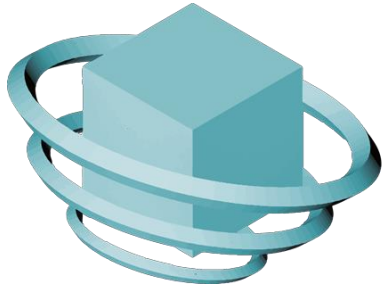
Pantecnica®
ENGINEERED SOLUTIONS

R&D & Innovation – Circular Economy
Pantecnica Acoustic Shielding -Naval Sector
MetaLow Frequency & MetaPanel Absorbing
in collaboration with



PHONONIC VIBES
THE METAMATERIAL EXPERIENCE

MANAGEMENT SYSTEM CERTIFICATION
DNV
ISO 9001 · AS9120

Facts & Figures

Uffici e magazzini:	Rho (MI), Italia
Anno di costituzione:	1968
Proprietà:	Famiglia Fatigati
Numero di collaboratori:	30
Società collegate:	1
Fatturato 2020:	≈ € 9,0 mio

Quality Management System

DNV

CERTIFICATO DI SISTEMA DI GESTIONE

Certificato n.: CERT-08910-2001-AQ-MIL-SINCERT | Data Prima Emissione: 18 luglio 2001 | Validità: 24 luglio 2021 – 23 luglio 2024

Si certifica che il sistema di gestione di
PANTECNICA S.p.A.
Via Magenta, 77/14 A - 20017 Rho (MI) - Italia

È conforme allo Standard:
ISO 9001:2015

Questa certificazione è valida per il seguente campo applicativo:
Progettazione e commercializzazione, anche a marchio proprio, di sistemi antivibranti, di sistemi di tenuta per fluidi e di articoli tecnici industriali (IAF 29, 14, 17)

Luogo e Data: Vimercate (MB), 04 febbraio 2022

ACCREDIA

Per l'Organismo di Certificazione:
DNV - Business Assurance
Via Energy Park, 14, - 20871 Vimercate (MB) - Italy

Claudia Baroncini
Management Representative

DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 119652-2012-AQ-ITA-ACCREDIA | Initial certification date: 19 July 2012 | Issue Date: 19 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.
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

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Cluster & Associations

Member lombardia aerospace cluster

DESIGN QUALITÀ NAUTICA DQN

we are member of

Cluster Lombardo Scienze della Vita

ASSOLOMBARDA
Confindustria Milano, Monza e Brianza, Lodi

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

Consulenza tecnico-applicativa alla progettazione, sviluppo, produzione e fornitura di prodotti e sistemi per l'isolamento e smorzamento di vibrazioni e urti, in ogni applicazione industriale e in alcuni specialistici ambiti civili, e di tenuta dei fluidi, anche con certificazione dei materiali e dei processi.

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1968

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

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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.

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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 shipowners 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 goal, it is necessary to isolate and dampen the vibrations caused by the operation of the auxiliary machinery on board, such as:

1. structure-borne noise: a vibrating device transmits mechanical energy to all structures to which it is connected. The vibratory energy, once transmitted to the structure, propagates within it and, due to the low level of damping typical of the materials used for the structure's construction (steel, aluminum, fiberglass), also propagates to areas far away from the source. Once the energy reaches a panel or flat surface, it induces vibrations in it, which in turn generate pressure waves in the surrounding air, producing ambient noise.
2. Airborne noise: the walls of a vibrating device 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 known as 'airborne noise transmission'.

On-board vibro-acoustic comfort : the solution

Our consolidated experience in improving on-board vibro-acoustic comfort, achieved both by isolating vibration sources, such as generators and all auxiliary on-board machinery, and structural ones, such as the shipowner's cabins, has highlighted the need to integrate the range of our systems with innovative acoustic shielding, lighter and better performing than those available on the market, and with distinctive characteristics in terms of renewability and of fire/smoke resistance. The collaboration with the associated Start-up Phononic Vibes S.r.l., owner of various patents on metamaterials, has led to the development of MetaLow Frequency and MetaPanel Absorbing shielding, specially calibrated to isolate and dampen air-borne noise and structure-borne noise such as those generated during operation by propulsion machinery and generators normally installed in the engine room.

On-board vibro-acoustic comfort : the Meta-materials

Meta-materials do not exist in nature and are characterized by customizable geometry and dimensions and special dynamic properties: these are advanced materials whose acoustic performance is defined by the topology of the unit cell and does not depend on intrinsic material properties. The potential of meta-materials is therefore enormous and of great interest, not only for the study of soundproofing, but also for many other engineering fields. The problem, however, is the transition from the world of numbers and mathematical models to real applications: how to design and how to realize a meta-material, and what are the mechanical properties of the realized structure?

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On-board vibro acoustic comfort: Metapanel Insulation Low Frequency

The combination of the elements that make up the **Metapanel Insulation Low Frequency** product makes it possible to have a resonant mechanism, which makes the soundproofing power particularly efficient in very specific frequencies, from 500 to 2000 Hz. The resonant phenomenon can be appropriately designed and adjusted to intervene in the most interesting frequency ranges depending on the application.

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On-board vibro-acoustic comfort: the application

The **Metapanel Insulation Low Frequency** panel was tested on board a yacht to investigate the acoustic insulation properties of the separation bulkhead between the shipowner's cabin and crew area with the following steps:

Pre-installation measurement

Evaluation of the acoustic properties of the environment considered in the real situation by measuring the sound pressure level at various points along the wall. This analysis led to the identification of portions of the wall with lower sound insulation power in which to install the solution.

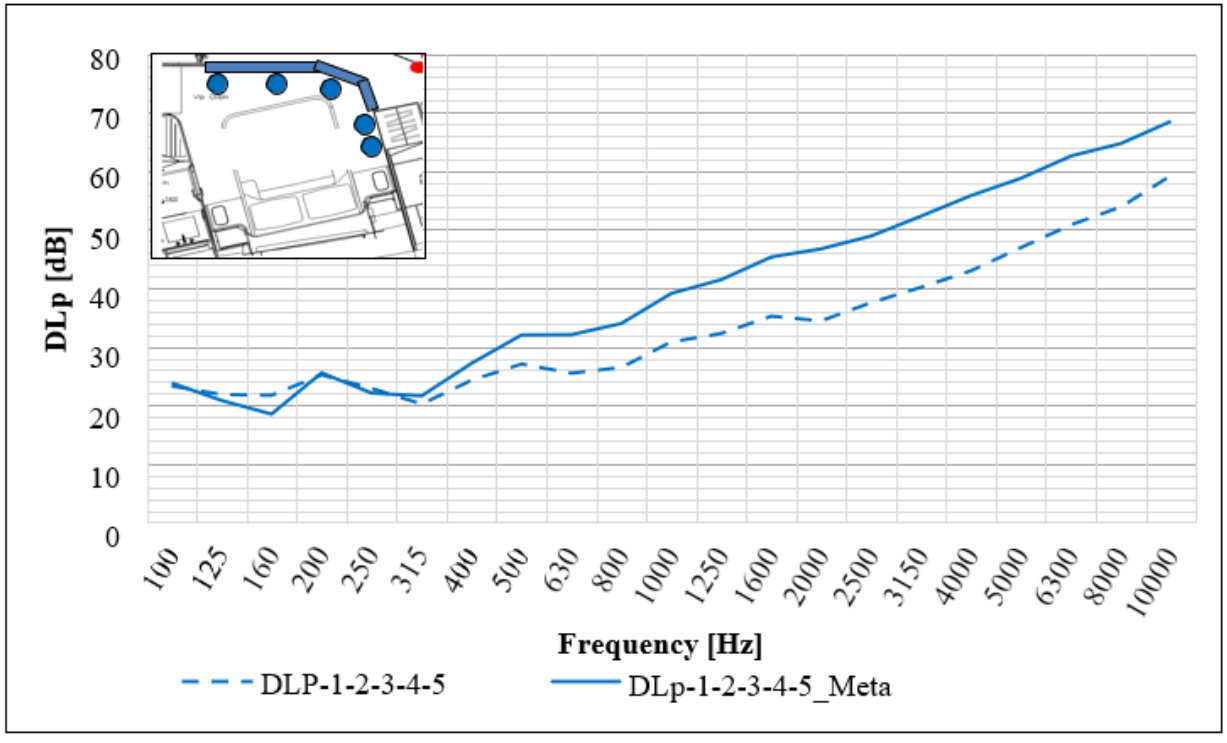
Design of the MetaPanel solution

Study with a numerical finite element model and its preliminary experimental validation by means of laboratory tests on planar samples.

Post-installation measurements

Description of the installation setup and results of the measurements performed after installation of the MetaSolution.

On-board vibro acoustic comfort: the results



Difference in sound insulation levels between the shipowner's cabin (source) and the crew area (receiver), both for the existing wall (dotted line) and after installation of the MetaSolution,

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 iwe have developed innovative systems to avoid antifouling treatments, notoriously polluting, and acoustic shieldings in 100% recyclable material.

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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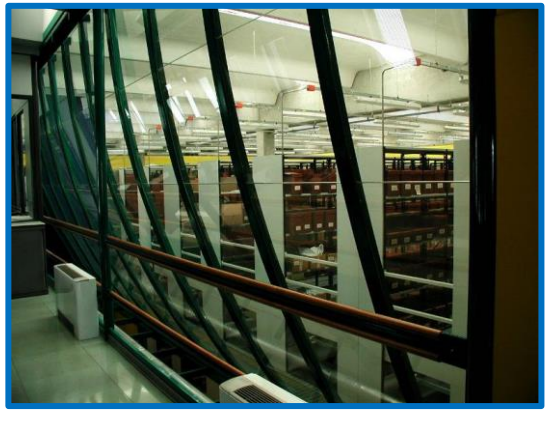
Technical application know-how
Blue Technologies for on-board comfort

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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