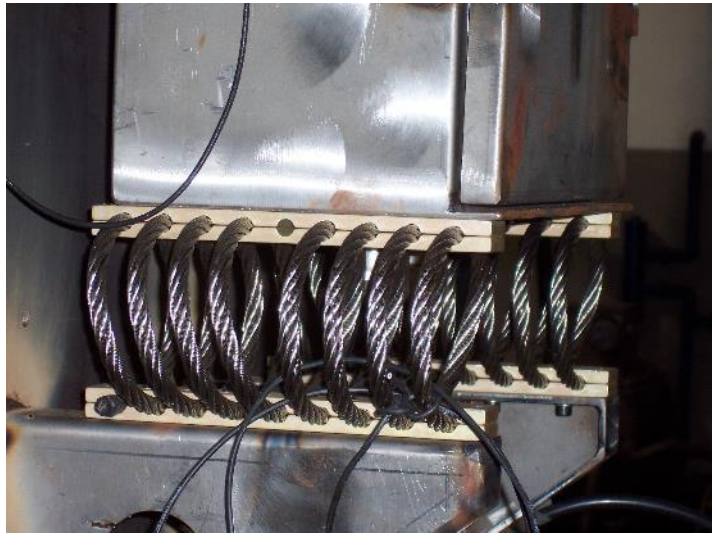
The GUMMIMETALL® Triflex-2 vibration damper, with an elastomer body vulcanised directly onto steel parts, is designed to control vibrations on three axes with three different degrees of stiffness and it is internally protected against jolts, shocks and overloads.

GUMMIMETALL® Triflex-2 is suitable for insulation of machines and engines, even installed on board of yachts, superyachts, megayachts and ships.

ISODAMPER®

ISODAMPER® isolator-dampers consist of an AISI 304 steel wire spring with peculiar characteristics and qualities, which meet the most stringent requirements related to the problem of controlling shocks and active and passive vibrations.

The capability of ISODAMPER® elements to have high elastic deflections allows them to achieve low natural frequencies and high degrees of insulation. In the nautical field they are used for the insulation of instruments, GPS, engines, generators and exhausts.



SILENTFLEX®

SILENTFLEX® insulator-dampers have peculiar characteristics of insulation and damping, and are capable of working both in traction and compression.
They are made entirely of metallic materials (including the AISI 304 stainless steel wire cushion) which are resistant to oxidation and aggressive environments, and guarantee absolute fire resistance without toxic emissions.
They are also characterized by:
- a wide range of working temperatures: -70ºC ÷ +300ºC;
- protection against corrosion.

In the nautical field they are particularly suitable for use as suspensions of engine, boilers, silencers, electric generators, high temperature tubes, exhaust gases.

Preserving marine environment

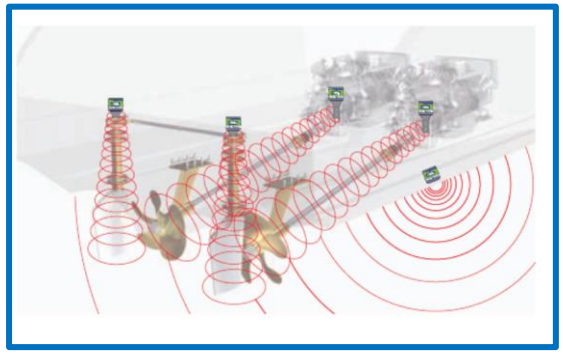
Given that our commitment to mitigate the vibro-acoustic disturbance originating from on-board auxiliary machinery has the positive implication of reducing the introduction of energy into the marine environment (noise and vibrations), the attention to preserve the marine environment has always been one of our priorities, in accordance with Sustainable Development Goal 14 of the ONU 2030 Agenda.

In fact, not only are we Supporters since the beginning of the One Ocean Foundation, but we have developed innovative systems to avoid antifouling treatments, notoriously polluting, and acoustic shieldings in 100% recyclable material.

SonicBoat® solution: operating principle

Vibratory waves are sent to the hull by ultrasonic waves with one or more high-frequency power generator(s). Some transducers (from a minimum of 4, up to 6 or 8 sensors, depending on the size of the boat) are glued on the internal shell of the boat, in precise locations chosen for great performance. Generator(s) send(s) vibratory impulses to transducers at a very high frequency; the sonic vibrations generated are transferred outside the boat, causing the formation of micro bubbles in water immediately in contact with the hull (water molecules suddenly pass into vapor phase due to the high vibrational energy they receive), which implode due to the pressure of water and sudden cooling, causing ultrasonic shocks that prevent the formation of microorganisms on the fairing itself.

SonicBoat®
Industrial Invention Patent No. 102020000021769 by the Ministry of Economic Development issued on 26.09.2022



SonicBoat® solution: benefits

- ✓ The cost is amortized over a period of 1 / 3 years, depending on type of boat and dock time.
- ✓ Fuel consumption is reduced, as the boat is no longer held back by a fairing full of parasites.
- ✓ Eco-friendly: it does not damage sea life or people.
- ✓ It doesn't make any noise while in use, even at night.
- ✓ Working on 12V or 24V, it can be powered by wind turbines and/or solar panels.

SONICBOAT®

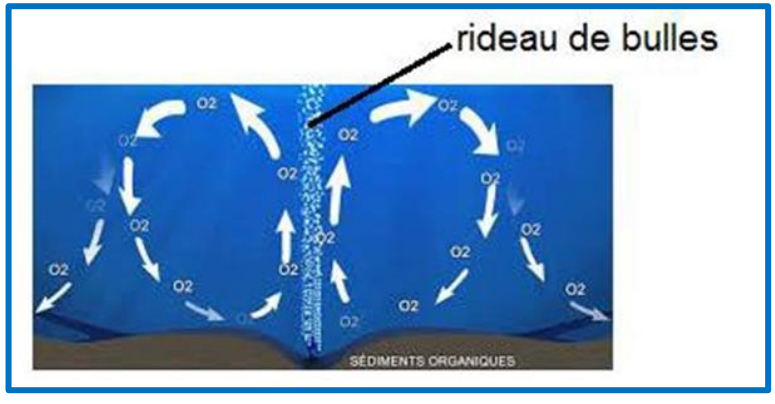
PATENTED

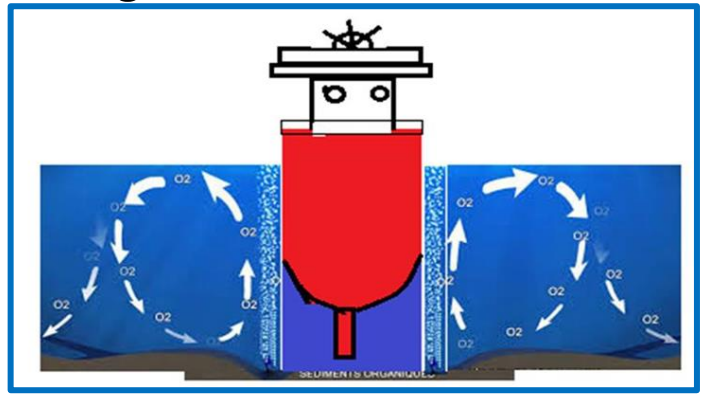
BubbleBoat®solution: operating principle

The BubbleBoat® is a system that, in all its variants, injects micro-bubbles of air directly into the water. As they rise up along the hull to the surface, they create an impenetrable wall for marine micro-organisms, producing an effective and natural protective shield around the hull of the boat.

Furthermore, the consequent forced introduction of oxygen helps to restore the pH value of the water to normal, which benefits the marine environment.

The sketches below show that the wall of micro-bubbles is not crossed by large nor small micro-organisms.





BubbleBoat®
Patent for Industrial Invention No. 102020000021490 by the Ministry of Economic Development issued on 21.09.2022

BUBBLEBOAT®

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BubbleBoat® solution: benefits

- ✓ Fuel-saving, as the boat is no longer held back by a hull full of parasites.
- ✓ Eco-friendly: it does not damage sea life, fish or people, and since even and especially in the version for marinas and commercial ports the pumps can be powered by renewable energy sources (e.g. photovoltaic panels), the combined effect of the port water oxygenation and the use of renewable energies would be a concrete proof of the operator's environmental commitment, in line with **SDG 14** - Life Below Water of the ONU 2030 Sustainable Development Goals and with the investments planned for the ecological transition and financed by the famous Next Generation EU, and an undeniable competitive advantage (**ESG** - Environmental, Social, Governance -).

It makes no noise during use, not even at night, and if necessary the installations could be insulated with our innovative NoViDamp® sound shieldings, made of 100% regenerated PVC.

BUBBLEBOAT®

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MetaLow Frequency & MetaPanel Absorbing Acoustic Shieldings

Our consolidated experience in improving the vibroacoustic comfort on board, pursued both by isolating vibration sources, such as generators and all auxiliary machinery on board, and structural vibrations, again by way of non-exhaustive example in the shipowners' cabins, has convinced us of the necessity of integrating the range of our systems with innovative acoustic shieldings, lighter and better performing than those available on the market, and with distinctive characteristics in terms of fire-smoke behaviour and regenerability. The collaboration with the associated Start-up Phononic Vibes S.r.l., owner of numerous patents on metamaterials, has led to the development of MetaLow Frequency and MetaPanel Absorbing shielding, specially calibrated to insulate and absorb airborne noise that is transmitted on board, including the structural one, such as that one originated by the operation of propulsion machinery and generators normally installed in the engine room.

Warranty

1. WARRANTY

1. The content of this document refers expressly to « **Pantecnica S.p.A. - Technical Documents Disclaimer - EN - Rev.01** » published online, and it is provided for general information purposes only and should not be considered as a binding recommendation.

2. Pantecnica® does not assume any kind of responsibility, neither express nor implied, related to both the completeness and care of any type of Information contained and/or mentioned in this document, and the use that the Customer / User will do of the Information provided herein. Pantecnica® recommends to the Customer / User to obtain accurate guidance from experts in any specific scope of application to which the purchased Products are destined, possibly by carrying out appropriate verification tests on the specific suitability of the aforementioned Products.

3. Pantecnica® has tried to render the text accurate and informative, however, where it has not been expressly stated that the Information contained in this catalogue is based on specific experiences or laboratory tests, it must be understood that the Information are based on general experiences.

4. Given the wide range of possible applications and operating conditions, together with the imponderable factors involved, even of a human nature, Pantecnica® does not give any express or implicit guarantee regarding the durability of the Products nor the success of the application. Any assistance or advice from Pantecnica® commercial and technical support in choosing the Products does not in any way derogate from the foregoing, unless this was expressly and specifically provided for.

2. OPERATING CONDITIONS' LIMIT VALUES

1. The limit values referred to the operating conditions are correlated with each other and must never be reached simultaneously. They are in close relationship both with the correct choice of the Products with respect to the specific application, and with its correct assembly.

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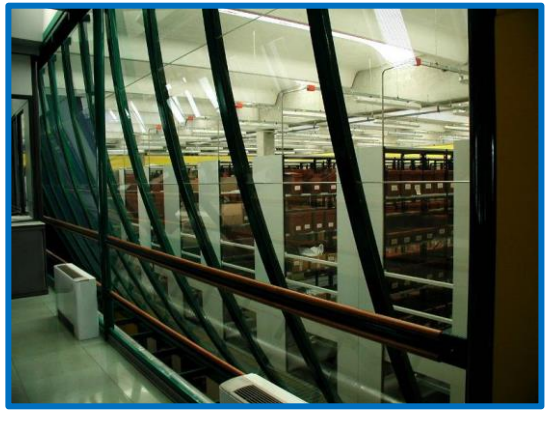
Technical application know-how
Blue Technologies for shipbuilding industry

Thank you for your attention!
www.pantecnica.it



"Let our love for the sea be a metaphor for the love of future generations."
Dott. Davide Fatigati - Executive Chairman - Pantecnica S.p.A.

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