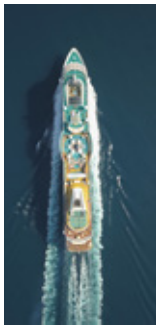
ISOVER
SAINT-GOBAIN

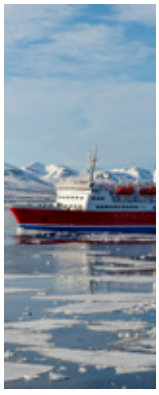
INSULATION GUIDE MARINE & OFFSHORE

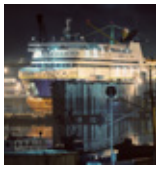
For safe, comfortable and sustainable ships

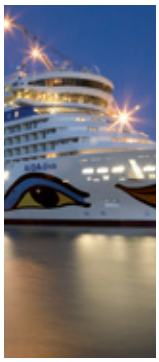
SAINT-GOBAIN

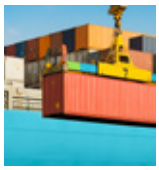
Table OF CONTENT

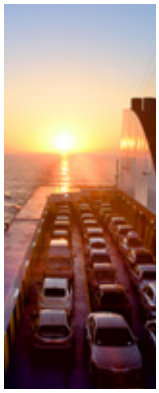












BUILDING TOMORROW'S VESSELS

Shipbuilding is a strategic sector that is transforming faster than ever before. As naval architects, ship owners, installers and insulation suppliers, we constantly face new challenges and opportunities – from reducing carbon emissions by 40% by 2030 to meeting more demanding regulations and using digital tools for maintenance, navigation or design. While user comfort demands are greater than ever, sustainability, safety and digital solutions are increasingly shaping the choices we make and the way we work.

At the service
OF YOUR PRIORITIES

Your choices will have an impact on every step of the shipping project, including the insulation. While safety is everyone's concern, your priorities will depend on factors like the type of vessel and your role in its construction.

If you're a passenger ship owner, this might be the **comfort** of passengers and crew members. If you're designing a navy ship, **resilience** is probably high on the agenda. Or maybe it's important to combine **energy and cost savings** for a fleet of container ships.

At Saint-Gobain ISOVER, we strive to meet these different needs through customised solutions for every kind of ship building project.

Thermal comfort

Creating the ideal thermal environment for passengers and crew is essential to their overall experience, particularly on passenger ships like ferries and cruise ships. High-performing insulation materials **reduce heat loss**, so you achieve **high levels of comfort** while also making **significant energy savings**.

This is why we have developed solutions with exceptional thermal insulation, which offers equivalent performance with thinner and lighter solutions.

FIND OUT MORE (page 20)

Sustainability & health

By building lighter, well insulated ships and offshore platforms, you can **reduce energy consumption** and therefore **CO2 emissions**. By choosing insulation products with **recycled content,** you contribute in reducing the natural resources. By using safe products, you take care of the health of the labour, as well as the passengers & crew.

This is why we focus on the weight of our solutions, as well as the waste produced, and energy used during the entire product lifecycle. It's also why we test our products to the most demanding standards.

FIND OUT MORE (page 13)

Acoustic comfort

Noise has direct and indirect impacts on people's health from hearing damage to sleep disturbance. Increasing acoustic comfort is therefore vital for the **well-being and comfort** of passengers and crew.

This is why our solutions have high airflow resistivity values to ensure high levels of sound absorption.

FIND OUT MORE (page 25)

DID YOU KNOW?

We offer a wide range of customised solutions to meet the needs of your Marine and Offshore projects.

Fire safety

As a ship owner or naval architect, it is your duty to take all necessary measures to ensure **maximum protection of passengers and crew against fire**. Non-combustible, fire-resistant insulation plays a key role in any fire prevention and containment strategy.

This is why all our solutions are tested to the latest IMO regulations and rated for their fire safety performance.

FIND OUT MORE (page 19)

Optimised costs (TCO & TCI)

For any shipping project, optimising the **total cost of ownership (TCO)** is a priority. High thermal performance reduces heat loss and therefore energy consumption and costs. Less weight also contributes to lower operational costs including fuel.

Installation costs (TCI) also need to be kept to a minimum. For example, by reducing installation time and making the insulation solution easier to handle, transport and store.

This is why our marine range not only has excellent thermal properties but is also light, flexible, compressible and available as a pre-cut solution.

FIND OUT MORE (page 61)

What kind of vessels
CAN WE HELP YOU INSULATE?

Drawing on deep industry expertise, we have developed insulating solutions for different kinds of vessels - whether deep sea or short sea - adapted to the specificities of each project.

PASSENGER SHIPS
All kinds of ferries, yachts and cruise ships regardless of size or destination

DEEP SEA & SHORT SEA SHIPS
All types of transport vessels such as container ships, LNG carriers, tankers, bunkers

NAVY AND GOVERNMENT SHIPS
Any kind of military ship and specific requirements

FISHING VESSELS
Commercial fishing boats and ships of any size and format

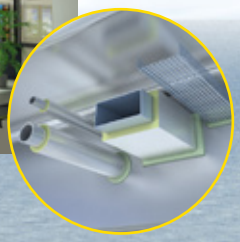
OFFSHORE & WIND ENERGY
All kinds of offshore platforms – floating or fixed – as well as wind energy installations

What applications

CAN YOU USE OUR INSULATION SOLUTIONS FOR?

PUBLIC ROOMS

- Acoustic ceilings
- Acoustic floor
- Draught stop
- Linings
- Suspended ceilings

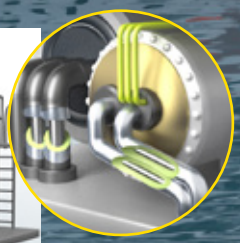


MAIN STRUCTURES

- Bulkheads
- Corrugated bulkheads
- Decks
- Fire doors
- Hull

TECHNICAL EQUIPMENT

- Exposed surfaces
- High/low temperature equipment



Our solutions cover the full scope of your insulation needs for any ship or offshore platform.

HVAC SYSTEM

- Exhaust ducts
- Main ducts
- Piping
- Sea CLIMAVER®

ENGINE ROOM

- Chimneys
- Exposed surfaces
- High/low temperature equipment
- Tanks

CABINS

- Acoustic floor
- Cabin doors
- Cabin ducts
- Cabin walls
- Suspended ceilings
- Wall extensions

Rainbow Warrior III, Fassmer GmbH, Germany, 2011

1. GREEN SHIPBUILDING

The Marine & Offshore sector is not automatically associated with a positive environmental impact and is often criticised for generating air and water pollution, especially high CO_2 emissions. However, led by the International Marine Organisation (IMO), the industry has understood the need for urgent action and is increasingly committed to positive change.

Shaping
A NEW KIND OF SHIPPING

In 2020, the IMO chose the theme of *"sustainable shipping for a sustainable planet"*. This means ensuring that seagoing vessels limit their impact on the environment – for example, reducing CO_2 emissions by at least 40% by 2030 - in line with the United Nations Sustainable Development Goals.

To drive this change, the IMO is setting ever stricter regulations - from construction to decommissioning - that are triggering intensive research and development in greener technology.

COMMITTED TO SUSTAINABLE GROWTH

As part of this accelerating ecological transition, Saint-Gobain has placed values at the heart of its business model to help **foster responsible and sustainable development**.

And, the Marine and Offshore sector is no exception.

Saint-Gobain's global team of maritime experts provides architects, owners, installers and other sector players, like you, with a wide selection of innovative products and services to **minimise the environmental impact of different kinds of ships**, as well as oil & gas offshore vessels and platforms.

SUSTAINABLE INSULATION TO MINIMISE OUR ENVIRONMENTAL IMPACT

This commitment to Green Shipbuilding is transforming Saint-Gobain's approach to Marine & Offshore at every step, from building materials to the glass and insulation used.

Specialising in technical insulation, at Saint-Gobain ISOVER, we focus on innovating solutions that are **lighter, more energy efficient and sustainable** to help you **lower the vessel's environmental impact**.

This innovation is driven by two main aims:

- Reduce energy consumption
- Efficiently manage raw materials and waste

You may be wondering if focusing on sustainability compromises the performance, quality, and comfort of our insulating solutions. You may also have questions about the impact on installation and operational costs.

We're convinced that all these advantages go hand in hand, offering multiple benefits when insulating any kind of vessel.

But we'll let you decide for yourselves.

.

DID YOU KNOW?

We understand that it's important for you to know the environmental footprint of our solutions. That's why we disclose detailed information about the environmental impact of our materials using Environmental Product Declarations (EPDs).

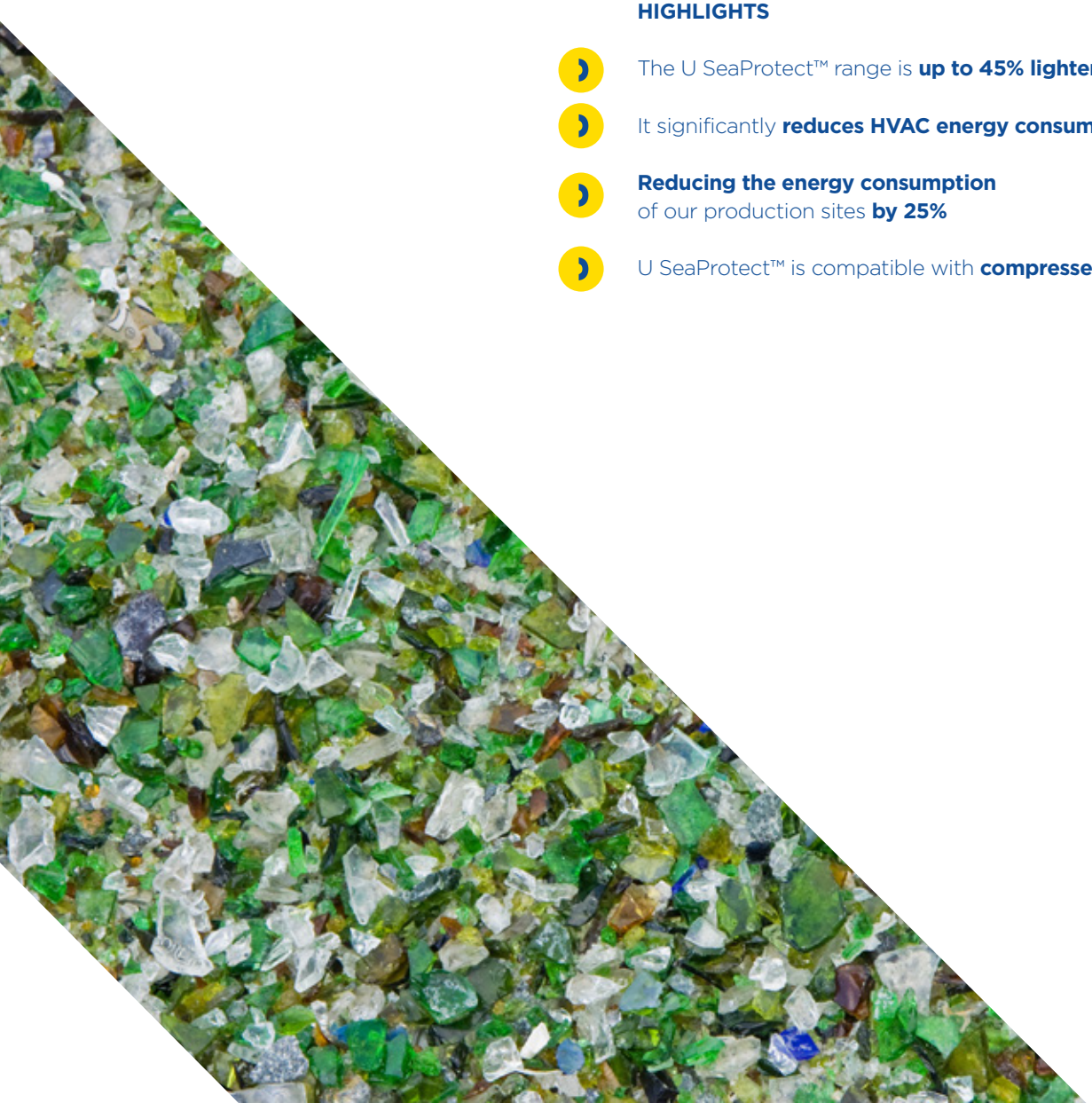
How can we be more energy efficient?

The amount of energy a ship consumes has a huge influence on its environmental impact. Any reduction makes a difference. This is why Saint-Gobain ISOVER has developed solutions like the U SeaProtect™ range that is up to 45% lighter than traditional stone wool, and easy to compress – so you need **less storage space, optimise transportation and minimise transport emissions**.

For a cruise ship, HVAC represents up to 35% of the total energy consumption. By offering superior thermal properties, our insulation enables you to **use less energy**, while maintaining high levels of passenger comfort and lowering operating costs.

We also apply this approach to our own operations - in the last 10 years, we have reduced our energy consumption and CO_2 emissions by 20% and our water consumption by 50%.

.



HIGHLIGHTS

- The U SeaProtect™ range is **up to 45% lighter**
- It significantly **reduces HVAC energy consumption**
- **Reducing the energy consumption** of our production sites **by 25%**
- U SeaProtect™ is compatible with **compressed packaging**

How can we preserve resources?

We're constantly looking for ways to **minimise our raw material use** at each step of the product lifecycle. This means **using more recycled or renewable resources** to consume less raw materials, while facilitating recycling and reuse at the end of the product's lifespan. This is why our mineral wools are made from natural mineral resources and we strive to continuously increase the amount of recycled content.

Health & wellbeing

Our commitment to protecting the planet extends to the people living on it, from our **employees to customers, end users and local populations**. On the one hand, we push for positive change across the shipping sector and beyond. For example, advocating European guidelines for disclosing and assessing hazard substances. On the other, we constantly challenge the way we work by ensuring our products don't contain any hazardous substances.

These targets are subject to independent third-party oversight – for example, EUCEB certification ensures our mineral wool products meet criteria for exemption from carcinogenicity in line with European Regulation (EC) No. 1272/2008.


FIRE
ACTIVATED
PULL
DOWN
NOTIFIER
by Honeywell

2. FIRE SAFETY

Reducing the risk of fire at sea is essential, especially given how difficult it can be for the emergency services to reach isolated locations. As an integral part of any ship design, fire safety is therefore a priority for shipbuilders, designers and contractors who need to ensure that people and vessels are protected, while meeting ever strict construction standards for fire protection including fireproof insulation.

Protecting lives, PRESERVING YOUR INVESTMENT

Developing innovative insulation materials for high levels of fire safety

The U SeaProtect™ range draws on the unique laminar structure of ULTIMATE™ stone wool to offer thinner, lighter and more effective fire insulation. This innovation has been integrated into our full range of marine fire insulation products and solutions.

ISOVER is committed to meeting the regulations and standards implemented by the International Maritime Organisation. All ISOVER products are tested according to the FTP code for non-combustibility and for surface flammability when a facing is applied. All ISOVER A-Class constructions are tested according to the FTP-code.

FTP CODE	TEST	DIRECTIVE	TESTING PROCEDURE
Part 1	Testing on Non-Combustibility	MSC.307(88)	ISO 1182
Part 2	Testing on Smoke Density and Toxicity	MSC.307(88)	ISO 5659-2
Part 3	Testing of Vertical and Horizontal Divisions, Classes A, B and F	MSC.307(88)	ISO 834-1
Part 5	Testing of Surface Flammability for Linings, Coatings and Floor covers	MSC.307(88)	ISO 5658-2
Part 1 , Appendix 2	Testing of Heat Release, Smoke Production and Mass Loss Rate	MSC.307(88)	ISO 5660

NON-COMBUSTIBILITY

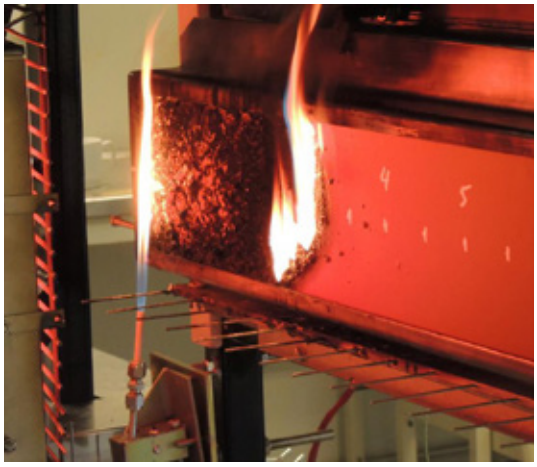
It is essential that the insulation you choose produces only a very limited amount of heat and flames when exposed to high temperatures. This is why all of our solutions for constructing ship divisions comply with the IMO's test criteria for non-combustibility.

DID YOU KNOW?

We carry out non-combustibility tests and material classification according to IMO 2010 FTP Code Part 1, IMO-Resolution MSC.307(88)

SURFACE FLAMMABILITY

Marine insulation also needs to withstand fire spreading along its surface and release as little heat as possible during combustion. Our facings and tapes for bulkheads, linings, decks, ceilings and floors are therefore designed to limit surface flammability.



DID YOU KNOW?

We evaluate the surface flammability of our products according to IMO 2010 FTP Code Part 5.

Vertical and Horizontal Divisions

To prevent fire from spreading, horizontal and vertical divisions like ceilings, walls, windows and doors need to resist fire as effectively as possible. The insulation should withstand fire without forming flames or emitting hot gases on the unexposed side. The temperature increase on the unexposed surface and integrity of the construction also have to be evaluated during testing.

For any kind of vessel, choose from a wide range of ISOVER fire-rated solutions certified according to stringent IMO tests.

DID YOU KNOW?

The fire tests on A and B divisions are conducted according to IMO 2010 FTP Code Part 3, IMO-Resolution MSC.307(88). For the fire resistance test, we reproduce the standard time-temperature curve according to ISO 834-1 in a full scale furnace.

CRITERIA	A-CLASS	B-CLASS	C-CLASS
Testing duration	60 minutes	30 minutes	30 minutes
Insulation/Temperature rise: average	140°C	140°C	140°C
Maximum	180°C	225°C	225°C
Class description	0, 15, 30, 60	0, 15, 30	30

U SeaProtect™ for your ship: prioritising fire safety

Designed to meet your fire protection requirements, the U SeaProtect™ range comprises 3 different types of fire-resistant insulation – rolls, slabs and wired mats – that are available in different densities and thicknesses, as well as a wide choice of adapted facings.

EXCELLENT FIRE PROTECTION PROPERTIES
U SeaProtect™ products are non-combustible, have low surface flammability and can resist fire for up to 2 hours. The facings are classified as low flame spread.

THINNER FIRE INSULATION MATERIALS
Space being often limited on board, our newest solutions for A-Class steel divisions offer the thinnest insulation around stiffeners (20 mm) while achieving excellent thermo-acoustic performances.

LIGHTER FIREPROOF INSULATION
U SeaProtect™ solutions are up to 45% lighter than traditional stone wool alternatives.

EXCELLENT THERMAL AND ACOUSTIC PERFORMANCE
Our Full Comfort solutions also provide the highest levels of thermal and acoustic protection.

OPTIMISED LOGISTICS
Despite a wide choice of products available, only 4 U SeaProtect™ references are necessary for the insulation of A-Class steel divisions, and only 2 references for A-Class aluminum divisions.

3. ACOUSTIC COMFORT

Insulation plays an important role in reducing unwanted noise to create a healthier and more enjoyable experience on any kind of vessel. Controlling sound and vibration levels is an integral part of ship design, especially for passenger ships where comfort is a priority.

Creating a calm, CONSTRUCTIVE ENVIRONMENT

Acoustic comfort is an essential consideration in any Marine and Offshore project for the benefit of both passengers and crew members.

Noise is defined as unwanted sound. Variations in air pressure can create sounds that are loud, distracting or annoying. Recognised as an environmental nuisance, it can have negative effects that are both direct (hearing damage) and indirect (sleep disturbance, mood changes and aggression).

INNOVATING A UNIQUE STRUCTURE WITH OUTSTANDING ACOUSTIC PROPERTIES

ISOVER specialists have spent many years developing optimised acoustic insulation offering the same **sound absorption** levels as other stone wool solutions in **much lighter products**. At the same time, the "elastic" characteristics of U SeaProtect™ products increase their **sound insulation** properties.

Traditional stone wool products are manufactured through an extrusion process that uses vertical wheels, meaning that up to 40% of the total mass comprises unfiberised particles. These unfiberised particles, known as slugs or shots, don't bring any extra acoustic performance, and artificially increase the weight and density.

Produced using horizontal spinners, ULTIMATE™ stone wool products are 100 % fiberised. The length and diameter of fibres are controlled. The shot-free laminar microstructure of ULTIMATE™ products is the main reason why they have excellent airflow resistivity values and offer excellent sound protection with a relatively low density. As well as providing enhanced **fire protection** and **thermal insulation**.

Norwegian Getaway, MEYER WERFT GmbH, Germany, 2014, © Hero Lang

REDUCING SOUND THROUGH AIRFLOW RESISTIVITY & THICKNESS

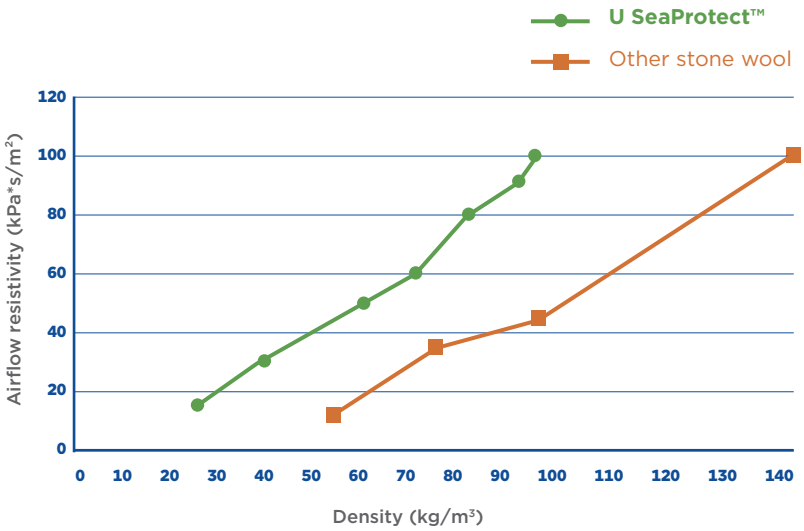
It is commonly believed heavier and denser insulation materials are better at reducing sound. However, the results of sound reduction modelling and measuring demonstrate that, for porous materials like mineral wool, **airflow resistivity and thickness are the most influential factors**. Measured in kPa·s/m², airflow resistivity indicates how well a porous material «blocks» the passage of air under a given difference of pressure.

U SeaProtect™ products - with a density of 36 kg/m³ onwards - have higher airflow resistivity values than traditional stone wool. This is mainly due to the internal structure of the ULTIMATE™ mats: fibre length and diameter, laminar geometry and absence of shot content.

AIRFLOW RESISTIVITY

AIRFLOW RESISTIVITY [KPA.S/M²]			
U SEAPROTECT		STONEWOOL	
24 kg/m³	15	50 kg/m³	11
36 kg/m³	30	70 kg/m³	35
56 kg/m³	50	90 kg/m³	44
66 kg/m³	60		
76 kg/m³	80		
86 kg/m³	90		
90 kg/m³	100	140 kg/m³	102

Saint-Gobain CRIR laboratory; 19/02/2015.



ACHIEVING HIGHER LEVELS OF SOUND REDUCTION WITH LOWER DENSITIES

Although airflow resistivity increases with density, once a certain level of resistivity has been achieved (≥ 30 kPa·s/m²), increasing the density won't necessarily increase the overall performance of the sound protection system. Only the weight and total cost.

DID YOU KNOW?

If the insulating material offers sufficient airflow resistivity (≥ 30 kPa.s/m² for ULTIMATE™), it is more beneficial to increase its thickness rather than its density.

All U SeaProtect™ solutions have high sound absorption properties.
The type of facing is also critical to the final result.

You'll find absorption graph for each product on pages 35 - 47.

ABSORPTION PROPERTIES

PRODUCTS	THICKNESS MM	FACINGS WEIGHTED ABSORPTION (A_w)					
		UNFACED	ALUMINIUM	GLASS CLOTH			B FACING (ALU-GLASS CLOTH COMPOSITE)
			ALU1	G 120 (BLACK)	G 220 (WHITE)	G 420 (WHITE)	B-GL (GLASS CLOTH OUTSIDE) B-AL (ALU FACING OUTSIDE)
U SeaProtect™ Roll / Slab 24	50 mm	α_w= 1.00	α_w= 0.70	α_w= 1.00	α_w= 1.00	α_w= 0.90	α_w= 0.30
U SeaProtect™ Roll / Slab 24	100 mm	α_w= 1.00	α_w= 0.75	–*	–*	–*	–*
U SeaProtect™ Roll / Slab 36	70 mm	α_w= 1.00	α_w= 0.85	–*	α_w= 1.00	α_w= 0.95	α_w= 0.40
U SeaProtect™ Roll / Slab 46	30 mm	α_w=0.80	–*	–*	–*	–*	–*
U SeaProtect™ Roll / Slab 50	60 mm	α_w=1.00	–*	–*	–*	–*	–*
U SeaProtect™ Roll / Slab 56	30 mm	α_w=0.80	α_w=0.80	–*	–*	–*	–*
U SeaProtect™ Roll / Slab 56	60 mm	α_w=1.00	–*	–*	–*	–*	–*
U SeaProtect™ Slab 56	70 mm	α_w=1.00	α_w=0.85	–*	α_w= 1.00	α_w= 0.95	α_w= 0.45
U SeaProtect™ Slab 66	30 mm	α_w=0.85	α_w=0.80	–*	α_w= 0.80	–*	–*
U SeaProtect™ Wired Mat 66	40 mm	α_w=1.00	–*				
U SeaProtect™ Slab 66	50 mm	α_w=1.00	α_w=0.90	–*	α_w= 1.00	α_w= 0.90	α_w= 0.45
U SeaProtect™ Slab 66	70 mm	α_w=0.95	α_w=0.85	α_w= 1.00	–*	α_w= 0.85	–*
U SeaProtect™ Slab 76	20 mm	α_w=0.55	α_w=0.70	–*	–*	–*	–*
U SeaProtect™ Slab 76	25 mm	α_w=0.65	α_w=0.80	–*	α_w= 0.75	α_w= 0.80	α_w= 0.40
U SeaProtect™ Slab 86	50 mm	α_w=0.95	α_w=0.90	–*	α_w= 0.95	α_w= 0.90	α_w= 0.45
U SeaProtect™ Slab 90	50 mm	α_w=0.95	–*	–*	–*	–*	–*

Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

*information on request

Products that cannot be manufactured with this facing.

Optimising sound reduction with U SeaProtect™

Designed for Marine & Offshore applications, the U SeaProtect™ range capitalises on the unique structure of ULTIMATE™ stone wool to optimise sound insulation and sound absorption with lighter, lower density products.

WHY CHOOSE U SEAPROTECT™?

- High airflow resistivity
- Excellent sound absorption
- Up to 45% lighter

without compromising thermal comfort and fire protection.

TAILORED TO YOUR PROJECT

In addition to U SeaProtect™ mineral wool rolls or slabs:

Facings
Choice of facings including aluminium, white glass fabric and black glass tissue.

Tape
SeaProtect Tape G120 and Marine Tape Alu are Marine IMO Low Flame Spread with excellent bonding properties.

Sound protection membrane
Made of visco-elastic polymer with reinforced Alu facing, dB-Flex Alu sound protection membrane increases sound reduction levels by up to 3 dB.

Combining acoustic comfort with light weight

All our solutions - even the lightest, i.e. 24 kg/m^3 - provide a good level of acoustic comfort.

The lightweight constructions presented in this manual prioritise sound reduction, while also providing thermal performance. Although these solutions offer some fire protection, they have been selected to be as cost effective as possible for the level of sound protection targeted. When designing these solutions, we paid particular attention to the cost of the materials and installation.

Demanding applications such as machine rooms require a high level of sound reduction and fire protection. For this, we recommend using our **Full Comfort solutions**.

Getting more from U SeaProtect™

Designed to enhance acoustic comfort, the U SeaProtect™ range adapts to different needs.

Although we usually recommend a density of 36 kg/m^3 in 70 mm thickness for superior sound insulation at an optimised cost, a multitude of other combinations are possible depending on your requirements.

RECONCILE ACOUSTICS AND COST EFFICIENCY

In some cases, products with a density of 24 kg/m^3 in 50 mm thickness can be sufficient, offering a good level of sound insulation while keeping the budget low to minimise costs.

LIGHTER WITH SUPERIOR ACOUSTIC COMFORT

For a lighter system that offers superior sound insulation, we recommend adding a second layer of U SeaProtect™ 24 / 50 mm between the stiffeners. With only 1.2 kg/m^2, you can increase your sound insulation by up to 2 dB.

MINIMUM VALUES

The correct prescription of minimum airborne sound indexes for insulation materials used in bulkheads and decks is essential to ensure the right level of comfort on board. All our U SeaProtect™ solutions have been developed and tested to ensure those minimum requirements: steel solutions have minimum values of 45 dB and could reach up to 49 dB.

Even more silence

HOW DOES SEA PROTECT DB-FLEX WORK?

ISOVER SeaProtect dB-Flex Alu is a sound protection membrane which, combined with U SeaProtect™ Constructions, provides very high sound insulation levels (up to 3 dB additional sound reduction).

This solution is particularly adapted to increase sound protection in the medium-low frequency range for specific areas on board of a ship such as engine or machinery rooms, discos, theatres, cinemas.

THIS ACOUSTIC INSULATION SOLUTION IS BASED ON THE "MASS-SPRING-MASS" PRINCIPLE:

Sea Protect dB-Flex Alu plays the role of "mass", reflecting some of the sound and letting the rest through. Sound is transmitted to the flexible insulation and U SeaProtect™ acts as damper absorbing and reducing the amplitude of the acoustic waves.

The steel/aluminium plate reflects back some of the sound into the insulation, which reabsorbs it;
The sound transmitted to the adjacent room is significantly attenuated.

U SeaProtect™ acoustic properties

Discover all the data you need for acoustic software modelling.

		U SEAPROTECT™ 24	U SEAPROTECT™ 36	U SEAPROTECT™ 46	U SEAPROTECT™ 50	U SEAPROTECT™ 56	U SEAPROTECT™ 66	U SEAPROTECT™ 76	U SEAPROTECT™ 86	U SEAPROTECT™ 90	METHOD
Airflow resistivity	**kPa.s.m^{-2}**	[5-25]	[20-40]	[40-60]	[40-60]	[40-60]	[50-70]	[70-90]	[80-100]	[100-130]	EN29053
Young Modulus at 2% of deformation	**kPa**	[5-15]	[5-15]	[10-25]	[10-25]	[10-25]	[20-40]	[15-25]	[20-30]	[100-30]	C. Langlois, R. Panneton, and N. Atalla. Polynomial relations for quasi-static mechanical characterisation of isotropic poroelastic materials. J. Acoust. Soc. Am., 110:3032–3040, 2001.
Open porosity	**-**	≥ 0.99	≥ 0.98	≥ 0.98	≥ 0.98	≥ 0.98	≥ 0.97	≥ 0.97	≥ 0.96	≥ 0.95	Salissou & Panneton (JAP 2007)
Poisson's ratio	**-**	0	0	0	0	0	0	0	0	0	Approximative value for fibrous material
Damping loss factor	**%**	[5 - 15]	[5 - 15]	[5 - 15]	[5 - 15]	[5 - 15]	[10 - 20]	[10 - 20]	[10 - 20]	[10 - 20]	C. Langlois, R. Panneton, and N. Atalla. Polynomial relations for quasi-static mechanical characterisation of isotropic poroelastic materials. J. Acoust. Soc. Am., 110:3032–3040, 2001.

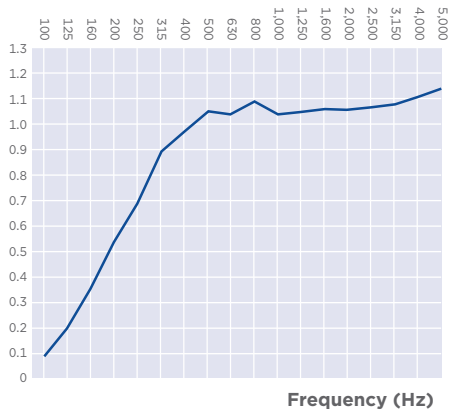
Sound aborption graphs

Discover the sound absorption properties of each U SeaProtect™ product.

FREQUENCY (Hz)	α_s
100	0.09
125	0.19
160	0.36
200	0.55
250	0.69
315	0.89
400	0.97
500	1.05
630	1.04
800	1.09
1,000	1.04
1,250	1.05
1,600	1.06
2,000	1.06
2,500	1.07
3,150	1.08
4,000	1.11
5,000	1.14
α_w	1.00

U SeaProtect™ Roll / Slab 24 50 mm

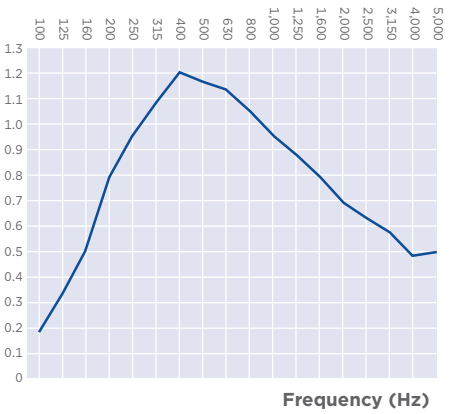
Unfaced



FREQUENCY (Hz)	α_s
100	0.18
125	0.34
160	0.51
200	0.79
250	0.96
315	1.08
400	1.20
500	1.16
630	1.13
800	1.05
1,000	0.96
1,250	0.88
1,600	0.79
2,000	0.69
2,500	0.63
3,150	0.58
4,000	0.48
5,000	0.49
α_w	0.70

U SeaProtect™ Roll / Slab 24 Alu1 50 mm

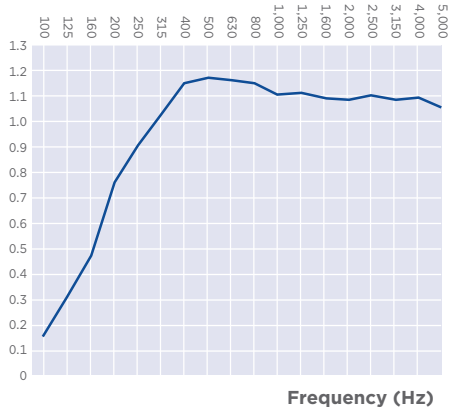
Facing: Alu1



FREQUENCY (Hz)	α_s
100	0.16
125	0.31
160	0.47
200	0.77
250	0.91
315	1.03
400	1.16
500	1.18
630	1.17
800	1.16
1,000	1.11
1,250	1.12
1,600	1.10
2,000	1.09
2,500	1.11
3,150	1.09
4,000	1.10
5,000	1.06
α_w	1.00

U SeaProtect™ Roll / Slab 24 G220 50 mm

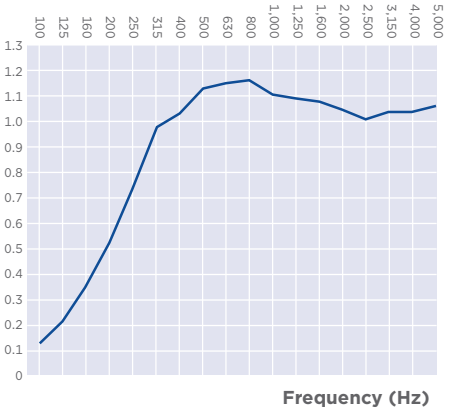
Facing: G220



FREQUENCY (Hz)	α_s
100	0.13
125	0.22
160	0.35
200	0.52
250	0.73
315	0.98
400	1.03
500	1.13
630	1.15
800	1.16
1,000	1.11
1,250	1.09
1,600	1.08
2,000	1.05
2,500	1.01
3,150	1.04
4,000	1.04
5,000	1.06
α_w	1.00

U SeaProtect™ Roll / Slab 24 G120 50 mm

Facing: G120

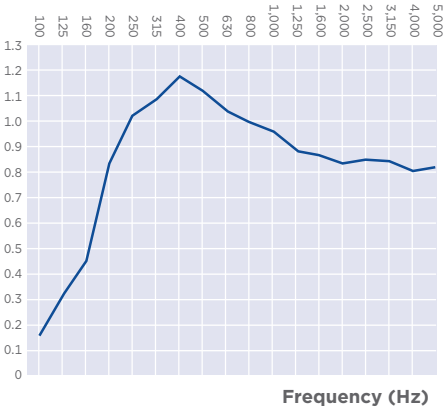


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.16
125	0.31
160	0.45
200	0.83
250	1.02
315	1.08
400	1.17
500	1.11
630	1.04
800	0.99
1,000	0.96
1,250	0.88
1,600	0.86
2,000	0.83
2,500	0.85
3,150	0.84
4,000	0.80
5,000	0.82
α_w	**0.90**

U SeaProtect™ Slab 24 G420 50 mm

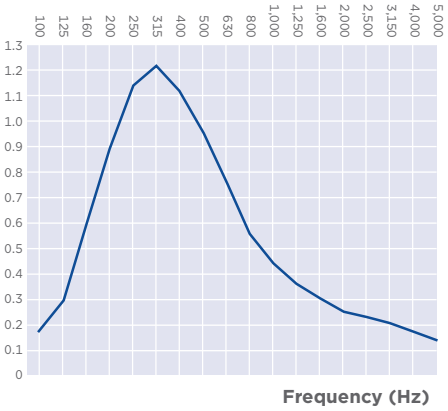
Facing: G420



FREQUENCY (Hz)	α_s
100	0.17
125	0.29
160	0.58
200	0.87
250	1.13
315	1.21
400	1.11
500	0.95
630	0.75
800	0.56
1,000	0.44
1,250	0.36
1,600	0.30
2,000	0.25
2,500	0.23
3,150	0.20
4,000	0.17
5,000	0.14
α_w	**0.30**

U SeaProtect™ Slab 24 B-Al 50 mm
U SeaProtect™ Slab 24 B-Gl 50 mm

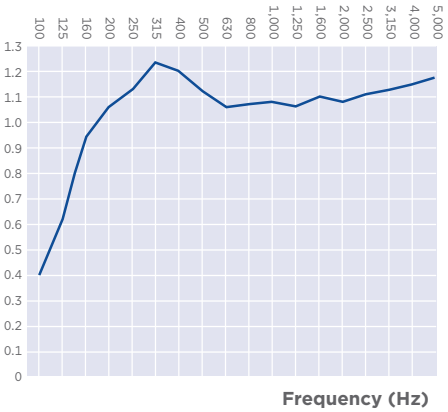
Facing: B-Al/B-Gl



FREQUENCY (Hz)	α_s
100	0.40
125	0.62
160	0.94
200	1.06
250	1.13
315	1.23
400	1.20
500	1.12
630	1.06
800	1.07
1,000	1.08
1,250	1.06
1,600	1.10
2,000	1.08
2,500	1.11
3,150	1.13
4,000	1.15
5,000	1.17
α_w	**1.00**

U SeaProtect™ Roll / Slab 24 100 mm

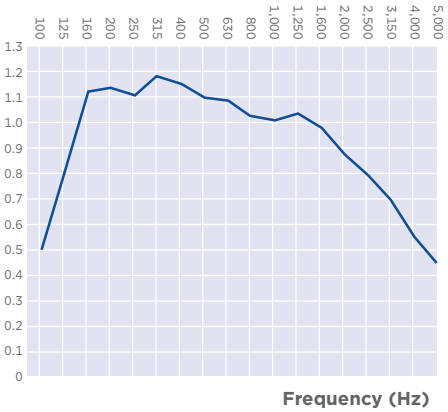
Unfaced



FREQUENCY (Hz)	α_s
100	0.51
125	0.81
160	1.12
200	1.14
250	1.11
315	1.19
400	1.15
500	1.10
630	1.09
800	1.03
1,000	1.01
1,250	1.03
1,600	0.98
2,000	0.87
2,500	0.79
3,150	0.69
4,000	0.55
5,000	0.46
α_w	**0.75**

U SeaProtect™ Roll / Slab 24 Alu1 100 mm

Facing: Alu1

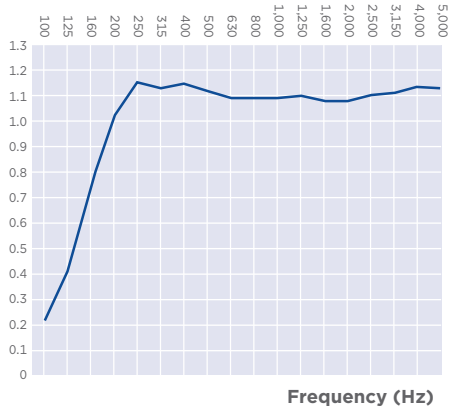


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.22
125	0.40
160	0.74
200	1.01
250	1.15
315	1.12
400	1.14
500	1.11
630	1.08
800	1.08
1,000	1.08
1,250	1.09
1,600	1.07
2,000	1.07
2,500	1.09
3,150	1.10
4,000	1.12
5,000	1.12
α_w	**1.00**

U SeaProtect™ Roll / Slab 36 70 mm

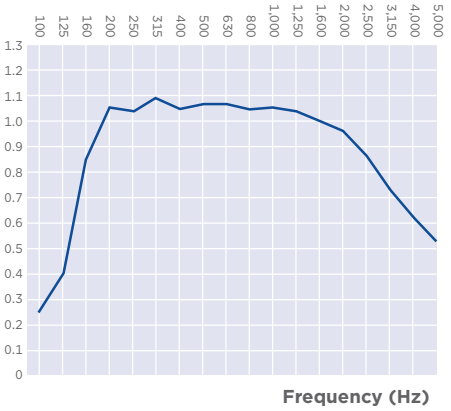
Unfaced



FREQUENCY (Hz)	α_s
100	0.25
125	0.40
160	0.84
200	1.05
250	1.04
315	1.09
400	1.04
500	1.06
630	1.06
800	1.04
1,000	1.05
1,250	1.03
1,600	1.00
2,000	0.96
2,500	0.86
3,150	0.74
4,000	0.62
5,000	0.53
α_w	**0.85**

U SeaProtect™ Roll / Slab 36 Alu1 70 mm

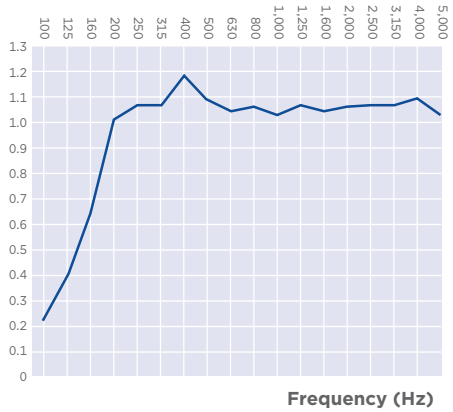
Facing: Alu1



FREQUENCY (Hz)	α_s
100	0.22
125	0.39
160	0.64
200	1.01
250	1.07
315	1.07
400	1.18
500	1.09
630	1.04
800	1.06
1,000	1.03
1,250	1.07
1,600	1.04
2,000	1.06
2,500	1.07
3,150	1.07
4,000	1.09
5,000	1.03
α_w	**1.00**

U SeaProtect™ Slab 36 G220 70 mm

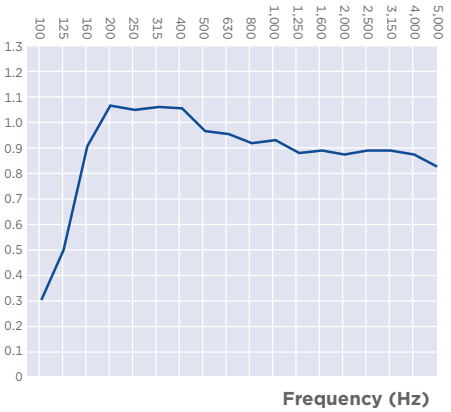
Facing: G220



FREQUENCY (Hz)	α_s
100	0.29
125	0.50
160	0.91
200	1.06
250	1.04
315	1.06
400	1.05
500	0.96
630	0.95
800	0.92
1,000	0.93
1,250	0.88
1,600	0.89
2,000	0.87
2,500	0.89
3,150	0.89
4,000	0.87
5,000	0.82
α_w	**0.95**

U SeaProtect™ Slab 36 G420 70 mm

Facing: G420

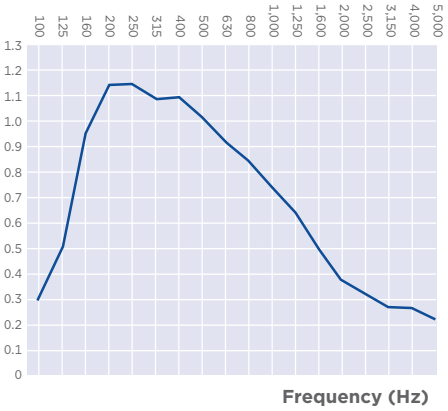


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.28
125	0.49
160	0.94
200	1.14
250	1.15
315	1.09
400	1.10
500	1.02
630	0.92
800	0.84
1,000	0.75
1,250	0.65
1,600	0.50
2,000	0.38
2,500	0.31
3,150	0.26
4,000	0.26
5,000	0.21
α_w	0.40

U SeaProtect™ Slab 36 B-Al 70 mm
U SeaProtect™ Slab 36 B-Gl 70 mm

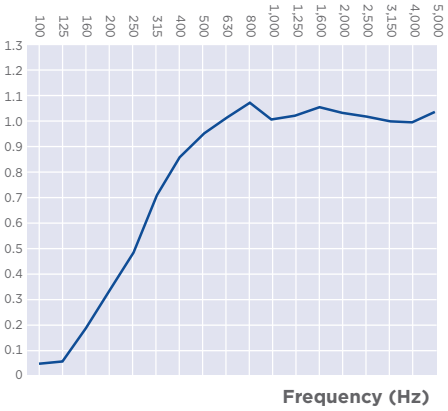
Facing: B-Al/B-Gl



FREQUENCY (Hz)	α_s
100	0.05
125	0.06
160	0.19
200	0.34
250	0.48
315	0.71
400	0.86
500	0.95
630	1.01
800	1.07
1,000	1.00
1,250	1.02
1,600	1.05
2,000	1.03
2,500	1.02
3,150	1.00
4,000	0.99
5,000	1.03
α_w	0.80

U SeaProtect™ Roll / Slab 46 30 mm

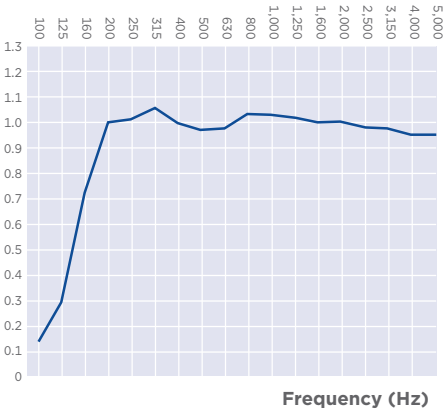
Unfaced



FREQUENCY (Hz)	α_s
100	0.14
125	0.29
160	0.74
200	0.99
250	1.01
315	1.05
400	0.99
500	0.97
630	0.98
800	1.03
1,000	1.03
1,250	1.02
1,600	1.00
2,000	1.00
2,500	0.98
3,150	0.98
4,000	0.95
5,000	0.95
α_w	1.00

U SeaProtect™ Roll / Slab 50 60 mm

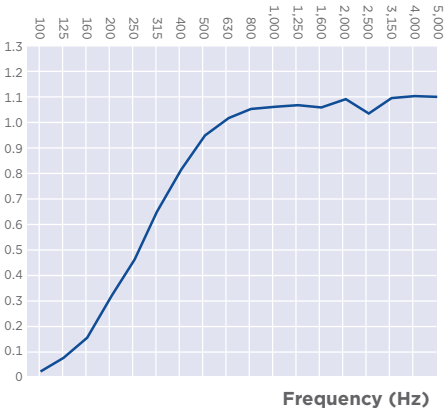
Unfaced



FREQUENCY (Hz)	α_s
100	0.03
125	0.09
160	0.17
200	0.33
250	0.47
315	0.66
400	0.83
500	0.96
630	1.02
800	1.06
1,000	1.07
1,250	1.07
1,600	1.06
2,000	1.09
2,500	1.04
3,150	1.10
4,000	1.11
5,000	1.11
α_w	0.80

U SeaProtect™ Roll / Slab 56 30 mm

Unfaced

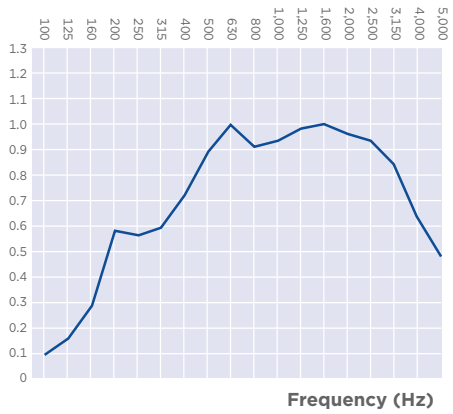


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.09
125	0.17
160	0.29
200	0.58
250	0.56
315	0.59
400	0.71
500	0.89
630	1.00
800	0.91
1,000	0.93
1,250	0.98
1,600	1.00
2,000	0.96
2,500	0.93
3,150	0.84
4,000	0.64
5,000	0.48
α_w	**0.80**

U SeaProtect™ Roll / Slab 56 Alu1 30 mm

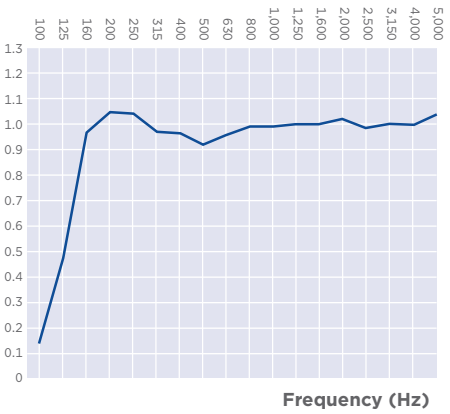
Facing: Alu1



FREQUENCY (Hz)	α_s
100	0.13
125	0.44
160	0.97
200	1.05
250	1.04
315	0.97
400	0.97
500	0.92
630	0.96
800	0.99
1,000	0.99
1,250	1.00
1,600	1.00
2,000	1.02
2,500	0.98
3,150	1.00
4,000	1.00
5,000	1.04
α_w	**1.00**

U SeaProtect™ Roll / Slab 56 60 mm

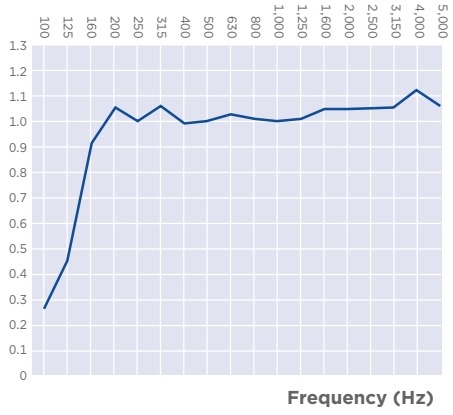
Unfaced



FREQUENCY (Hz)	α_s
100	0.27
125	0.45
160	0.92
200	1.05
250	1.00
315	1.06
400	0.99
500	1.00
630	1.02
800	1.01
1,000	1.00
1,250	1.01
1,600	1.04
2,000	1.04
2,500	1.05
3,150	1.05
4,000	1.12
5,000	1.06
α_w	**1.00**

U SeaProtect™ Slab 56 70 mm

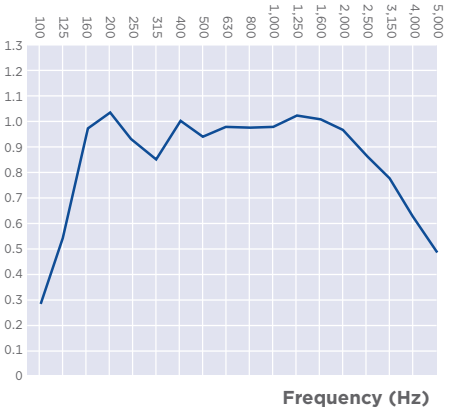
Unfaced



FREQUENCY (Hz)	α_s
100	0.27
125	0.53
160	0.97
200	1.03
250	0.93
315	0.85
400	1.01
500	0.94
630	0.98
800	0.98
1,000	0.98
1,250	1.02
1,600	1.01
2,000	0.97
2,500	0.87
3,150	0.78
4,000	0.63
5,000	0.49
α_w	**0.85**

U SeaProtect™ Slab 56 Alu1 70 mm

Facing: Alu1

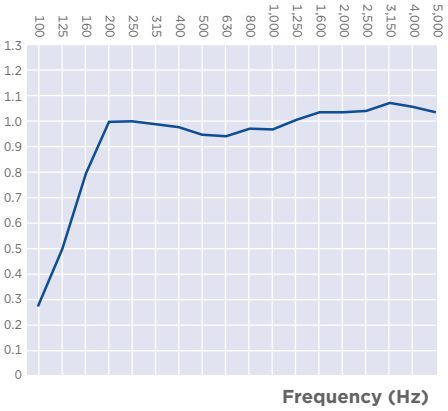


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.28
125	0.50
160	0.80
200	1.00
250	1.00
315	0.99
400	0.98
500	0.95
630	0.94
800	0.97
1,000	0.97
1,250	1.01
1,600	1.03
2,000	1.03
2,500	1.04
3,150	1.07
4,000	1.06
5,000	1.03
α_w	**1.00**

U SeaProtect™ Slab 56 G220 70 mm

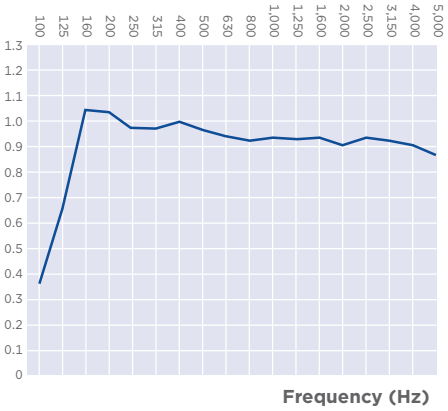
Facing: G220



FREQUENCY (Hz)	α_s
100	0.35
125	0.65
160	1.04
200	1.04
250	0.97
315	0.97
400	0.99
500	0.96
630	0.94
800	0.92
1,000	0.93
1,250	0.93
1,600	0.93
2,000	0.90
2,500	0.93
3,150	0.92
4,000	0.90
5,000	0.86
α_w	**0.95**

U SeaProtect™ Slab 56 G420 70 mm

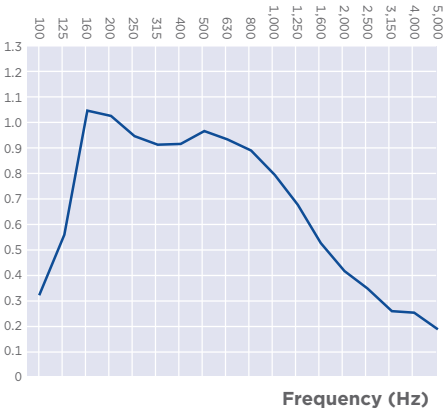
Facing: G420



FREQUENCY (Hz)	α_s
100	0.32
125	0.55
160	1.04
200	1.02
250	0.94
315	0.91
400	0.91
500	0.96
630	0.93
800	0.89
1,000	0.80
1,250	0.69
1,600	0.53
2,000	0.42
2,500	0.35
3,150	0.26
4,000	0.25
5,000	0.19
α_w	**0.45**

U SeaProtect™ Slab 56 B-Al 70 mm
U SeaProtect™ Slab 56 B-Gl 70 mm

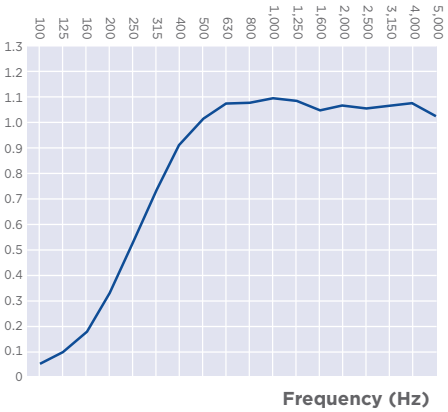
Facing: B-Al/B-Gl



FREQUENCY (Hz)	α_s
100	0.05
125	0.10
160	0.18
200	0.33
250	0.52
315	0.73
400	0.91
500	1.01
630	1.07
800	1.07
1,000	1.09
1,250	1.08
1,600	1.04
2,000	1.06
2,500	1.05
3,150	1.06
4,000	1.07
5,000	1.02
α_w	**0.85**

U SeaProtect™ Slab 66 30 mm

Unfaced

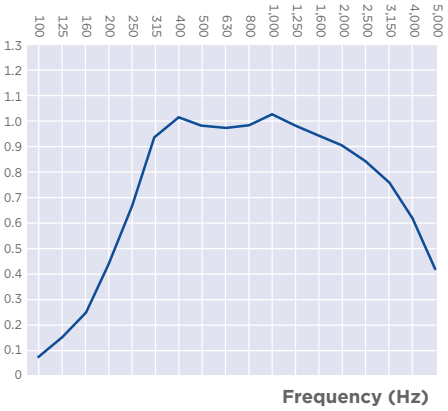


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.07
125	0.15
160	0.24
200	0.43
250	0.66
315	0.93
400	1.01
500	0.98
630	0.97
800	0.98
1,000	1.02
1,250	0.98
1,600	0.94
2,000	0.90
2,500	0.84
3,150	0.76
4,000	0.62
5,000	0.42
α_w	**0.80**

U SeaProtect™ Slab 66 Alu1 30 mm

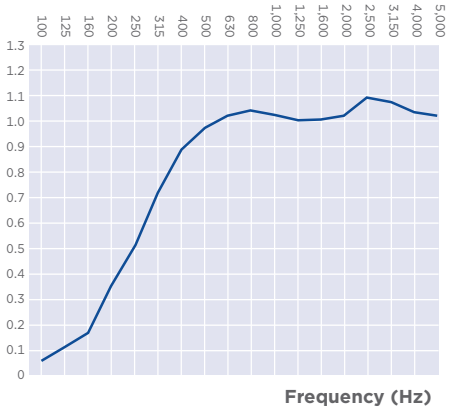
Facing: Alu1



FREQUENCY (Hz)	α_s
100	0.06
125	0.11
160	0.17
200	0.35
250	0.51
315	0.71
400	0.88
500	0.97
630	1.02
800	1.04
1,000	1.02
1,250	1.00
1,600	1.00
2,000	1.02
2,500	1.09
3,150	1.07
4,000	1.03
5,000	1.02
α_w	**0.80**

U SeaProtect™ Slab 66 G220 30 mm

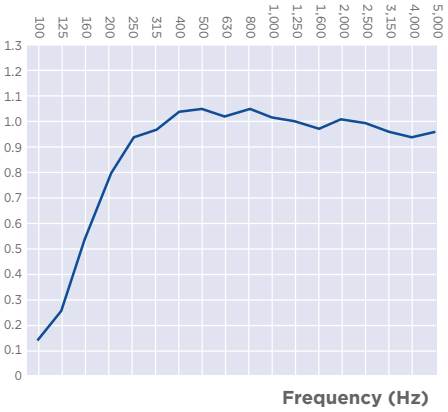
Facing: G220



FREQUENCY (Hz)	α_s
100	0.14
125	0.26
160	0.54
200	0.80
250	0.94
315	0.97
400	1.04
500	1.05
630	1.02
800	1.05
1,000	1.01
1,250	1.00
1,600	0.97
2,000	1.01
2,500	1.00
3,150	0.96
4,000	0.94
5,000	0.96
α_w	**1.00**

U SeaProtect™ Wired Mat 66 40 mm

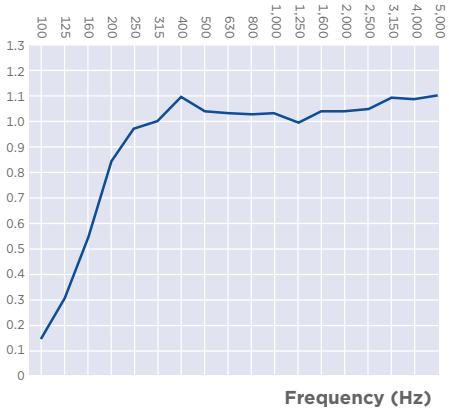
Unfaced



FREQUENCY (Hz)	α_s
100	0.14
125	0.30
160	0.55
200	0.84
250	0.97
315	1.00
400	1.09
500	1.04
630	1.03
800	1.02
1,000	1.03
1,250	0.99
1,600	1.03
2,000	1.04
2,500	1.04
3,150	1.09
4,000	1.08
5,000	1.10
α_w	**1.00**

U SeaProtect™ Slab 66 50 mm

Unfaced

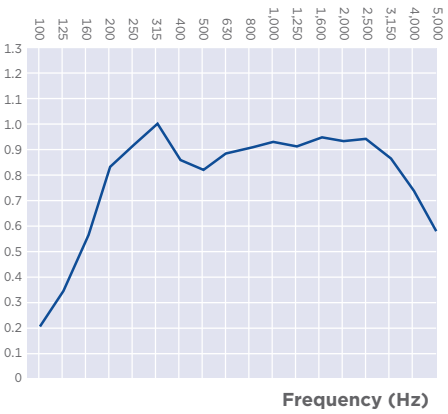


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.22
125	0.36
160	0.57
200	0.84
250	0.93
315	1.01
400	0.87
500	0.83
630	0.89
800	0.91
1,000	0.94
1,250	0.92
1,600	0.96
2,000	0.94
2,500	0.95
3,150	0.88
4,000	0.75
5,000	0.60
α_w	**0.90**

U SeaProtect™ Slab 66 Alu1 50 mm

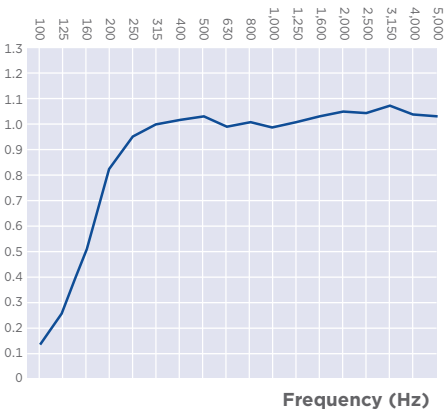
Facing: Alu1



FREQUENCY (Hz)	α_s
100	0.14
125	0.26
160	0.52
200	0.83
250	0.96
315	1.00
400	1.02
500	1.04
630	0.99
800	1.01
1,000	0.99
1,250	1.01
1,600	1.03
2,000	1.05
2,500	1.05
3,150	1.07
4,000	1.04
5,000	1.03
α_w	**1.00**

U SeaProtect™ Slab 66 G220 50 mm

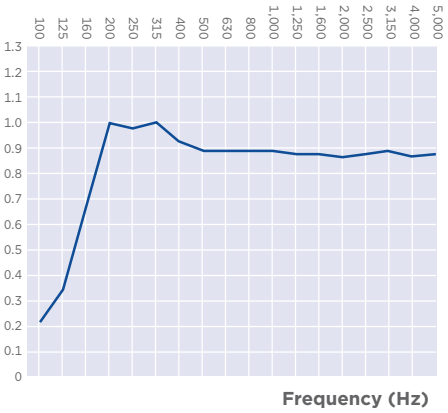
Facing: G220



FREQUENCY (Hz)	α_s
100	0.21
125	0.33
160	0.66
200	0.99
250	0.97
315	0.99
400	0.92
500	0.89
630	0.88
800	0.88
1,000	0.88
1,250	0.87
1,600	0.87
2,000	0.86
2,500	0.87
3,150	0.88
4,000	0.86
5,000	0.86
α_w	**0.90**

U SeaProtect™ Slab 66 G420 50 mm

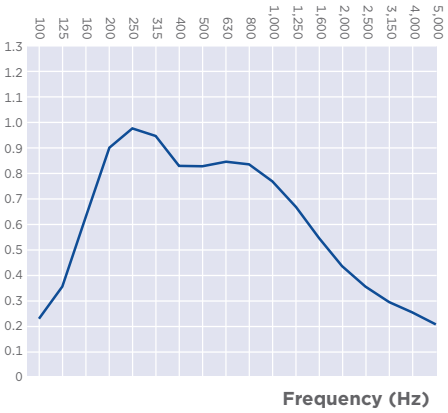
Facing: G420



FREQUENCY (Hz)	α_s
100	0.23
125	0.35
160	0.62
200	0.90
250	0.98
315	0.95
400	0.83
500	0.83
630	0.85
800	0.84
1,000	0.77
1,250	0.67
1,600	0.55
2,000	0.44
2,500	0.36
3,150	0.30
4,000	0.26
5,000	0.21
α_w	**0.45**

U SeaProtect™ Slab 66 B-Al 50 mm
U SeaProtect™ Slab 66 B-Gl 50 mm

Facing: B-Al/B-Gl

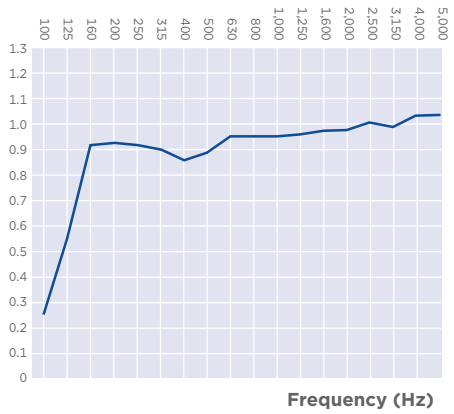


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.25
125	0.54
160	0.92
200	0.93
250	0.92
315	0.90
400	0.86
500	0.89
630	0.95
800	0.95
1,000	0.95
1,250	0.96
1,600	0.98
2,000	0.98
2,500	1.01
3,150	0.99
4,000	1.04
5,000	1.04
α_w	**0.95**

U SeaProtect™ Slab 66 70 mm

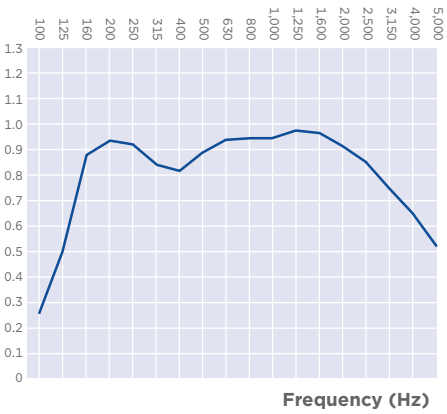
Unfaced



FREQUENCY (Hz)	α_s
100	0.25
125	0.49
160	0.88
200	0.94
250	0.92
315	0.84
400	0.82
500	0.89
630	0.94
800	0.95
1,000	0.95
1,250	0.98
1,600	0.96
2,000	0.91
2,500	0.85
3,150	0.75
4,000	0.65
5,000	0.52
α_w	**0.85**

U SeaProtect™ Slab 66 Alu1 70 mm

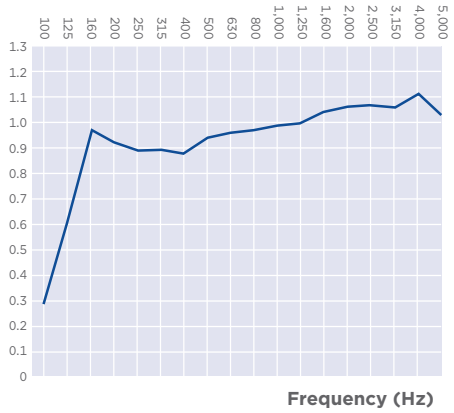
Facing: Alu1



FREQUENCY (Hz)	α_s
100	0.28
125	0.60
160	0.97
200	0.92
250	0.89
315	0.89
400	0.88
500	0.94
630	0.96
800	0.97
1,000	0.99
1,250	1.00
1,600	1.04
2,000	1.06
2,500	1.07
3,150	1.06
4,000	1.11
5,000	1.03
α_w	**1.00**

U SeaProtect™ Slab 66 G120 70 mm

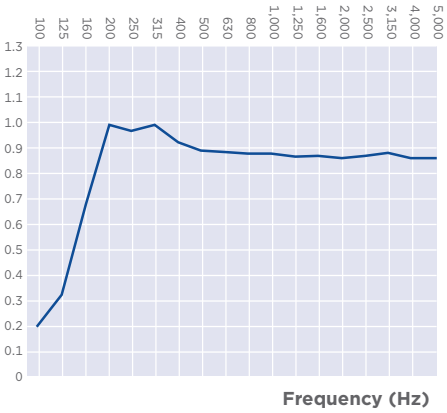
Facing: G120



FREQUENCY (Hz)	α_s
100	0.30
125	0.62
160	0.96
200	0.92
250	0.90
315	0.85
400	0.80
500	0.84
630	0.87
800	0.87
1,000	0.85
1,250	0.81
1,600	0.81
2,000	0.79
2,500	0.79
3,150	0.77
4,000	0.75
5,000	0.70
α_w	**0.85**

U SeaProtect™ Slab 66 G420 70 mm

Facing: G420

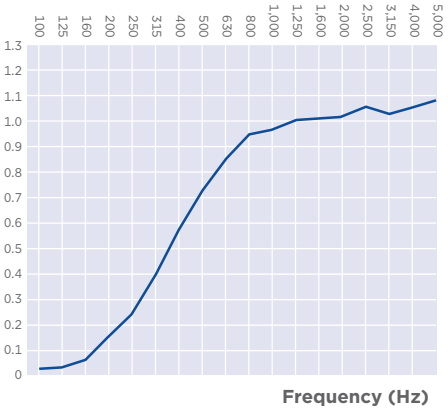


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.03
125	0.03
160	0.06
200	0.15
250	0.24
315	0.39
400	0.57
500	0.72
630	0.84
800	0.94
1,000	0.96
1,250	1.00
1,600	1.00
2,000	1.01
2,500	1.05
3,150	1.02
4,000	1.04
5,000	1.07
α_w	**0.55**

U SeaProtect™ Slab 76 20 mm

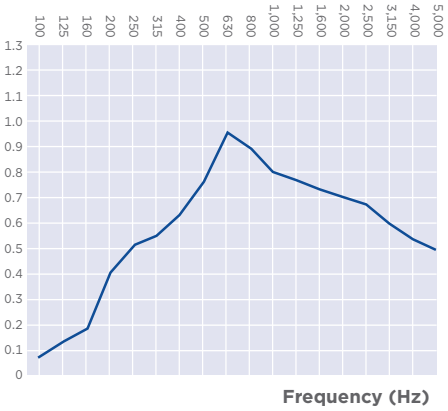
Unfaced



FREQUENCY (Hz)	α_s
100	0.07
125	0.13
160	0.19
200	0.41
250	0.51
315	0.55
400	0.63
500	0.76
630	0.95
800	0.90
1,000	0.79
1,250	0.77
1,600	0.73
2,000	0.70
2,500	0.67
3,150	0.60
4,000	0.54
5,000	0.49
α_w	**0.70**

U SeaProtect™ Slab 76 Alu1 20 mm

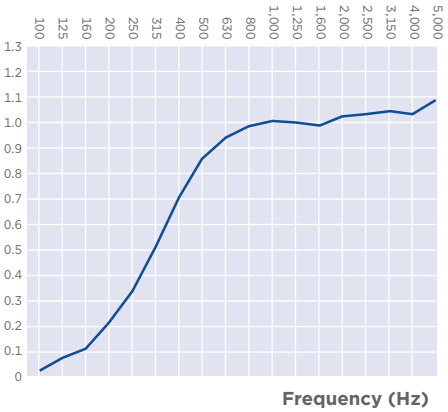
Facing: Alu1



FREQUENCY (Hz)	α_s
100	0.03
125	0.08
160	0.12
200	0.22
250	0.34
315	0.52
400	0.71
500	0.86
630	0.94
800	0.99
1,000	1.01
1,250	1.00
1,600	0.99
2,000	1.02
2,500	1.03
3,150	1.04
4,000	1.03
5,000	1.09
α_w	**0.65**

U SeaProtect™ Slab 76 25 mm

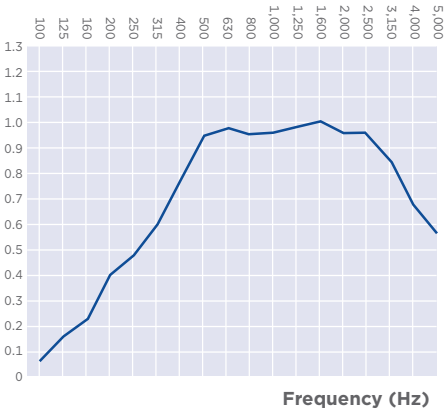
Unfaced



FREQUENCY (Hz)	α_s
100	0.06
125	0.15
160	0.22
200	0.40
250	0.47
315	0.60
400	0.77
500	0.94
630	0.97
800	0.95
1,000	0.95
1,250	0.97
1,600	1.00
2,000	0.95
2,500	0.95
3,150	0.86
4,000	0.68
5,000	0.56
α_w	**0.80**

U SeaProtect™ Slab 76 Alu1 25 mm

Facing: Alu1

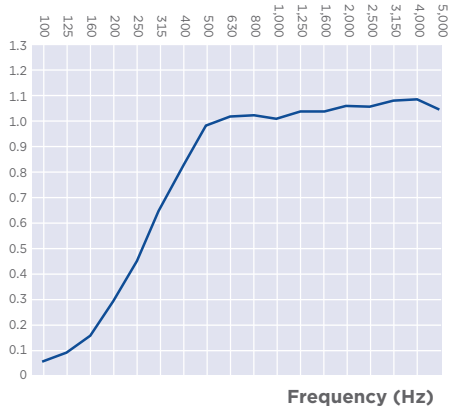


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.05
125	0.09
160	0.15
200	0.29
250	0.44
315	0.64
400	0.82
500	0.98
630	1.01
800	1.02
1,000	1.00
1,250	1.03
1,600	1.03
2,000	1.05
2,500	1.05
3,150	1.07
4,000	1.07
5,000	1.04
α_w	**0.75**

U SeaProtect™ Slab 76 G220 25 mm

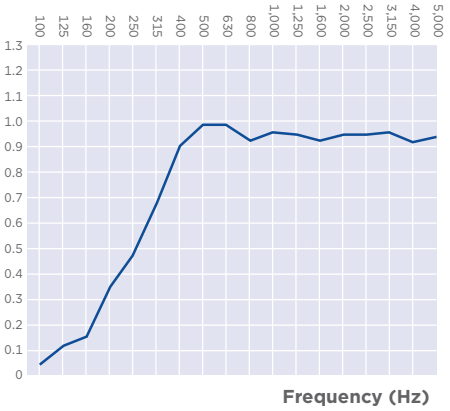
Facing: G220



FREQUENCY (Hz)	α_s
100	0.04
125	0.12
160	0.16
200	0.35
250	0.48
315	0.68
400	0.90
500	0.99
630	0.99
800	0.93
1,000	0.96
1,250	0.95
1,600	0.93
2,000	0.95
2,500	0.95
3,150	0.96
4,000	0.92
5,000	0.94
α_w	**0.80**

U SeaProtect™ Slab 76 G420 25 mm

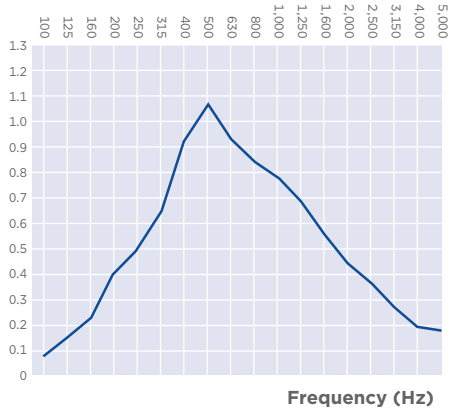
Facing: G420



FREQUENCY (Hz)	α_s
100	0.08
125	0.15
160	0.24
200	0.40
250	0.50
315	0.65
400	0.92
500	1.07
630	0.93
800	0.85
1,000	0.78
1,250	0.69
1,600	0.56
2,000	0.45
2,500	0.37
3,150	0.28
4,000	0.20
5,000	0.19
α_w	**0.40**

U SeaProtect™ Slab 76 B-Gl 25 mm

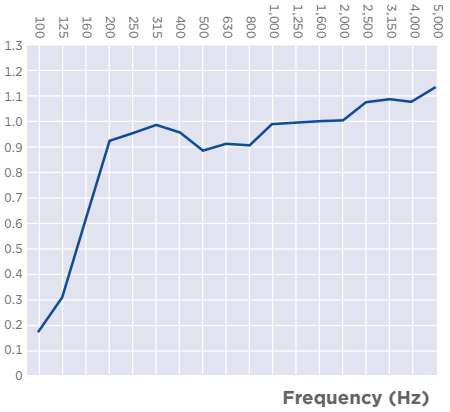
Facing: B-Gl



FREQUENCY (Hz)	α_s
100	0.17
125	0.31
160	0.62
200	0.92
250	0.95
315	0.98
400	0.95
500	0.88
630	0.91
800	0.90
1,000	0.99
1,250	0.99
1,600	1.00
2,000	1.00
2,500	1.07
3,150	1.08
4,000	1.07
5,000	1.13
α_w	**0.95**

U SeaProtect™ Slab 86 50 mm

Unfaced

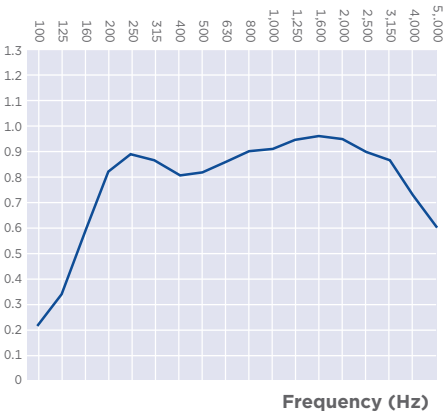


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.22
125	0.34
160	0.59
200	0.82
250	0.89
315	0.87
400	0.81
500	0.82
630	0.86
800	0.90
1,000	0.91
1,250	0.95
1,600	0.96
2,000	0.95
2,500	0.90
3,150	0.87
4,000	0.74
5,000	0.61
α_w	**0.90**

U SeaProtect™ Slab 86 Alu1 50 mm

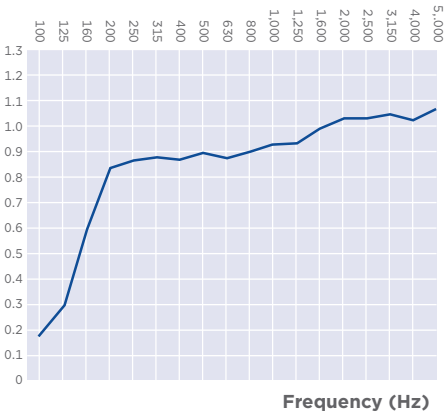
Facing: Alu1



FREQUENCY (Hz)	α_s
100	0.18
125	0.30
160	0.61
200	0.84
250	0.87
315	0.88
400	0.87
500	0.90
630	0.88
800	0.90
1,000	0.93
1,250	0.94
1,600	0.99
2,000	1.03
2,500	1.03
3,150	1.05
4,000	1.03
5,000	1.07
α_w	**0.95**

U SeaProtect™ Slab 86 G220 50 mm

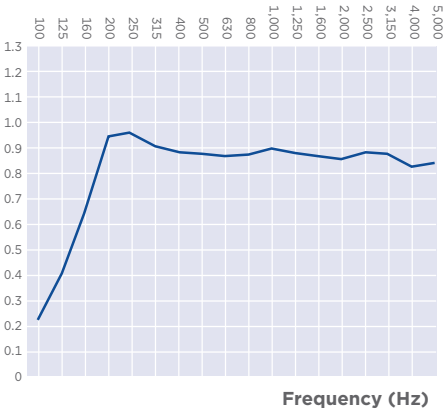
Facing: G220



FREQUENCY (Hz)	α_s
100	0.22
125	0.40
160	0.65
200	0.95
250	0.96
315	0.91
400	0.89
500	0.88
630	0.87
800	0.88
1,000	0.90
1,250	0.88
1,600	0.87
2,000	0.86
2,500	0.89
3,150	0.88
4,000	0.83
5,000	0.84
α_w	**0.90**

U SeaProtect™ Slab 86 G420 50 mm

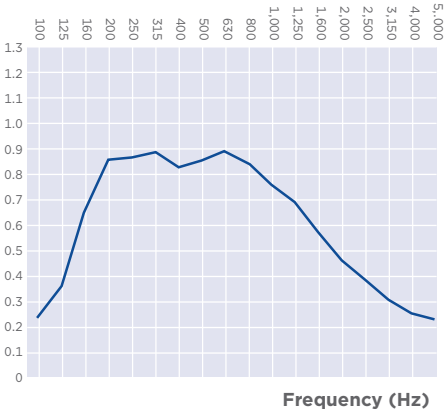
Facing: G420



FREQUENCY (Hz)	α_s
100	0.24
125	0.37
160	0.65
200	0.85
250	0.86
315	0.88
400	0.82
500	0.85
630	0.88
800	0.84
1,000	0.76
1,250	0.69
1,600	0.57
2,000	0.46
2,500	0.39
3,150	0.31
4,000	0.25
5,000	0.23
α_w	**0.45**

U SeaProtect Slab 86 B-Al 50 mm

Facing: B-Al

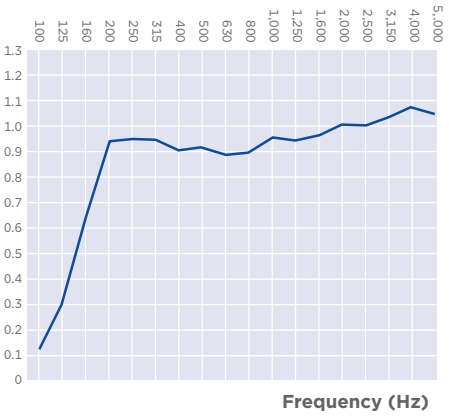


Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

FREQUENCY (Hz)	α_s
100	0.13
125	0.32
160	0.65
200	0.95
250	0.95
315	0.95
400	0.91
500	0.92
630	0.89
800	0.90
1000	0.96
1250	0.95
1600	0.97
2000	1.01
2500	1.01
3150	1.04
4000	1.07
5000	1.05
α_w	**0.95**

U SeaProtect™ Slab 90 50 mm

Unfaced



Platform Supply Vessel PSV PX 105 CNN. La Naval, Spain, ©Oliver Design

Measurements according to ISO 354:2003 and weighted sound absorption coefficient α_w calculated according to ISO 11654:1998

4. THERMAL COMFORT

Thermal comfort is often the first element evoked when referring to marine wellbeing. In a green ship, the concept goes beyond simple temperature control to ensuring crew and passengers are warm enough while also minimising energy consumption.

Creating the ideal balance
BETWEEN COMFORT & ENERGY SAVINGS

Focusing on ambient temperature and humidity is an essential aspect of the ship design process, particularly for overnight accommodation units. This involves both an efficient HVAC system and insulation with low thermal conductivity.

INNOVATING A NEW KIND OF STONE WOOL FOR THERMAL COMFORT

Based on years of intensive R&D and testing, ISOVER has developed a Marine & Offshore portfolio with exceptional thermal insulation properties. Drawing on the unique structure of **ULTIMATE™** stone wool, the systems with U SeaProtect™ combine **low thermal transmittance (U-value) with acoustic comfort and fire protection**.

These properties derive from the **unique fiberising** process that converts 100 % of the raw material into fibres. This laminar microstructure is totally shot free with tightly controlled fibre length and diameter. This not only ensures excellent airflow resistivity values but also outstanding sound protection and thermal performance at a lower density.

Achieving low thermal conductivity

Thermal conductivity, **lambda λ(T)**, measured in units of **W/(m*K)**, indicates how easily heat flows through a material (in other words, how well that material conducts heat). The lower the thermal conductivity, the less conductive the material and the better the insulation. The thermal conductivity of a material increases as the temperature increases.

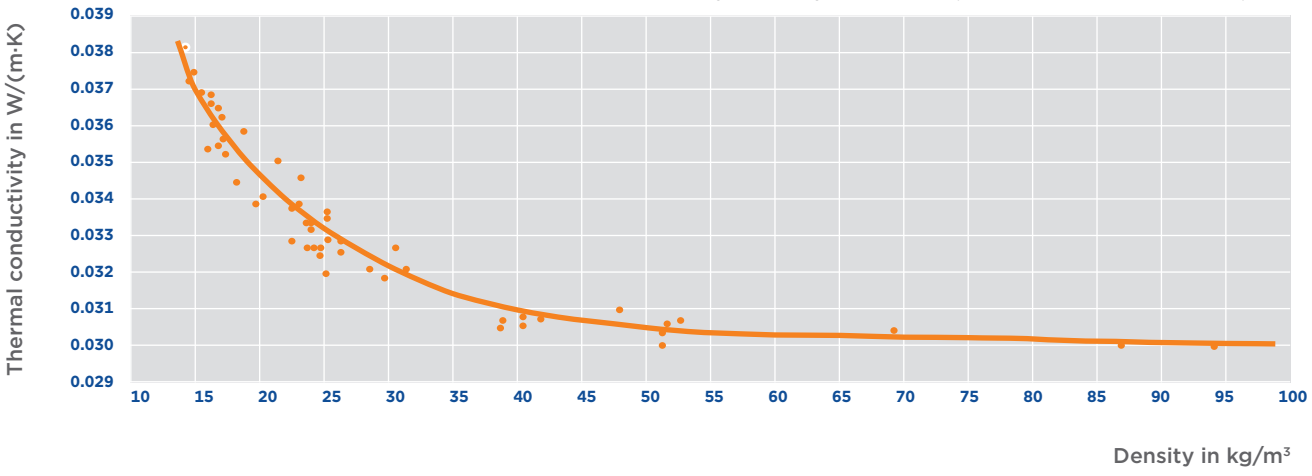
DID YOU KNOW?

The thermal conductivity of U SeaProtect™ products has been tested by FIW, a German-based laboratory and recognised expert in thermal performance measurements. Thermal conductivity is measured according to EN 12667 for flat products (wired mats, slabs and rolls) and ISO 8497 for pipe sections.

For a given thickness of insulation, installing a product with a lower conductivity λ in W/(m*K) will reduce the heat loss. This in turn generates more energy and budget savings.

THERMAL CONDUCTIVITY MEASUREMENT AT 10 °C

FIW laboratory, Germany, ULTIMATE™ products from ISOVER Lübz plant



DENSITIES	THERMAL CONDUCTIVITY λ
13 kg/m³	0.039 W/m.K
24 kg/m³	0.034 W/m.K
36 to 46 kg/m³	0.032 W/m.K
50 to 100 kg/m³	0.031W/m.K

Achieving low U-values

Expressed in W/(m².K), the U-value is a measure of how much heat is lost through a given thickness of a particular material. The lower the U-value, the better the insulation.

Reducing the U-value of walls is crucial for the comfort of passengers aboard a ship and also for limiting energy consumed by HVAC (Heating Ventilation and Air Conditioning) systems. HVAC can represent up to 35% of a cruise ship's total energy consumption.
The unique microstructure of ULTIMATE™ stone wool means that U SeaProtect™ products have excellent U-values. Products (with λ 0.031) in 50 mm thickness have a **U-value below ≤ 0.6 W/(m².K)** and products in 70 mm **≤ 0.45 W/(m².K)**.

Norwegian Escape / Norwegian Cruise Line

U-Value of products

FOR STEEL DIVISIONS

MAIN U SEA-PROTECT™ DENSITIES [KG/M³]	THERMAL CONDUC-TIVITY W/(M*K)	PRODUCTS FORM	U-VALUE (IN W/(M².K)) THICKNESS									
			20 MM	25 MM	30 MM	40 MM	50 MM	60 MM	70 MM	80 MM	90 MM	100 MM
24 kg/m³	0.034	Roll / Slab	1.222	1.049	0.920	0.739	0.619	0.533	0.468	0.417	0.377	0.343
36 kg/m³	0.032	Roll / Slab	1.174	1.005	0.880	0.706	0.591	0.508	0.446	0.397	0.358	0.327
46 kg/m³	0.032	Roll / Slab	1.174	1.005	0.880	0.706	0.591	0.508	0.446	0.397	0.358	0.327
50 kg/m³	0.031	Roll / Slab	1.149	0.983	0.860	0.689	0.576	0.495	0.434	0.387	0.349	0.318
56 kg/m³	0.031	Roll / Slab	1.149	0.983	0.860	0.689	0.576	0.495	0.434	0.387	0.349	0.318
66 kg/m³	0.031	Slab / Wired Mat	1.149	0.983	0.860	0.689	0.576	0.495	0.434	0.387	0.349	0.318
76 kg/m³	0.031	Slab	1.149	0.983	0.860	0.689	0.576	0.495	0.434	0.387		
86 kg/m³	0.031	Slab	1.149	0.983	0.860	0.689	0.576	0.495	0.434	0.387		
90 kg/m³	0.031	Slab	1.149	0.983	0.860	0.689	0.576	0.495	0.434	0.387		

FOR ALUMINIUM DIVISIONS

MAIN U SEA-PROTECT™ DENSITIES [KG/M³]	THERMAL CONDUC-TIVITY W/(M*K)	PRODUCTS FORM	U-VALUE (IN W/(M².K)) THICKNESS									
			20 MM	25 MM	30 MM	40 MM	50 MM	60 MM	70 MM	80 MM	90 MM	100 MM
66 kg/m³	0.031	Slab / Wired Mat	1.150	0.984	0.861	0.690	0.577	0.496	0.435	0.388	0.350	0.318

For the method of calculating the U-value of our products, please see page 59

Prioritising thermal comfort

Based on the thermal performance of U SeaProtect™ products for thermal applications, ISOVER recommends using the **roll format with a density of 24 kg/m³**.

This offers an optimised balance between thermal performance (thermal conductivity of 0.034 W/(m*K), and acoustics, mechanics and logistics - compressed rolls reduce transport costs.

To achieve a higher comfort level, apply products in 24 kg/m³ 100 mm (either as one single layer or 2 layers of 50 mm).

DENSITY KG/M³]	THICKNESS MM	PRODUCTS	FACINGS			THERMAL CONDUCTIVITY [W/M.K]	U-VALUE [W/M².K]
			UNFACED	ALUMINIUM	GLASS CLOTH		
				ALU1	G220		
24 kg/m³	50	U SeaProtect™ Roll 24 50 mm	●	●	●	0.034	0.619
	100	U SeaProtect™ Roll 24 100 mm	●	●	●		0.343

Piana, Brodogradjevna Industrija Split D.O.O., Croatia, 2011

Maximum energy efficiency
FOR HIGH-TEMPERATURE EQUIPMENT

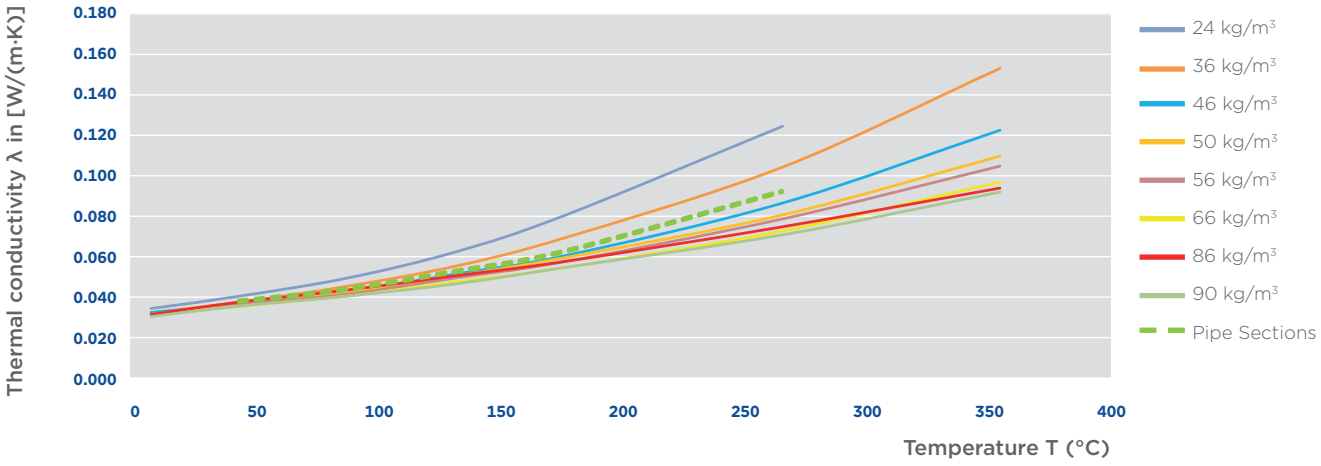
Thermal conductivity at high temperatures

Insulating high-temperature equipment improves energy efficiency (less heat loss), while also protecting workers, crew and passengers.

U SeaProtect™ achieves excellent thermal conductivity values across the entire temperature range and this high level of thermal performance significantly reduces energy losses as the operational temperature increases.

DENSITY [KG/M³]	PRODUCTS	THERMAL CONDUCTIVITY λ(T) W/(M*K) TEMPERATURE (°C)						
		10°C	50°C	100°C	150°C	200°C	300°C	400°C
24 kg/m³	U SeaProtect™™ Roll / Slab 24	0.034	0.040	0.049	0.062	0.080	0.124	-
36 kg/m³	U SeaProtect™ Roll / Slab 36	0.032	0.037	0.045	0.055	0.069	0.104	0.153
46 kg/m³	U SeaProtect™ Roll / Slab 46	0.032	0.036	0.042	0.051	0.060	0.086	0.122
50 kg/m³	U SeaProtect™ Roll / Slab 50	0.031	0.036	0.042	0.050	0.059	0.080	0.109
56 kg/m³	U SeaProtect™ Roll / Slab 56	0.031	0.036	0.041	0.049	0.057	0.078	0.104
66 kg/m³	U SeaProtect™ Slab 66 U SeaProtect™ Wired Mat 66	0.031	0.035	0.040	0.047	0.054	0.072	0.096
76 kg/m³	U SeaProtect™ Slab 76	0.031	0.035	0.040	0.047	0.054	0.072	0.096
86 kg/m³	U SeaProtect™ Slab 86	0.031	0.037	0.043	0.050	0.057	0.074	0.093
90 kg/m³	U SeaProtect™ Slab 90	0.031	0.035	0.040	0.046	0.054	0.070	0.091
60-90 kg/m³	U TECH Pipe Section MT 4.0 U Protect™ Pipe Section Alu2		0.037	0.043	0.052	0.062	0.092	

U SEAPROTECT™ THERMAL EFFICIENCY λ(T)



Adapted to diverse needs

The U SeaProtect™ range adapts to a wide array of different requirements.

LARGE FLAT-SURFACED EQUIPMENT

For large scale equipment with flat surfaces or a low curve (diameters Ø ≥ 2 m), such as vessels, big tanks or boilers, we recommend using U SeaProtect™ slabs or rolls.

CYLINDERS

For cylindrical equipment with diameter Ø ≥ 200 mm, such as large pipes or small and medium size tanks, U SeaProtect™ Wired Mats are ideal.

NARROW PIPES

For pipes with a diameter Ø ≤ 200 mm, we suggest opting for pipe sections.

HIGH TEMPERATURE EQUIPMENT

If you need to fulfil a certain fire-rating level, for large scale equipment having flat surfaces or with a low curve such as vessels, big tanks or boilers (for example equivalence to A-60), we recommend using either:

- U SeaProtect™ Roll / Slab 36 70mm
  (A-60 Deck, A-60 Bulkhead restricted certificate)
- U SeaProtect™ Roll / Slab 50 60mm
  (A-60 Bulkhead certificate)
- U SeaProtect™ Roll / Slab 56 50mm
  (A-60 Deck certificate)
- U SeaProtect™ Slab 86 50mm
  (A-60 Bulkhead certificate)
- U SeaProtect™ Wired Mat 66 Alu1 40mm
  (A-60 Deck certificate)
- U SeaProtect™ Wired Mat 48 100mm
  (A-60 Bulkhead certificate)

EXHAUST PIPES

You can reduce the weight up to 50% and achieve low surface temperatures by using for example U SeaProtect™ Wired Mats.

DID YOU KNOW?

Our pipe sections are available unfaced (U TECH Pipe Section MT 4.0) or with an aluminium facing (U Protect™ Pipe Section Alu2).

U PROTECT™ PIPE SECTION ALU2

LENGTH (MM)	THICK-NESS (MM)	PIPE OUTSIDE DIAMETER (MM)																					
		15	18	22	28	35	42	48	54	57	60	64	70	76	89	102	108	114	133	140	159	168	219	273
1200	20	57.6	50.4	43.2	36.0	30.0	24.0	19.2	28.8	28.8*	27.6	24.0	19.2*	19.2	16.8									
	25	30.0	28.8	24.0	19.2	19.2	14.4	24.0	19.2	19.2*	19.2	18.0	14.4	14.4	10.8	9.6*	9.6	7.2	6.0	6.0	4.8	4.8	1.2*	1.2*
	30	19.2*	28.8	14.4	19.2	10.8	10.8	9.6	10.8	10.8*	10.8	10.8	10.8	10.8	9.6	7.2*	7.2*	6.0	4.8*	4.8	4.8*	3.6*	1.2	1.2*
	40			18.0*	14.4*	10.8	10.8	10.8	10.8	10.8*	9.6	9.6	9.6	4.8	4.8	6.0*	6.0	4.8	4.8	3.6	3.6	1.2	1.2*	1.2*
	50				10.8	10.8	9.6*	9.6*	4.8	4.8*	4.8	4.8	4.8	6.0	4.8	4.8*	4.8	4.8	3.6*	1.2*	1.2*	1.2*	1.2*	1.2*
	60										4.8*	4.8*	4.8*	4.8	4.8*	3.6*	3.6*	3.6*	1.2*	1.2*	1.2*	1.2*	1.2*	1.2*
	70						6.0*	4.8*						4.8	3.6	1.2*	1.2*	1.2	1.2*	1.2	1.2*	1.2*	1.2*	1.2*
	80														1.2									
	100							3.6*	3.6					1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2*	1.2	1.2	1.2
	120																				1.2*	1.2*	1.2*	

*The information provided in this table refers to linear meters per pack. The references marked with an asterisk * are not permanently in central stock.*

U TECH PIPE SECTION MT4.0

LENGTH (MM)	THICK-NESS (MM)	PIPE OUTSIDE DIAMETER (MM)																					
		15	18	22	28	35	42	48	54	57	60	64	70	76	89	102	108	114	133	140	159	168	219	273
1200	20	57.6	50.4	43.2	36.0	30.0	24.0	19.2	28.8	28.8*	27.6	24.0			16.8									
	25	30.0	28.8	24.0	19.2	19.2	14.4	24.0	19.2	19.2*	19.2	18.0	14.4	14.4	10.8	9.6*	9.6*	7.2	6.0	6.0	4.8*	4.8	1.2	1.2*
	30		28.8*	14.4	19.2	10.8	10.8	9.6	10.8	10.8*	10.8	10.8	10.8	10.8	9.6	7.2*	7.2*	6.0	4.8*	4.8	4.8*	3.6	1.2	1.2
	40			18.0	14.4	10.8	10.8	10.8	10.8	10.8*	9.6	9.6	9.6	4.8	4.8	6.0*	6.0	4.8	4.8	3.6	3.6	1.2	1.2	1.2
	50			10.8	10.8	10.8	9.6	9.6	4.8*	4.8*	4.8	4.8*	4.8*	6.0	4.8	4.8*	4.8*	4.8	3.6*	1.2	1.2*	1.2	1.2	1.2
	60										4.8	4.8*	4.8*	4.8	4.8*	3.6*	3.6*	3.6*	1.2*	1.2*	1.2*	1.2	1.2	1.2*
	70						6.0*	4.8*					4.8*	4.8*	3.6	1.2*	1.2*	1.2	1.2*	1.2	1.2*	1.2	1.2	1.2*
	80														1.2*									
	100													1.2*	1.2	1.2*	1.2	1.2	1.2	1.2	1.2*	1.2	1.2*	1.2*
	120																				1.2*	1.2*	1.2*	

*The information provided in this table refers to linear meters per pack. The references marked with an asterisk * are not permanently in central stock.*

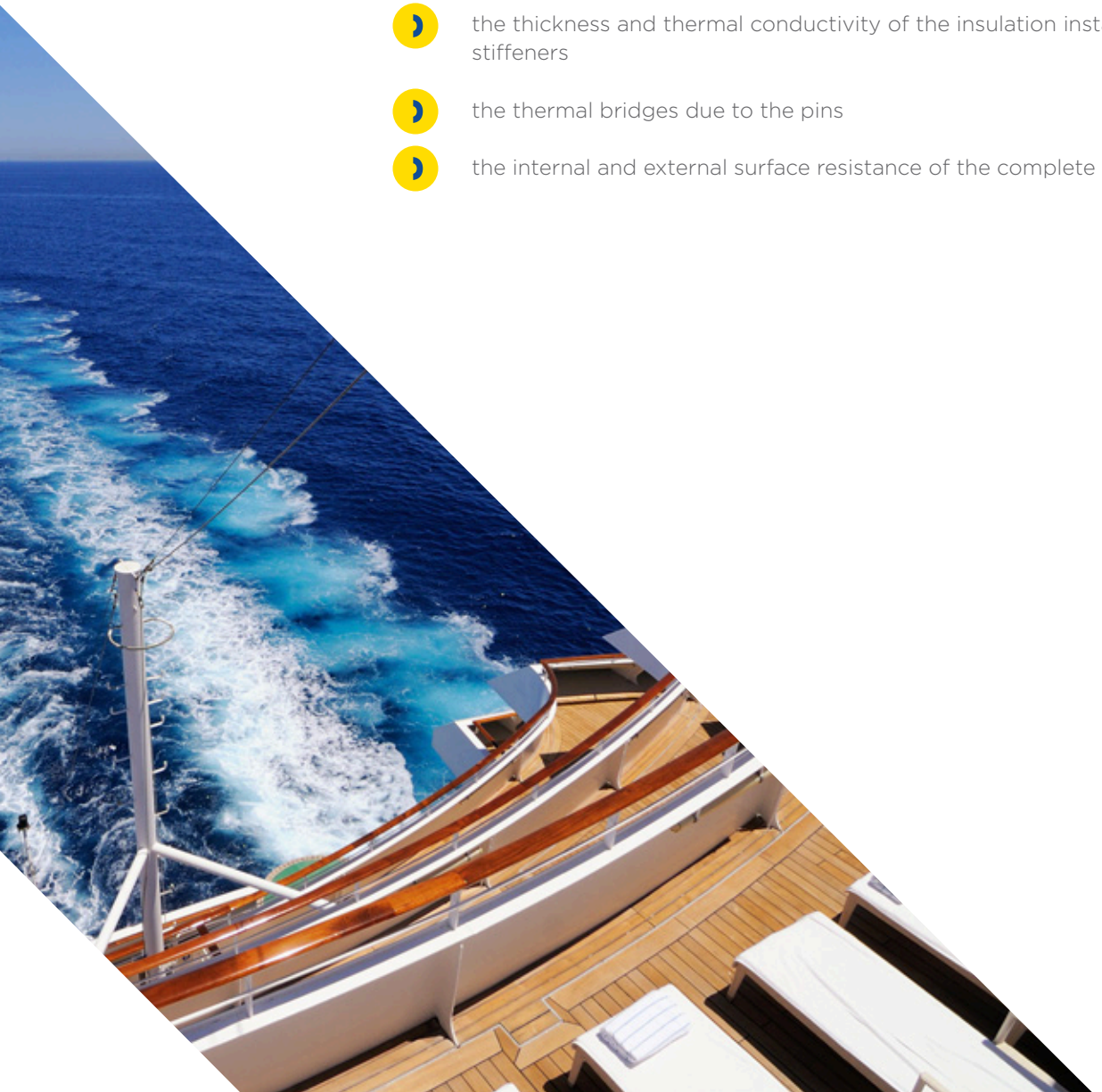
Calculating U-values

As an insulation supplier, we believe it is essential to provide engineers, designers and naval architects with the most accurate information possible regarding U-values.

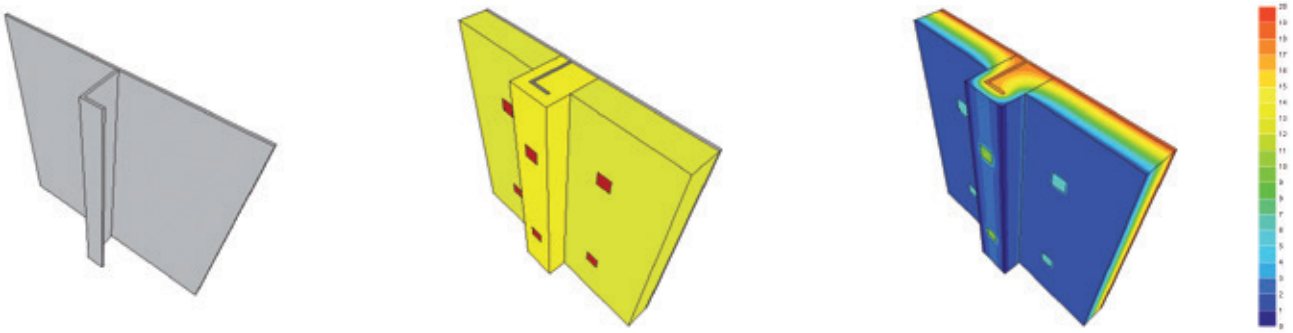
FOR CONSTRUCTIONS

To calculate the U-values we declare for our constructions, we used a 3D thermal model taking into account:

- the thermal resistance of the division (steel or aluminium in 6mm thickness)
- the geometry of the stiffeners
- the thickness and thermal conductivity of the insulation installed on the plate
- the thickness and thermal conductivity of the insulation installed around the stiffeners
- the thermal bridges due to the pins
- the internal and external surface resistance of the complete system



For the insulant part, the U-Values used are based on the measurement of the thermal conductivity and the thickness of the products.

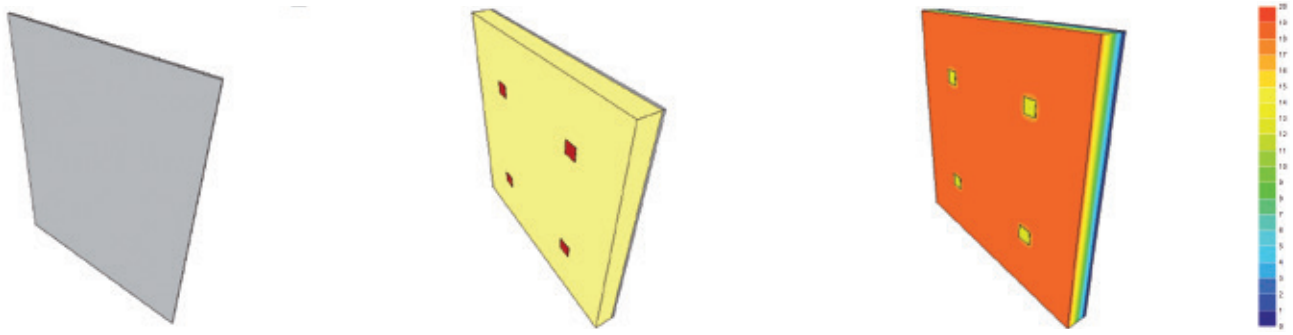


Geometry: Steel plate: Thickness = 6 mm; Height = 600 mm; Width = 600 mm
Stiffener: L-shape Thickness = 6 mm; Length = 600 mm; Height = 100 mm; Width = 50 mm

Parameters: λ_{Steel} = 50 W/(m·K); $\lambda_{Aluminium}$ = 160 W/(m·K);
Internal Surface resistance: R_{SI} = 0.13 m^2·K/W
External Surface resistance: R_{SO} = 0.04 m^2·K/W

FOR U SEAPROTECT™ PRODUCTS

For our products, we use a similar 3D thermal calculation model but for « flat » geometries with no stiffeners.



Geometry: Division: Thickness = 6 mm; Height = 600 mm; Width = 600 mm

Parameters: λ_{Steel} = 50 W/(m·K); $\lambda_{Aluminium}$ = 160 W/(m·K);
Internal Surface resistance: R_{SI} = 0.13 m^2·K/W
External Surface resistance: R_{SO} = 0.04 m^2·K/W

DON'T HESITATE TO CONTACT US TO DETERMINE THE U-VALUES FOR SPECIFIC COMPOSITE TYPES.

5.
TOTAL COST OF OWNERSHIP & TOTAL COST OF INSTALLATION

For ship owners, designers, architects and installers alike, cost is a key consideration whether during installation or while the vessel is operating. Lighter insulation significantly reduces both Total Cost of Ownership (TCO) and Total Cost of Installation (TCI), provided that it offers the same high levels of thermal, acoustic and fire performance.

Innovating

A LIGHTER MINERAL WOOL FOR LOWER COSTS

With a unique microstructure (100% fiberised, shot free), U SeaProtect™ solutions are up to 45 % lighter than traditional stone wool solutions. In addition, they offer the required fire safety performance as well as acoustic and thermal comfort.
U SeaProtect™ solutions therefore generate subsequent weight savings making installation faster and easier, while also improving the vessel's stability and reducing operating costs. This optimises both TCI (total cost of installation) and TCO (total cost of ownership).

Alexander von Humboldt II

Reduced weight for optimised TCO

By installing U SeaProtect™ insulation solutions, you can capitalise on the full capacity of your equipment while controlling costs for maximum profitability.

LESS WEIGHT FOR LOWER OPERATING COSTS

U SeaProtect™ provides the ideal opportunity to significantly reduce energy consumption. Since every extra kilogramme means higher fuel consumption and emissions, any weight savings significantly **reduce operating costs** – while also maintaining at least the same levels of safety and comfort as traditional solutions.

The excellent thermal performance of U SeaProtect™ also **reduces HVAC energy consumption**, while maximising passenger comfort.

LESS WEIGHT FOR BETTER STABILITY

Lightweight U SeaProtect™ solutions help designers **make the ship's construction more stable** with identical insulation performance. Less weight in critical areas above the water line like accommodation also means more freedom during the design phase.

LESS WEIGHT FOR MORE PAYLOAD

Ship builders are subject to ever more demanding requirements in terms of safety, comfort and equipment complexity. For critical weight-sensitive projects, reducing the weight of insulation with U SeaProtect™ enables you to **increase the deadweight**. Depending on the project, this could mean increasing the number of passenger cabins, trailers or other crucial equipment. So that **deadload becomes payload**.

IN ACTION

According to a study carried out by an independent naval architecture design office, lightweight U SeaProtect™ products **reduced the ship's weight by approximately 280t** vs. traditional stone wool solutions:

RORO PASSENGER FERRY						
Length	210 m	Beam	29 m	Original Design (traditional stone wool)	U SeaProtect™	Difference
Passengers	2,800	Passengers public decks	2			
Passenger cabins	900	Passengers cabin decks	4			
		Car decks	1			
Estimated weight (t) of Insulation				575 t	295 t	-280 t (-50 % !)

1) NON-COMPENSATED WEIGHT REDUCTION: -280T

	LIGHTSHIP		FULLY LOADED		DIFFERENCE
	ORIGINAL	U SEAPROTECT™	ORIGINAL	U SEAPROTECT™	
Displacement	18,600 t	18,320 t	23,750 t	23,470 t	-280 t
Draught	-	-	6.3 m	6.23 m	-7 cm
Block coefficient	-	-	0.649	0.642	-1 %
Gravity Vertical Center	15.45 m	15.35 m	-	-	-10 cm

Decreasing a ship's vertical centre of gravity by nearly 10cm makes it much more stable. With a cruise speed of 23 knots, this would save approximately 180,000 $/year on fuel*.

* calculation hypothesis: 15 h/day, 340 d/year and 300 t of HFO saved/year at 600$/ton of Heavy Fuel

2) COMPENSATED WEIGHT REDUCTION

An alternative approach would be to capitalise on these weight savings.

HIGHER REVENUES
The 280t savings would increase the ship's deadweight by 5.3 %, equivalent to six 45-ton trailers, which would in turn increase ship operator's revenues.

REDUCED CONSTRUCTION COSTS
The 280t savings would enable one of the aluminium upper deck structures to be replaced by a steel alternative. The total estimated savings for this substitution would be $1,800,000.

AIDAmar, MEYER WERFT GmbH, Germany, 2008

Reduced weight for optimised TCI

Lightweight, compressible and flexible, U SeaProtect™ solutions are easy to handle and take up less space, leading to significantly lower costs in terms of logistics and installation for installers and distributors.

LESS WEIGHT FOR EASIER HANDLING AND LOWER COSTS

U SeaProtect™ mineral wool solutions are up to 45% lighter than traditional stone wool. This reduces transportation and storage costs – less manpower, fewer operations required and more products in each truck.

Installing U SeaProtect™ is also more cost-effective and requires fewer person-hours as the products are lighter, easier to handle and can be installed using the Quick-Cover system around the stiffeners.

MORE COMPACT FOR LESS SPACE AND LOWER COSTS

U SeaProtect™ mats can also be compressed into rolls during packaging without losing their mechanical properties. Using rolls rather than slabs significantly reduces the space needed for storage and increases the amount of insulation per pallet and truck.

Using U SeaProtect™ rolls also significantly reduces cut-off waste and therefore the amount of insulating material you need to purchase (up to 10%).

IN ACTION

Using rolls of 24 kg/m^3 50 mm instead of slabs gives you 75% more m^2 per pallet and in the truck. The transport cost per m^2 using rolls is therefore 42% lower. In terms of distribution, 42% less space is occupied and 1.7 times fewer operations are required for loading and carrying the pallet.

DENSITY	THICKNESS	FORM	PRODUCTS NAME	QUANTITY PER PALLET	QUANTITY PER TRUCK (FOR 22 PAL)	QUANTITY PER HC 40FT CONTAINER (APPROX.)
24 kg/m^3	50 mm	Roll	U SeaProtect™ Roll 24 Alu1 50 mm	201.60 m^2	4,435.20 m^2	3,360.00 m^2
		Slab	U SeaProtect™ Slab 24 Alu1 50 mm	115.20 m^2	2,534.40 m^2	1,656.00 m^2

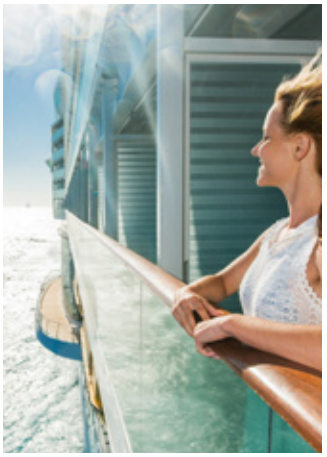
6. U SEAPROTECT™ SOLUTIONS

Whether you are looking for fire protection, optimum thermal performance or advanced sound insulation, with our U SeaProtect™ range, you will benefit from maximum installation comfort and the lightest mineral wool insulation solution on the market.

Lightweight
INSULATION SOLUTIONS

U SeaProtect™ solutions are most commonly used for fire-rated divisions but meet many more of your insulation needs.

FOR PASSENGERS & THE CREW:



Comfort on board

Our U SeaProtect™ "Full Comfort" solutions offer the highest level of thermo-acoustic comfort that can be achieved with mineral wool insulation.

- **Excellent thermal performance**: U SeaProtect™ offers equivalent performances with thinner and lighter solutions, or better performance with equivalent thickness.
- **Best-in-class sound insulation**: Excellent acoustic performance with less weight compared to traditional stone wool solutions.

Safety on board

The entire U SeaProtect™ range has been designed to guarantee optimum fire safety on board and to protect lives in an environment where the risk of fire is particularly sensitive.

FOR THE SHIP OWNER:

Sustainable shipbuilding:

- **Lower energy consumption**: The weight savings achieved with U SeaProtect™ translate directly into primary energy savings, reducing the impact of the vessel on the environment.
- **CO_2 emissions reductions**: At the same time, CO_2 emissions are reduced.

Cost savings

- **Less fuel consumption**: The weight savings achieved with U SeaProtect™ significantly reduce fuel consumption.
- **Save energy on HVAC systems**: Thanks to their excellent thermal performance, U SeaProtect™ solutions considerably reduce the energy consumption of HVAC systems on board.
- **Turn deadweight into payload:** Reducing the weight of the insulation opens the door to proportionally increase the payload, i.e. the number of passenger cabins, trailers or other equipment, on a scale that cannot be reached with other stone wool insulation.

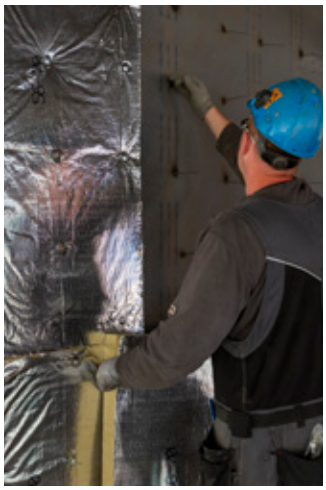
FOR THE NAVAL ARCHITECT:

Maximum design freedom:

- **Space savings**: With U SeaProtect™, it is possible to achieve the required level of performance with less insulation thickness, in some cases it may not even be necessary to insulate the stiffeners.
- **Better stability**: Being lightweight, U SeaProtect™ solutions help designers improve the stability of a ship construction, which provides more freedom in the planning phase.

FOR THE INSTALLER:

Reduce installation time and cost:



- **Lightweight**: Thanks to its weight up to 45% lighter than other stone wool products, U SeaProtect™ is easy to handle and to carry around on site.
- **Flexibility**: The flexible product characteristics facilitate bending and handling in general and make U SeaProtect™ easier to cut.
- **Comfortable installation**: As U SeaProtect™ products are more convenient to handle, they generate less fatigue for the workers and are more pleasant to work with.
- **Quick-Cover mounting system**: This smart feature contributes to significantly reducing installation time and improving installation comfort.

Optimise logistics:

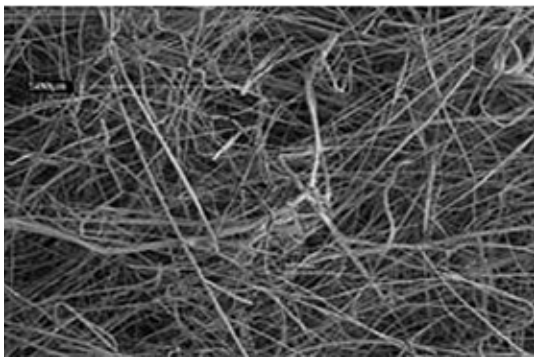
Being highly resilient, U SeaProtect™ can be compressed significantly without creating a permanent distortion. As a consequence – in the case of rolls and wired net mats – more material can be packed into the same packing unit and less space is needed for storage or during transport

What is the secret behind U SeaProtect™?

ULTIMATE™, THE LIGHTWEIGHT PREMIUM STONE WOOL FROM ISOVER

Thanks to intense and continuous R&D efforts, involving a composition of raw material equivalent to that of stone wool and a patented fiberising process allowing us to transform 100% of the material into insulation performance, we are able to offer our customers this revolutionary stone wool product. Unlike traditional stone wool, every gram of ULTIMATE™ benefits the customer.

Traditional stone wool microstructure
(25 % - 30 % of slugs/ unfiberised particles)



ULTIMATE™ microstructure
(100 % fiberised, no «shot» content)

DID YOU KNOW?

ULTIMATE™ mineral fibres are extruded through horizontal spinners instead vertical rotary wheels. This unique fiberising process ensures the fine control of the fibre diameter and results in a totally shot free product made of long interwoven fibres.

The U SeaProtect™ product range

Choose from a full range of fire protection products to insulate steel, aluminium or composite constructions, according to your specific performance requirements.

With the support of our team, we can adapt any standard marine product to meet your specific, semi-customised needs towards light weight fittings (or OEM).

THERMAL COMFORT

THERMAL & ACOUSTIC COMFORT

FIRE PROTECTION

PRODUCT NAME	DENSITY KG/M³	FACING	THICKNESS MIN.	THICKNESS MAX.	APPLICATION
U SeaProtect™ Roll	13	-	40 mm	120 mm	
		Alu	50 mm	120 mm	
U SeaProtect™ Roll	24	-	20 mm	180 mm	Hull insulation OEM Application (ceilings) 50 mm: • A-15 Steel Bulkhead • A-30 Steel Deck
		Alu	30 mm	140 mm	
		Tissue V1	50 mm	70 mm	
		Glass fabric (G120, G220)	50 mm	100 mm	
U SeaProtect™ Slab		-	20 mm	150 mm	
		Alu	50 mm	150 mm	
		Tissue (V1, V2)	60 mm	100 mm	
		Glass Fabric (G120, G220, G420)	50 mm	100 mm	
		Alu glass fabric composite (B-Al, B-Gl)	50 mm	100 mm	
U SeaProtect™ Roll	36	-	70 mm	70 mm	70 mm: • A-30 Steel Bulkhead • A-60 Steel Bulkhead restricted • A-15 & A-30 Steel Deck OEM Application (ceilings)
		Alu	20 mm	70 mm	
		Tissue V1	30 mm	120 mm	
		Glass Fabric G220	50 mm	70 mm	
U SeaProtect™ Slab		-	30 mm	120 mm	
		Alu	30 mm	100 mm	
		Tissue (V1, V2)	70 mm	100 mm	
		Glass Fabric (G120, G220, G420)	50 mm	100 mm	
		Alu glass fabric composite (B-Al, B-Gl)	60 mm	70 mm	
		dB-Flex Alu	50 mm	100 mm	
U SeaProtect™ Roll	50	-	60 mm	60 mm	30 mm: • A-15 Steel Bulkhead OEM Application (ceilings)
		Alu	60 mm	60 mm	
		Glass Fabric G220	60 mm	60 mm	
U SeaProtect™ Slab		-	60 mm	60 mm	
		Alu	60 mm	60 mm	
		Tissue (V1, V2)	60 mm	60 mm	
		Glass Fabric (G120, G220, G420)	60 mm	60 mm	
		Alu glass fabric composite (B-Al, B-Gl)	60 mm	60 mm	
		dB-Flex Alu	60 mm	60 mm	

FIRE PROTECTION

PRODUCT NAME	DENSITY KG/M³	FACING	THICKNESS MIN.	THICKNESS MAX.	APPLICATION
U SeaProtect™ Roll	56	-	30 mm	60 mm	30 mm: • stiffener's solution for steel divisions 60 mm: • A-60 Steel Bulkhead 70 mm: • A-60 Steel Corrugated Bulkhead
		Alu	30 mm	60 mm	
		Glass Fabric G220	30 mm	60 mm	
U SeaProtect™ Slab		-	30 mm	100 mm	
		Alu	30 mm	100 mm	
		Tissue (V1, V2)	50 mm	50 mm	
		Glass Fabric (G120, G220, G420)	30 mm	80 mm	
		Alu glass fabric composite (B-Al, B-Gl)	30 mm	80 mm	
		dB-Flex Alu	30 mm	80 mm	
U SeaProtect™ Slab	66	-	20 mm	100 mm	30, 50, 70 mm: • A-Class Aluminium divisions 50 mm.. • B-15 Wall Extension Draught stop Insulation for composite division OEM Aplication (ceilings)
		Alu	25 mm	80 mm	
		Tissue (V1, V2)	30 mm	70 mm	
		Glass Fabric (G120, G220, G420)	30 mm	80 mm	
		Alu glass fabric composite (B-Al, B-Gl)	50 mm	70 mm	
		dB-Flex Alu	30 mm	80 mm	
U SeaProtect™ Slab	76	-	20 mm	40 mm	20, 25 m: • stiffener's solution for steel divisions
		Alu	20 mm	40 mm	
		Tissue (V1, V2)	25 mm	40 mm	
		Glass Fabric (G120, G220, G420)	20 mm	40 mm	
		Alu glass fabric composite (B-Al, B-Gl)	20 mm	40 mm	
		dB-Flex Alu	20 mm	40 mm	
U SeaProtect™ Slab	86	-	25 mm	50 mm	50 mm: • A-60 Steel Bulkhead Insulation for composite division
		Alu	25 mm	50 mm	
		Tissue (V1, V2)	25 mm	50 mm	
		Glass Fabric (G120, G220, G420)	25 mm	50 mm	
		Alu glass fabric composite (B-Al, B-Gl)	25 mm	50 mm	
		dB-Flex Alu	25 mm	50 mm	
U SeaProtect™ Slab	90	-	10 mm	80 mm	50 mm: • A-60 Steel Floating Floor
		Alu	20 mm	50 mm	
		Glass Fabric (G120, G220, G420)	20 mm	20 mm	
U SeaProtect™ Slab	100	-	30 mm	70 mm	OEM application: • cabin wall
		Alu	40 mm	50 mm	
		Glass Fabric (G120, G220, G420)	30 mm	70 mm	

HIGH TEMPERATURE

U SeaProtect™ Wired Mat	66	-	30 mm	100 mm	30, 40, 70 mm: • A-Class Aluminium divisions
		Alu	30 mm	100 mm	
U TECH Pipe Section MT 4,0	~66*	-	20**	120**	Hot pipe equipment
U Protect™ Pipe Section		Alu	20**	120**	

* Density higher for 20 , 25 and 30 mm pipe thickness

** Min / Max thickness depending on pipe diameter

FACINGS & TAPES

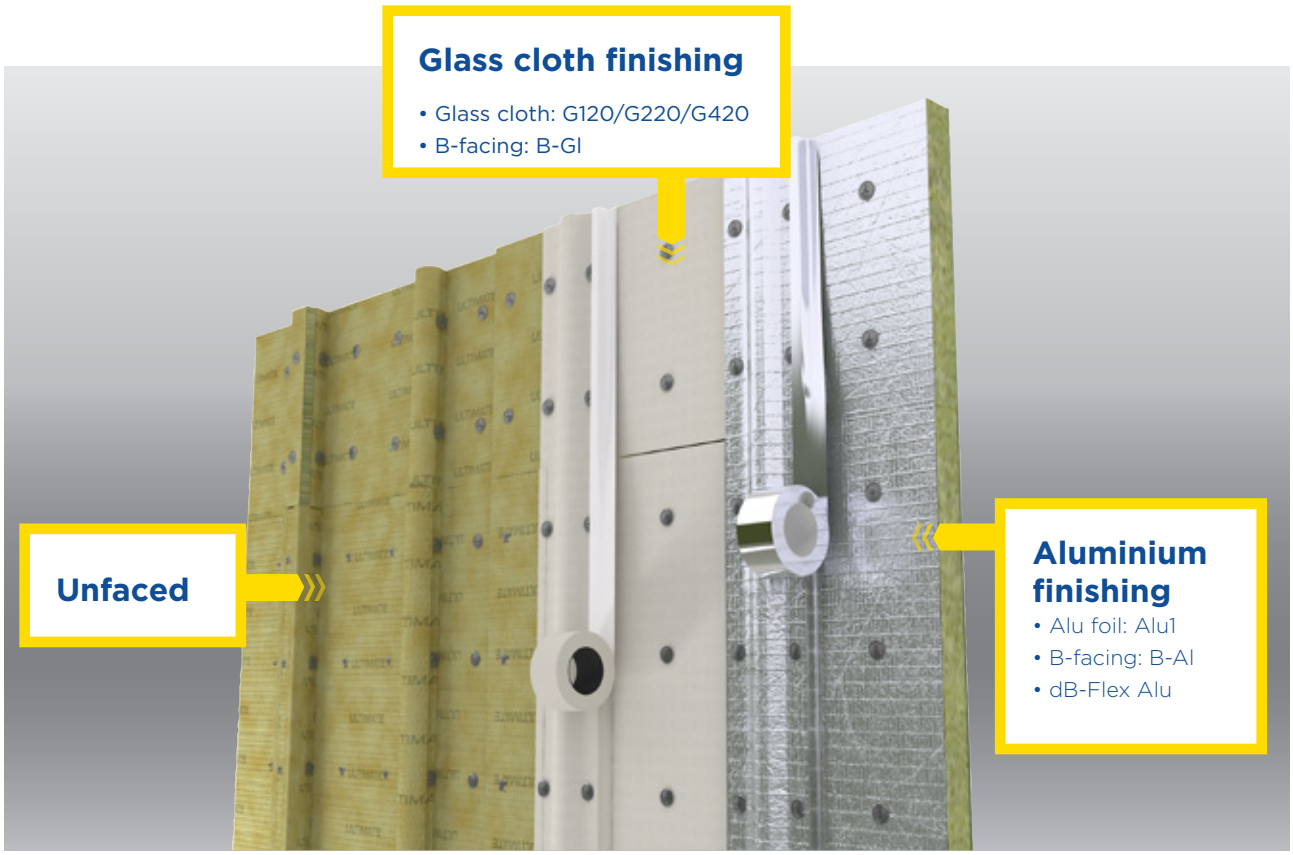
U SeaProtect™ products are available with a range of facings

Different facings can be applied directly on our production line. Alternatively, the facings are available in rolls of 20 kg each, easy to transport and install on site.

All facings and accessories are certified according to the most qualified regulations in force and can be used on any type of ships.

TYPE OF FACING	NAME	COLOR	GRAMWEIGHT	VAPOUR BARRIER	MECHANICAL PROTECTION	SOUND ABSORPTION	OTHER PROPERTIES
Reinforced Aluminium foil	Alu1	Shiny	~ 65 - 80 g/m²	Yes (18 µm Alu foil)	Sensitive to punching	Limited	-
Thin Glass tissue	V1	Yellow	~ 35 g/m²	No	Light	Excellent	-
	V2	Black	~ 60 g/m²				Aesthetics
Glass cloth	G 120	Black	~ 120 g/m²	No	Light	Good	Good aesthetics
	G 220	White	~ 200 g/m²		Strong		
	G 420	White	~ 420 g/m²		Heavy duty		
Aluminium foil/ Glass cloth composite	B-Al	Shiny (Alu exposed side)	~ 265 g/m²	Yes (18 µm Alu foil)	Heavy duty	Limited	Cleanable with water
	B-Gl	White (Glass fabric exposed side)					Paintable*

** with water, acrylic and polyester based paints*



MARINE CERTIFIED ACCESSORIES

U SeaProtect™ products are available with a range of accessories

We also provide high quality marine certified tapes for sealing product joints. Our tapes have been tested in combination with ISOVER facings and work as a complete system to ensure a strong finished solution.

ACCESSORIES	NAME	COLOR	GRAM-WEIGHT	VAPOUR BARRIER	OPERATING TEMPERATURE	INSTALLATION TEMPERATURE	OTHER PROPERTIES
Self-adhesive Aluminium tape	SeaProtect Tape Alu	Shiny	-	Yes (26 µm Alu foil)	-40°C to 80 °C	-5 °C to 40 °C	Excellent bonding
Self-adhesive glass cloth tape	SeaProtect Tape G120	White	~ 120 g/m²	No	-25°C to 70°C	-5 °C to 35 °C	Excellent bonding
Visco-elastic acoustic membrane	SeaProtect dB-Flex Alu	Shiny (Alu exposed side) / Light grey (non exposed side)	3 kg/m²	-	-20°C to 70°C	Storage: 12 months at 20 °C	Excellent acoustic properties when associated to U SeaProtect™ solutions

DID YOU KNOW?

To facilitate the work of installers and to help surveyors identify insulation products once installed, U SeaProtect™ products are provided with a marking*: a pair of two-digit numbers at regular intervals indicates the density of the product in kg/m³ and the thickness of the product in mm:

For example, «76-25» corresponds to U SeaProtect™ with a density of 76 kg/m³ and a thickness of 25 mm.

By ensuring that the right products have been used in the right place, we contribute to a safer environment on board ships.

** except the white colour facings (G220, G420 and B-GI)*

A full range of U SeaProtect™ solutions

U SeaProtect™ offers a comprehensive range of solutions for marine and offshore applications, for steel, aluminium and composite divisions. All our solutions are tested and certified according to IMO regulations. They meet environmental, energy efficiency, weight savings, safety, aesthetics and comfort requirements which are omnipresent in our customers' specifications.

DID YOU KNOW?

With our online marine solutions selector available at www.isover-technical-insulation.com, you can find the right marine insulation solution in just a few clicks.

Norwegian Getaway / Norwegian Cruise Line

STEEL CONSTRUCTIONS

APPLICATION	A-FIRE CLASS	SOLUTION	PLATE				STIFFENERS				SOUND REDUCTION R_w DB	THERMAL TRANS-MITTANCE U VALUE W/M².K	WEIGHT OF THE SOLUTION KG/M2
Bulkhead (Fire from either side)	A-15	Full Comfort	U SeaProtect™	Roll/ Slab	24	50 mm	U SeaProtect™	Slab	76	20 mm	**46 (-1; -5) dB**	0.858	2.26
		Easy Handling	U SeaProtect™	Roll/ Slab	24	50 mm	U SeaProtect™	Roll/ Slab	24	50 mm	**46 (-1; -5) dB**	0.716	2.04
		Even lighter!	U SeaProtect™	Roll/ Slab	46	30 mm	No insulation				**44 (-2; -5) dB**	2.079	1.38
	A-30	Full Comfort	U SeaProtect™	Roll/ Slab	36	70 mm	U SeaProtect™	Roll/ Slab	36	70 mm	**48(-2;-6) dB**	0.504	4.28
		Easy Handling	U SeaProtect™	Roll/ Slab	36	70 mm	U SeaProtect™	Roll/ Slab	56	30 mm	**48(-2;-6) dB**	0.618	3.7
		Even lighter!	U SeaProtect™	Roll/ Slab	36	70 mm	U SeaProtect™	Slab	76	20 mm	**49 (-3; -7) dB**	0.678	3.58
	A-60	Easy Handling	U SeaProtect™	Roll/ Slab	56	60 mm	U SeaProtect™	Roll/ Slab	56	30 mm	**47(-2;-6) dB**	0.674	4.54
		Space Saving	U SeaProtect™	Slab	86	50 mm	U SeaProtect™	Slab	76	25 mm	**48(-2;-7) dB**	0.785	5.63
		Even lighter!	U SeaProtect™	Roll/ Slab	50	60 mm	U SeaProtect™	Slab	76	20 mm	**47(-2;-7) dB**	0.739	4.06
Bulkhead (Fire from insulated side)	A-60	Full Comfort	U SeaProtect™	Roll/ Slab	36	70 mm	U SeaProtect™	Roll/ Slab	36	70 mm	**48(-2;-6) dB**	0.504	4.28
		Even lighter!	U SeaProtect™	Roll/ Slab	36	70 mm	U SeaProtect™	Slab	76	20 mm	**49 (-3; -7) dB**	0.678	3.58
Deck	A-15	Easy Handling	U SeaProtect™	Roll/ Slab	36	70 mm	No insulation				**47(-1;-6) dB**	1.475	2.52
	A-30	Full Comfort	U SeaProtect™	Roll/ Slab	24	50 mm	U SeaProtect™	Slab	76	20 mm	**46 (-1; -5) dB**	0.858	2.26
		Even lighter!	U SeaProtect™	Roll/ Slab	24	50 mm	U SeaProtect™	Roll/ Slab	24	50 mm	**46 (-1; -5) dB**	0.716	2.04
	A-60	Full Comfort	U SeaProtect™	Roll/ Slab	36	70 mm	U SeaProtect™	Roll/ Slab	36	70 mm	**48(-2;-6) dB**	0.504	4.28
		Easy Handling	U SeaProtect™	Roll/ Slab	36	70 mm	U SeaProtect™	Roll/ Slab	56	30 mm	**48(-2;-6) dB**	0.618	3.7
		Easy Handling	U SeaProtect™	Wired Mat	66	40 mm	U SeaProtect™	Wired Mat	66	40 mm	**47(-2;-7) dB**	0.762	4.49
		Space Saving	U SeaProtect™	Roll / Slab	56	50 mm	U SeaProtect™	Slab	76	20 mm	**47(-2;-7)**	0.824	3.86
		Even lighter!	U SeaProtect™	Roll/ Slab	36	70 mm	U SeaProtect™	Slab	76	20 mm	**49 (-3; -7) dB**	0.678	3.58
Floating Floor	A-60	Full Comfort	U SeaProtect™	Slab	90	50 mm					**53(-1;-5) dB**	0.3	4.75

STEEL CORRUGATED CONSTRUCTIONS

APPLICATION	A-FIRE CLASS	SOLUTION	INSULATION				TROUGHTS				SOUND REDUCTION R_w DB	THERMAL TRANS-MITTANCE U VALUE W/M².K	WEIGHT OF THE SOLUTION KG/M2
Bulkhead 2 mm (Fire from either side)	A-60	Full Comfort	U SeaProtect™	Slab	66	2 x 30 mm					40	0.450	3.96
Bulkhead 4.5 mm (Fire from either side)	A-60	Full Comfort	U SeaProtect™	Slab	56	70 mm	U SeaProtect™	Slab	56	100 mm	43	0.29	7.6

Sleipner A, Sleipner ÿst Stemning, Norway, © ÿyvind Hagen, GLAVA®

ALUMINIUM CONSTRUCTIONS 4 MM

APPLICATION	A-FIRE CLASS	SOLUTION	PLATE				STIFFENERS				SOUND REDUCTION R_w DB	THERMAL TRANS-MITTANCE U VALUE W/M².K	WEIGHT OF THE SOLUTION KG/M²
Bulkhead (Fire from either side)	A-60	Full Comfort	U SeaProtect™	Slab	66	70 mm both sides	U SeaProtect™	Slab	66	70 mm	37(-3;-8) dB	0.247	12.47
Bulkhead (Fire from insulated side)	A-30	Full Comfort	U SeaProtect™	Slab	66	50 mm	U SeaProtect™	Slab	66	50 mm	36(-2;-7) dB	0.675	5.61
	A-60	Full Comfort	U SeaProtect™	Slab	66	70 mm	U SeaProtect™	Slab	66	50 mm	37(-2;-7) dB	0.532	7.85
Deck	A-30	Full Comfort	U SeaProtect™	Slab	66	50 mm	U SeaProtect™	Slab	66	50 mm	36(-2;-7) dB	0.675	5.61
	A-60	Full Comfort	U SeaProtect™	Slab	66	70 mm	U SeaProtect™	Slab	66	70 mm	37(-2;-7) dB	0.532	7.85

ALUMINIUM CONSTRUCTIONS 6 MM

APPLICATION	A-FIRE CLASS	SOLUTION	PLATE				STIFFENERS				SOUND REDUCTION R_w DB	THERMAL TRANS-MITTANCE U VALUE W/M².K	WEIGHT OF THE SOLUTION KG/M²
Bulkhead Fire from either side	A-60	Full Comfort	U SeaProtect™	Slab	66	2 x 30 mm both sides	U SeaProtect™	Slab	66	2 x 30 mm	39(-4;-9) dB	0.286	10.69
		Easy Handling	U SeaProtect™	Slab / Wired Mat	66	70 mm both sides	U SeaProtect™	Slab / Wired Mat	66	70 mm	37(-4;-9) dB	0.247	12.47
Bulkhead Fire from insulated side	A-60	Full Comfort	U SeaProtect™	Slab	66	2 x 30 mm	U SeaProtect™	Slab	66	2 x 30 mm	39(-2;-7) dB	0.574	6.73
Deck	A-30	Easy Handling	U SeaProtect™	Wired Mat	66	40 mm	U SeaProtect™	Wired Mat	66	40 mm	39(-2;-7) dB	0.762	4.49
	A-60	Full Comfort	U SeaProtect™	Slab	66	2 x 30 mm	U SeaProtect™	Slab	66	2 x 30 mm	39(-2;-7) dB	0.574	6.73
		Easy Handling	U SeaProtect™	Wired Mat	66	70 mm	U SeaProtect™	Wired Mat	66	70 mm	39(-2;-7) dB	0.532	7.85

LOADBEARING COMPOSITE DIVISIONS

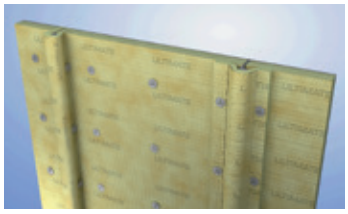
APPLICATION	FIRE RESISTING DIVISION	SOLUTION	LAYERS	PLATE				STIFFENERS				SOUND REDUCTION R_w DB	THERMAL TRANSMITTANCE U VALUE W/M².K	WEIGHT OF THE SOLUTION KG/M²
Bulkhead	FRD-30	Full Comfort	1	U SeaProtect™	Slab	86	25 mm					34	0.25	12.05
			2	U SeaProtect™	Slab	66	50 mm							
	FRD-60	Full Comfort	1	U SeaProtect™	Slab	86	25 mm					36	0.211	16.35
			2	U SeaProtect™	Slab	86	25 mm							
			3	U SeaProtect™	Slab	66	50 mm							
Deck	FRD-30	Full Comfort	1	U SeaProtect™	Slab	86	25 mm	U SeaProtect™	Slab	66	50 mm	34	0.25	12.05
			2	U SeaProtect™	Slab	66	50 mm	U SeaProtect™	Wired Mat	66	50 mm			
	FRD-60	Full Comfort	1	U SeaProtect™	Slab	86	25 mm	U SeaProtect™	Slab	86	25 mm	36	0.211	16.35
			2	U SeaProtect™	Slab	86	25 mm	U SeaProtect™	Slab	66	50 mm			
			3	U SeaProtect™	Slab	66	50 mm	U SeaProtect™	Wired Mat	66	50 mm			

U SEAPROTECT™ SOLUTIONS FOR STEEL CONSTRUCTIONS

AIDAdiva, MEYER WERFT GmbH, Germany, 2007

A-15 STEEL BULKHEAD
PLATE: 24-50 MM – STIFFENER: 76-20 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Improved logistics
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 24-50 mm**
Weight: 1.20 kg/m²

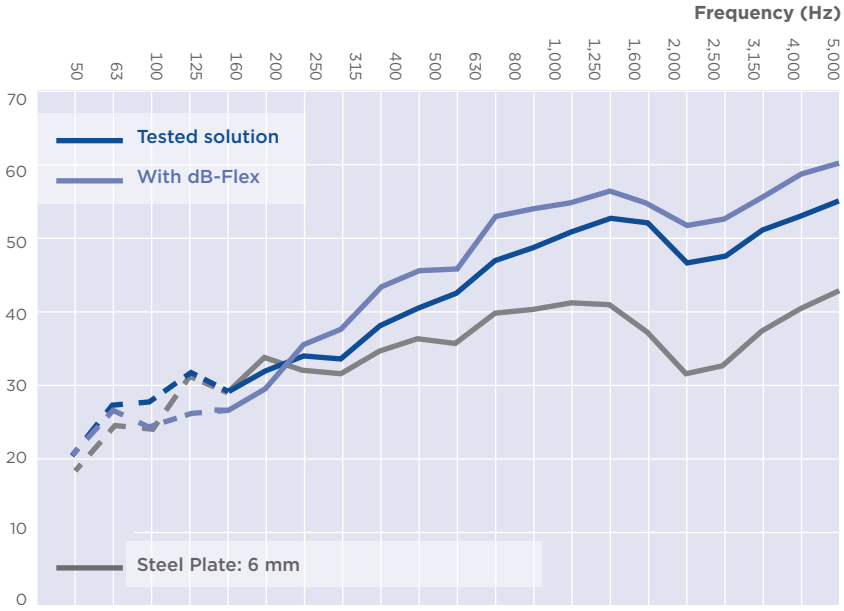
Stiffener: **U SeaProtect™ 76-20 mm**
Weight: 1.52 kg/m²

Complete solution
Weight*: 2.26 kg/m²
U-value*: 0.858 W/m²K
Sound Reduction R_w (C,C_{tr}): 46 (-1; -5) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 24 50 mm	●	●	●	●				
U SeaProtect™ Slab 24 50 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Slab 76 20 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

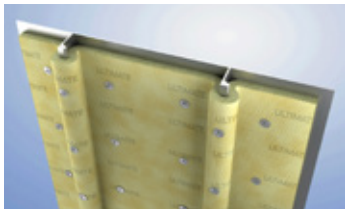


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.6	20.8	20.9
63	24.6	27.3	26.6
80	23.9	28.0	24.5
100	31.4	31.8	26.2
125	29.3	29.1	26.6
160	33.9	32.1	29.6
200	32.3	34.1	35.8
250	31.6	33.9	38.4
315	34.8	38.3	43.5
400	36.2	40.9	45.6
500	35.8	42.7	46.2
630	39.7	47.3	52.9
800	40.4	48.9	53.9
1,000	41.5	51.2	54.9
1,250	41.2	53.0	56.2
1,600	37.3	52.3	54.8
2,000	31.5	46.9	51.8
2,500	32.4	47.8	52.5
3,150	37.3	50.9	55.7
4,000	40.4	53.0	58.9
5,000	42.5	55.3	60.2
$R_w(C;C_{tr})$	37(-2;-1)	46(-1;-5)	49(-3;-8)
R_A	35.4	44.8	46.1
$R_{A.tr}$	35.9	41.4	40.8

A-15 STEEL BULKHEAD

PLATE: 24-50 MM – STIFFENER: 24-50 MM

Easy Handling



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Comfort
- Fast Installation
- Lightweight

Plate: **U SeaProtect™ 24-50 mm**
Weight: 1.20 kg/m²

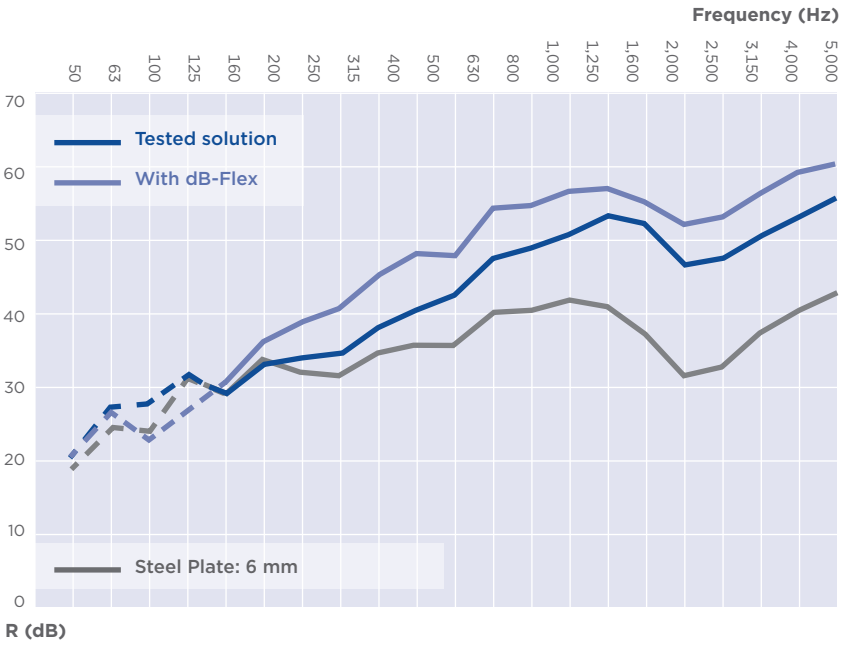
Stiffener: **U SeaProtect™ 24-50 mm**
Weight: 1.20 kg/m²

Complete solution
Weight*: 2.04 kg/m²
U-value*: 0.176 W/m²K
Sound Reduction R_w (C,C_{tr}): 46 (-1; -5) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 24 50 mm	●	●	●	●				
U SeaProtect™ Slab 24 50 mm	●	●	●	●	●	●	■	●

SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.6	19.7	21.1
63	24.6	26.9	26.5
80	23.9	27.8	22.9
100	31.4	30.9	26.8
125	29.3	29.4	30.3
160	33.9	32.9	35.9
200	32.3	34.0	38.8
250	31.6	34.3	40.5
315	34.8	38.3	45.2
400	36.2	40.6	48.1
500	35.8	42.4	47.5
630	39.7	47.4	54.1
800	40.4	48.9	54.6
1,000	41.5	51.1	56.4
1,250	41.2	53.2	56.9
1,600	37.3	52.2	55.0
2,000	31.5	46.6	51.9
2,500	32.4	47.4	52.9
3,150	37.3	50.6	56.2
4,000	40.4	53.1	59.1
5,000	42.5	55.3	60.1
$R_w(C;C_{tr})$	37(-2;-1)	46(-1;-5)	51(-2;-8)
R_A	35.4	44.8	48.6
$R_{A.tr}$	35.9	41.4	43.3

A-15 STEEL BULKHEAD

PLATE: 46-30 MM – STIFFENER: NO INSULATION

Even lighter!

WHY CHOOSE THIS SOLUTION:

- Lightweight
- Cost effective solution
- Easy handling
- Fast installation

Plate: **U SeaProtect™ 46-30 mm**
Weight: 1.38 kg/m²

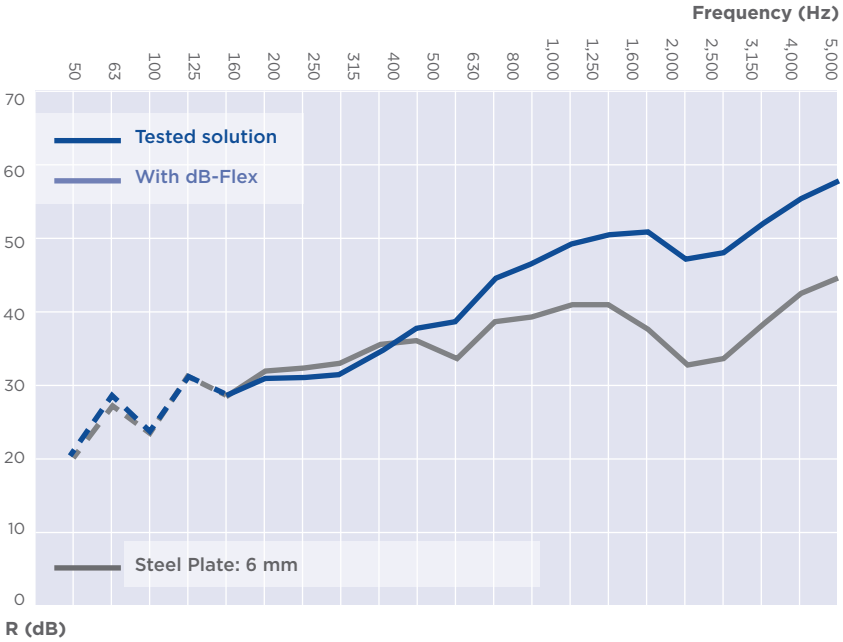
Stiffener: **no insulation**
Weight: 0.00 kg/m²

Complete solution
Weight*: 1.38 kg/m²
U-value*: 2,079 W/m²·K
Sound Reduction R_w (C,C_{tr}): 44 (-2; -5) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 46 30 mm	●	●		●				
U SeaProtect™ Slab 46 30 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

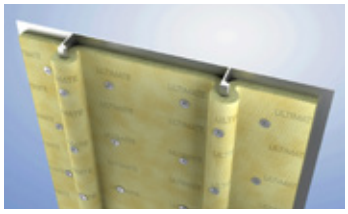


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)
50	20.1	21.3
63	26.9	28.3
80	23.2	23.6
100	30.8	30.6
125	28.2	28.4
160	31.7	30.8
200	32.1	30.9
250	32.8	31.3
315	35.4	34.1
400	35.8	37.7
500	33.8	38.5
630	38.6	44.4
800	39.0	46.4
1,000	40.7	49.1
1,250	40.7	50.5
1,600	37.4	50.8
2,000	32.6	47.2
2,500	33.4	48.0
3,150	38.3	51.8
4,000	42.3	55.4
5,000	44.6	57.6
$R_w(C;C_{tr})$	37(-1;-1)	44(-2;-5)
R_A	35.8	42.3
$R_{A.tr}$	35.8	39.0

A-30 STEEL BULKHEAD

PLATE: 36-70 MM – STIFFENER: 36-70 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Easy Handling
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

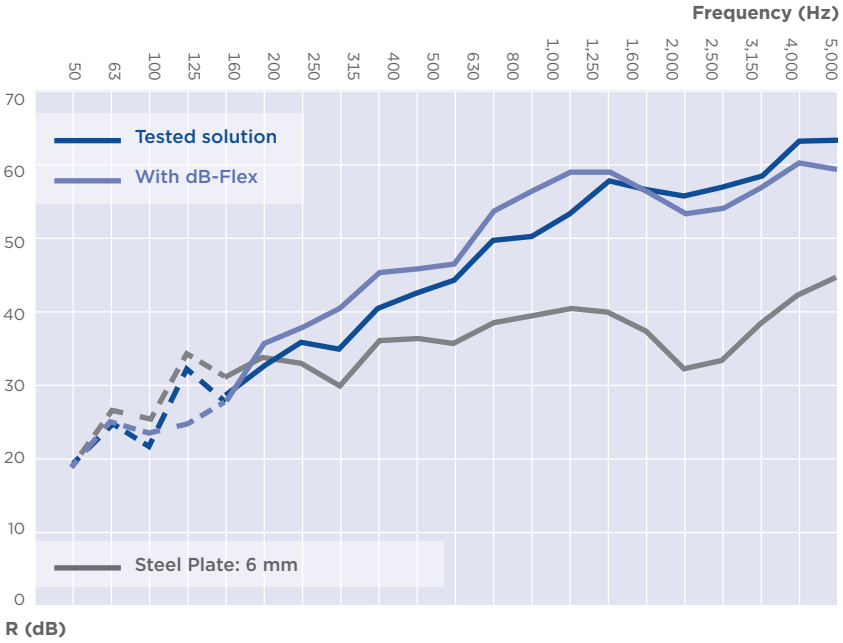
Stiffener: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

Complete solution
Weight*: 4.28 kg/m²
U-value*: 0.504 W/m²K
Sound Reduction R_w (C,C_{tr}): 48 (-2; -6) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

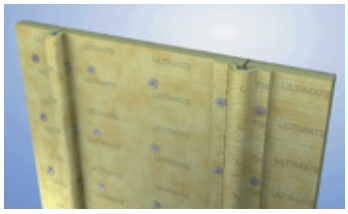


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.2	19.4	18.8
63	26.5	24.6	24.9
80	25.0	21.6	23.3
100	34.1	32.1	24.6
125	30.8	27.6	27.8
160	33.8	32.4	35.6
200	32.9	35.7	37.9
250	30.0	34.7	40.4
315	35.8	40.4	45.1
400	36.4	42.2	45.8
500	35.5	44.3	46.5
630	38.5	49.6	53.7
800	39.6	50.1	56.3
1,000	40.5	53.2	59.1
1,250	40.1	57.9	58.8
1,600	36.9	56.6	56.3
2,000	32.4	55.6	53.2
2,500	33.4	56.7	53.9
3,150	38.4	58.5	57.0
4,000	42.1	63.0	60.2
5,000	44.6	63.3	59.5
$R_w(C;C_{tr})$	37(-1;-1)	48(-2;-6)	50(-2;-8)
R_A	35.8	46.3	47.6
$R_{A,tr}$	36.1	42.0	41.6

A-30 STEEL BULKHEAD

PLATE: 36-70 MM – STIFFENER: 56-30 MM

Easy Handling



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Comfort
- Fast Installation
- Lightweight

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52kg/m²

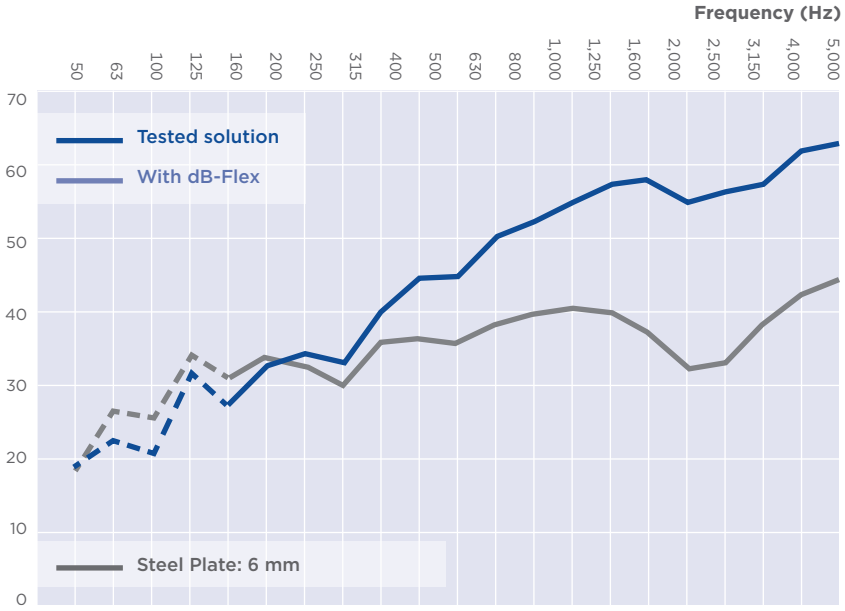
Stiffener: **U SeaProtect™ 56-30 mm**
Weight: 1.68 kg/m²

Complete solution
Weight*: 3.70 kg/m²
U-value*: 0.618 W/m²K
Sound Reduction R_w (C,C_{tr}): 48 (-2; -6) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Roll 56 30 mm	●	●		●				
U SeaProtect™ Slab 56 30 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

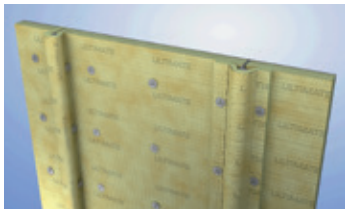


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)
50	18.2	18.8
63	26.5	22.4
80	25.0	20.6
100	34.1	31.6
125	30.8	27.3
160	33.8	32.6
200	32.9	34.3
250	30.0	33.3
315	35.8	40.1
400	36.4	44.9
500	35.5	44.7
630	38.5	50.5
800	39.6	52.5
1,000	40.5	55.2
1,250	40.1	57.6
1,600	36.9	58.1
2,000	32.4	55.0
2,500	33.4	56.4
3,150	38.4	57.7
4,000	42.1	62.4
5,000	44.6	63.1
$R_w(C;C_{tr})$	37(-1;-1)	48(-2;-6)
R_A	35.8	46.1
$R_{A.tr}$	36.1	41.6

A-30 STEEL BULKHEAD

PLATE: 36-70 MM – STIFFENER: 76-20 MM

Even Lighter!



WHY CHOOSE THIS SOLUTION:

- Lightweight
- Improved logistics
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52kg/m²

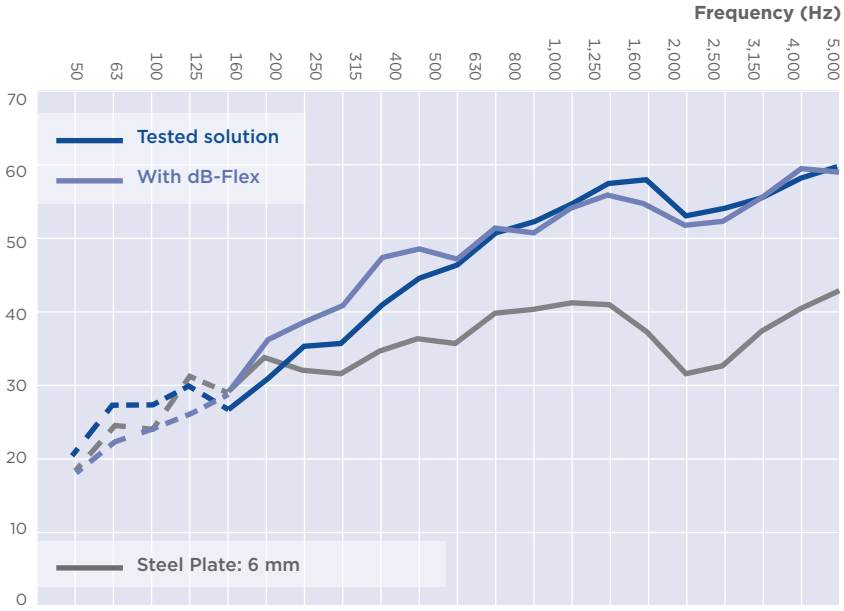
Stiffener: **U SeaProtect™ 76-20 mm**
Weight: 1.52 kg/m²

Complete solution
Weight*: 3.58 kg/m²
U-value*: 0.678 W/m²K
Sound Reduction R_w (C,C_{tr}): 49 (-3; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Slab 76 20 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

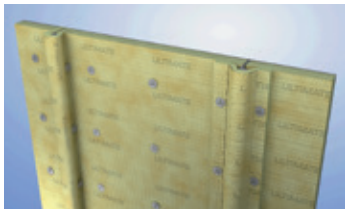


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.6	20.2	18.2
63	24.6	27.7	22.1
80	23.9	27.4	24.0
100	31.4	29.8	25.9
125	29.3	26.9	28.6
160	33.9	30.9	36.1
200	32.3	35.3	38.8
250	31.6	35.6	41.0
315	34.8	41.2	47.5
400	36.2	44.4	48.8
500	35.8	46.5	47.2
630	39.7	50.7	51.8
800	40.4	52.3	51.0
1,000	41.5	54.9	54.3
1,250	41.2	57.7	56.1
1,600	37.3	58.2	54.7
2,000	31.5	53.3	51.8
2,500	32.4	54.1	52.5
3,150	37.3	55.7	56.0
4,000	40.4	58.4	59.6
5,000	42.5	60.0	59.5
$R_w(C;C_{tr})$	37(-2;-1)	49(-3;-7)	50(-2;-7)
R_A	35.4	46.3	48.0
$R_{A.tr}$	35.9	41.6	42.5

A-60 STEEL BULKHEAD

PLATE: 56-60 MM – STIFFENER: 56-30 MM

Easy Handling



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Comfort
- Fast Installation
- Thermal insulation

Plate: **U SeaProtect™ 56-60 mm**
Weight: 3.36kg/m²

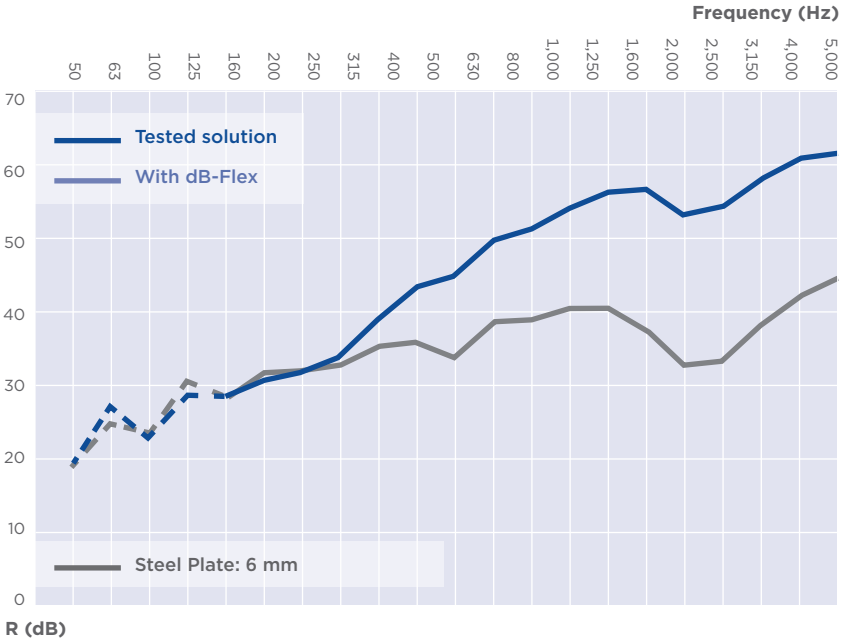
Stiffener: **U SeaProtect™ 56-30 mm**
Weight: 1.68 kg/m²

Complete solution
Weight*: 4.54 kg/m²
U-value*: 0.674 W/m²K
Sound Reduction R_w (C,C_{tr}): 47 (-2; -6) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 56 60 mm	●	●						
U SeaProtect™ Slab 56 60 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Roll 56 30 mm	●	●		●				
U SeaProtect™ Slab 56 30 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)
50	20.1	18.2
63	26.9	27.1
80	23.2	22.9
100	30.8	28.7
125	28.2	28.7
160	31.7	30.4
200	32.1	31.8
250	32.8	33.6
315	35.4	38.9
400	35.8	43.6
500	33.8	45.1
630	38.6	49.7
800	39.0	51.2
1,000	40.7	54.1
1,250	40.7	56.4
1,600	37.4	56.8
2,000	32.6	53.3
2,500	33.4	54.4
3,150	38.3	58.2
4,000	42.3	60.9
5,000	44.6	61.8
$R_w(C;C_{tr})$	37(-1;-1)	47(-2;-6)
R_A	35.8	45.3
$R_{A.tr}$	35.8	40.7

A-60 STEEL BULKHEAD

PLATE: 86-50 MM – STIFFENER: 76-25 MM

Space Saving

WHY CHOOSE THIS SOLUTION:

- Comfort
- Thermal Insulation
- Thin Insulation
- Sound Insulation

Plate: **U SeaProtect™ 86-50 mm**
Weight: 4.30 kg/m²

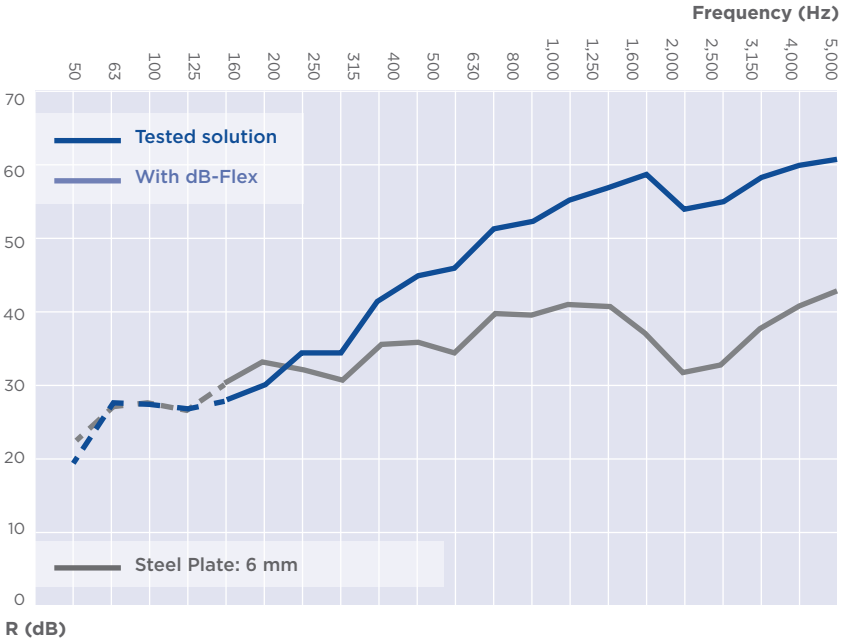
Stiffener: **U SeaProtect™ 76-25 mm**
Weight: 1.90 kg/m²

Complete solution
Weight*: 5.63 kg/m²
U-value*: 0.785 W/m²K
Sound Reduction R_w (C,C_{tr}): 48 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 86 50 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Slab 76 25 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)
50	22.0	20.5
63	26.6	26.3
80	27.7	27.7
100	26.4	26.6
125	30.4	28.5
160	33.0	29.8
200	32.0	34.4
250	30.6	34.4
315	35.2	41.0
400	35.7	44.9
500	34.6	45.6
630	39.4	51.0
800	39.7	52.2
1,000	40.8	55.0
1,250	40.6	57.0
1,600	36.9	58.4
2,000	31.7	53.7
2,500	32.6	54.9
3,150	37.6	57.9
4,000	40.5	59.4
5,000	42.7	60.4
$R_w(C;C_{tr})$	37(-2;-1)	48(-2;-7)
R_A	36.0	45.9
$R_{A.tr}$	35.0	40.8

A-60 STEEL BULKHEAD

PLATE: 50-60 MM – STIFFENER: 76-20 MM

Even lighter!

WHY CHOOSE THIS SOLUTION:

- Lightweight
- Fast Installation
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 50-60 mm**
Weight: 3.00 kg/m²

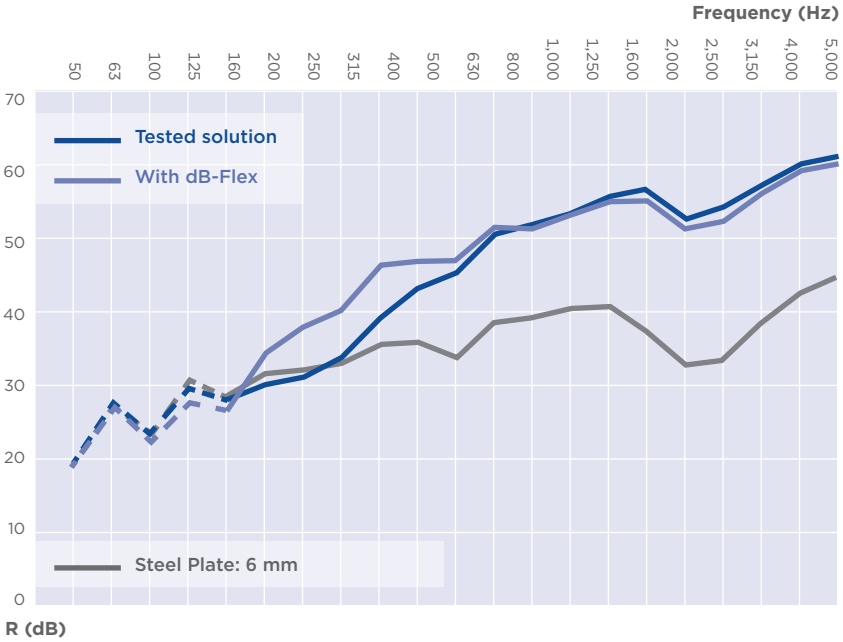
Stiffener: **U SeaProtect™ 36-70 mm**
Weight: 1.52 kg/m²

Complete solution
Weight*: 4.06 kg/m²
U-value*: 0.739 W/m²K
Sound Reduction R_w (C,C_{tr}): 47 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 50 60 mm	●	●		●				
U SeaProtect™ Slab 50 60 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Slab 76 20 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

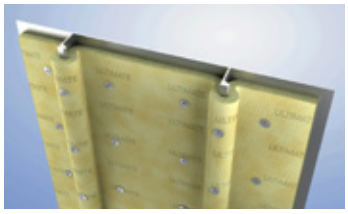


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	20.1	18.8	19.0
63	26.9	27.7	26.9
80	23.2	23.5	22.1
100	30.8	29.6	27.4
125	28.2	27.6	26.5
160	31.7	30.1	34.6
200	32.1	31.2	38.0
250	32.8	33.6	40.1
315	35.4	39.3	46.2
400	35.8	43.2	46.9
500	33.8	45.2	46.8
630	38.6	50.5	51.4
800	39.0	51.7	51.4
1,000	40.7	53.5	53.2
1,250	40.7	55.7	55.1
1,600	37.4	56.6	55.3
2,000	32.6	52.8	51.3
2,500	33.4	54.3	52.4
3,150	38.3	57.3	56.1
4,000	42.3	60.3	59.2
5,000	44.6	61.1	60.1
$R_w(C;C_{tr})$	37(-1;-1)	47(-2;-7)	50(-3;-8)
R_A	35.8	45.0	47.3
$R_{A.tr}$	35.8	40.4	42.1

A-60 STEEL BULKHEAD RESTRICTED

PLATE: 36-70 MM – STIFFENER: 36-70 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Easy Handling
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

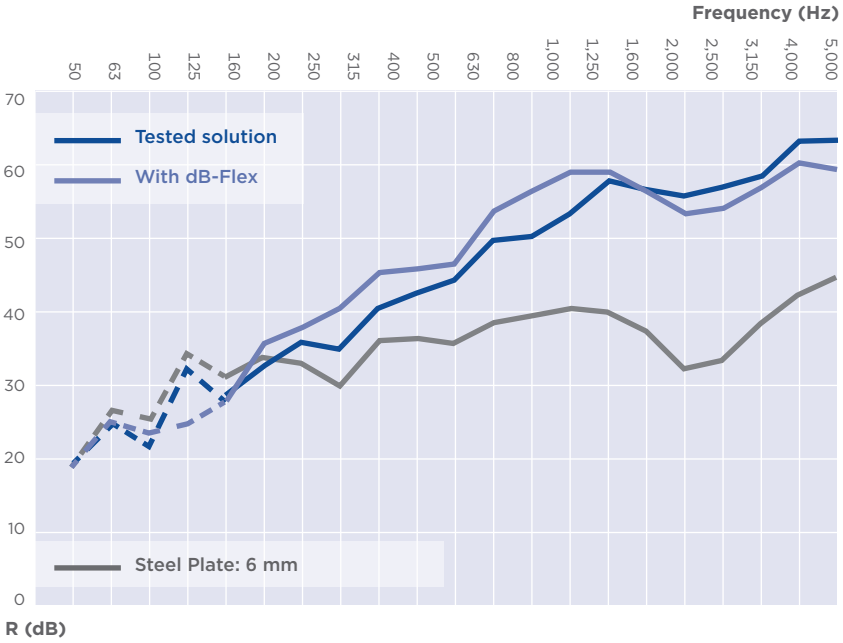
Stiffener: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

Complete solution
Weight*: 4.28 kg/m²
U-value*: 0.504 W/m²K
Sound Reduction R_w (C,C_{tr}): 48 (-2; -6) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

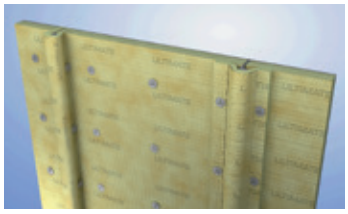


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.2	19.4	18.8
63	26.5	24.6	24.9
80	25.0	21.6	23.3
100	34.1	32.1	24.6
125	30.8	27.6	27.8
160	33.8	32.4	35.6
200	32.9	35.7	37.9
250	30.0	34.7	40.4
315	35.8	40.4	45.1
400	36.4	42.2	45.8
500	35.5	44.3	46.5
630	38.5	49.6	53.7
800	39.6	50.1	56.3
1,000	40.5	53.2	59.1
1,250	40.1	57.9	58.8
1,600	36.9	56.6	56.3
2,000	32.4	55.6	53.2
2,500	33.4	56.7	53.9
3,150	38.4	58.5	57.0
4,000	42.1	63.0	60.2
5,000	44.6	63.3	59.5
$R_w(C;C_{tr})$	37(-1;-1)	48(-2;-6)	50(-2;-8)
R_A	35.8	46.3	47.6
$R_{A.tr}$	36.1	42.0	41.6

A-60 STEEL BULKHEAD RESTRICTED

PLATE: 36-70 MM – STIFFENER: 76-20 MM

Even lighter!



WHY CHOOSE THIS SOLUTION:

- Lightweight
- Improved logistics
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52kg/m²

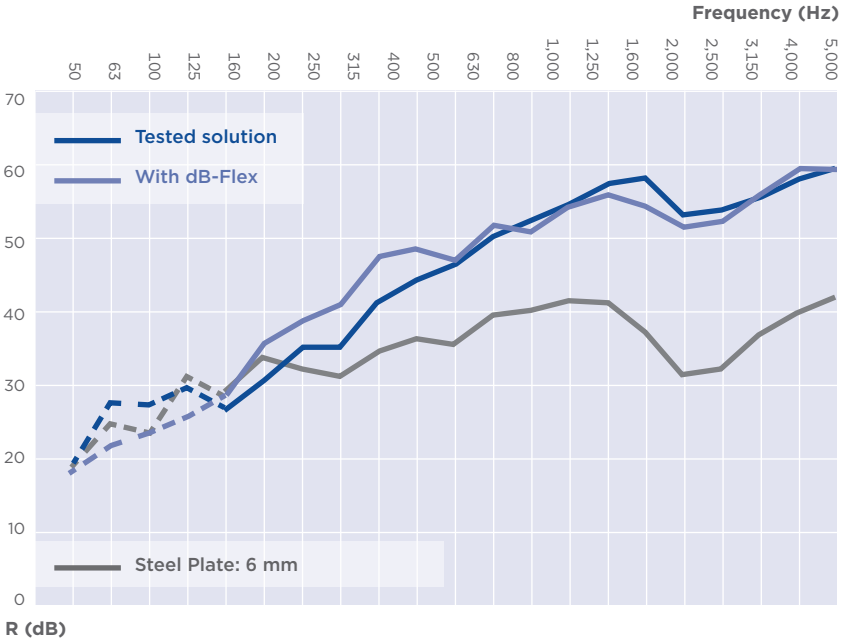
Stiffener: **U SeaProtect™ 76-20 mm**
Weight: 1.52 kg/m²

Complete solution
Weight*: 3.58 kg/m²
U-value*: 0.678 W/m²K
Sound Reduction R_w (C,C_{tr}): 49 (-3; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Slab 76 20 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

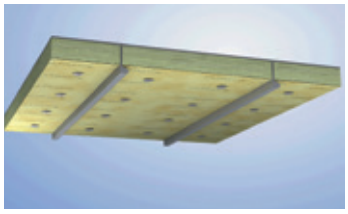


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.6	20.2	18.2
63	24.6	27.7	22.1
80	23.9	27.4	24.0
100	31.4	29.8	25.9
125	29.3	26.9	28.6
160	33.9	30.9	36.1
200	32.3	35.3	38.8
250	31.6	35.6	41.0
315	34.8	41.2	47.5
400	36.2	44.4	48.8
500	35.8	46.5	47.2
630	39.7	50.7	51.8
800	40.4	52.3	51.0
1,000	41.5	54.9	54.3
1,250	41.2	57.7	56.1
1,600	37.3	58.2	54.7
2,000	31.5	53.3	51.8
2,500	32.4	54.1	52.5
3,150	37.3	55.7	56.0
4,000	40.4	58.4	59.6
5,000	42.5	60.0	59.5
$R_w(C;C_{tr})$	37(-2;-1)	49(-3;-7)	50(-2;-7)
R_A	35.4	46.3	48.0
$R_{A.tr}$	35.9	41.6	42.5

A-15 STEEL DECK

PLATE: 36-70 MM – STIFFENER: NO INSULATION

Easy Handling



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Cost Effective Solution
- Fast Installation
- Sound Insulation

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

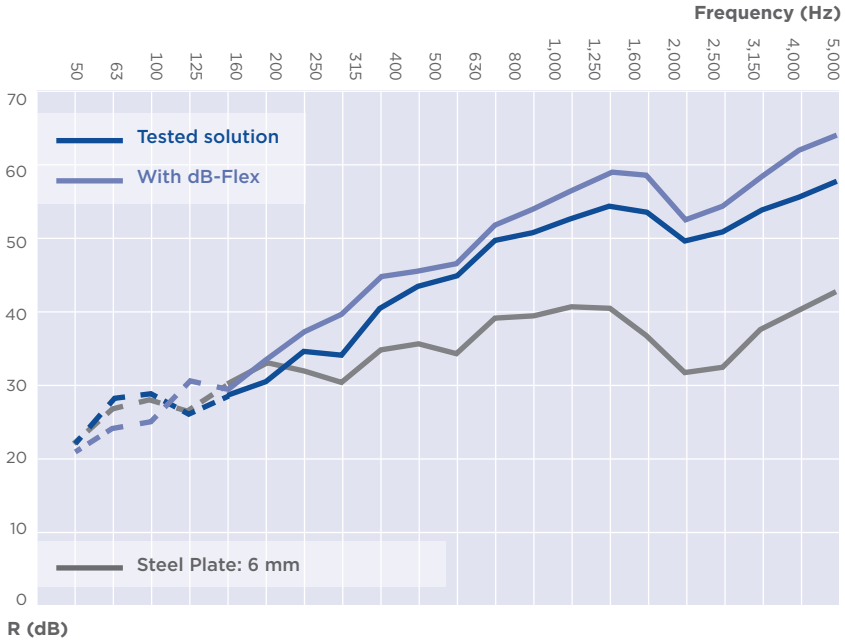
Stiffener: **no insulation**
Weight: 0.00 kg/m²

Complete solution
Weight*: 2.52 kg/m²
U-value*: 1.475 W/m²K
Sound Reduction R_w (C,C_{tr}): 47 (-1; -6) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●

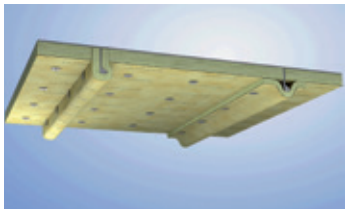
SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	22.0	21.9	21.0
63	26.6	28.3	24.5
80	27.7	29.0	25.1
100	26.4	26.0	30.8
125	30.4	28.7	29.4
160	33.0	30.7	33.6
200	32.0	34.7	37.5
250	30.6	34.2	39.7
315	35.2	41.0	45.1
400	35.7	43.8	45.7
500	34.6	45.1	46.6
630	39.4	49.8	52.0
800	39.7	51.0	54.0
1,000	40.8	53.0	56.8
1,250	40.6	54.7	59.0
1,600	36.9	53.8	58.6
2,000	31.7	49.9	52.7
2,500	32.6	51.3	54.4
3,150	37.6	54.1	58.4
4,000	40.5	55.9	62.1
5,000	42.7	58.1	64.3
$R_w(C;C_{tr})$	37(-2;-1)	47(-1;-6)	49(-2;-6)
R_A	36.0	45.5	47.3
$R_{A.tr}$	35.0	40.7	42.6

A-30 STEEL DECK

PLATE: 24-50 MM – STIFFENER: 76-20 MM



WHY CHOOSE THIS SOLUTION:

- Comfort
- Improved logistics
- Thermal Insulation
- Sound insulation

Plate: **U SeaProtect™ 24-50 mm**
Weight: 1.20kg/m²

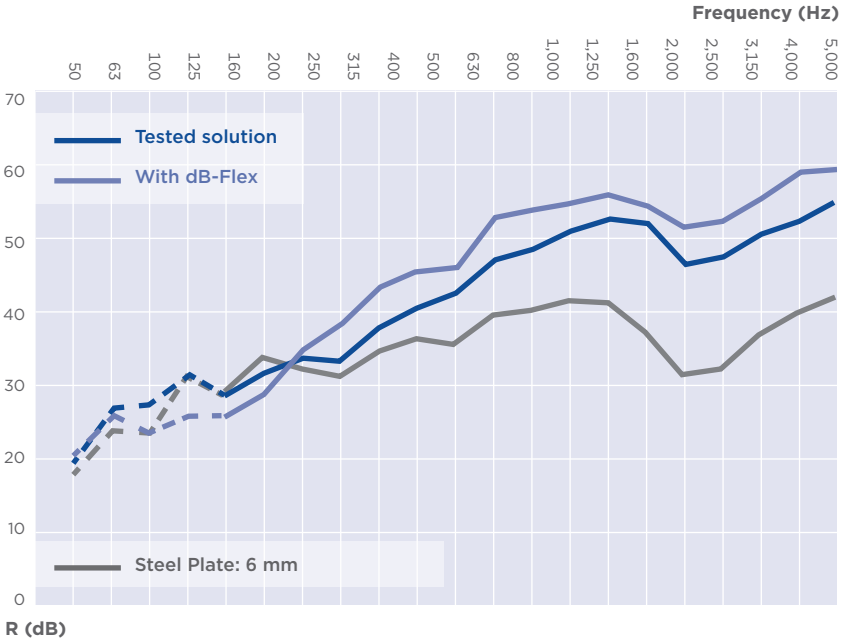
Stiffener: **U SeaProtect™ 76-20 mm**
Weight: 1.52 kg/m²

Complete solution
Weight*: 2.26 kg/m²
U-value*: 0.858 W/m²K
Sound Reduction R_w (C,C_{tr}): 46 (-1; -5) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)	
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)
U SeaProtect™ Roll 24 50 mm	●	●	●	●			
U SeaProtect™ Slab 24 50 mm	●	●	●	●	●	●	●
U SeaProtect™ Slab 76 20 mm	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

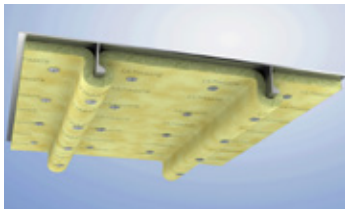


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.6	20.8	20.9
63	24.6	27.3	26.6
80	23.9	28.0	24.5
100	31.4	31.8	26.2
125	29.3	29.1	26.6
160	33.9	32.1	29.6
200	32.3	34.1	35.8
250	31.6	33.9	38.4
315	34.8	38.3	43.5
400	36.2	40.9	45.6
500	35.8	42.7	46.2
630	39.7	47.3	52.9
800	40.4	48.9	53.9
1,000	41.5	51.2	54.9
1,250	41.2	53.0	56.2
1,600	37.3	52.3	54.8
2,000	31.5	46.9	51.8
2,500	32.4	47.8	52.5
3,150	37.3	50.9	55.7
4,000	40.4	53.0	58.9
5,000	42.5	55.3	60.2
$R_w(C;C_{tr})$	37(-2;-1)	46(-1;-5)	49(-3;-8)
R_A	35.4	44.8	46.1
$R_{A.tr}$	35.9	41.4	40.8

A-30 STEEL DECK

PLATE: 24-50 MM – STIFFENER: 24-50 MM

Even lighter!



WHY CHOOSE THIS SOLUTION:

- Lightweight
- Comfort
- Easy Handling
- Fast Installation

Plate: **U SeaProtect™ 24-50 mm**
Weight: 1.20 kg/m²

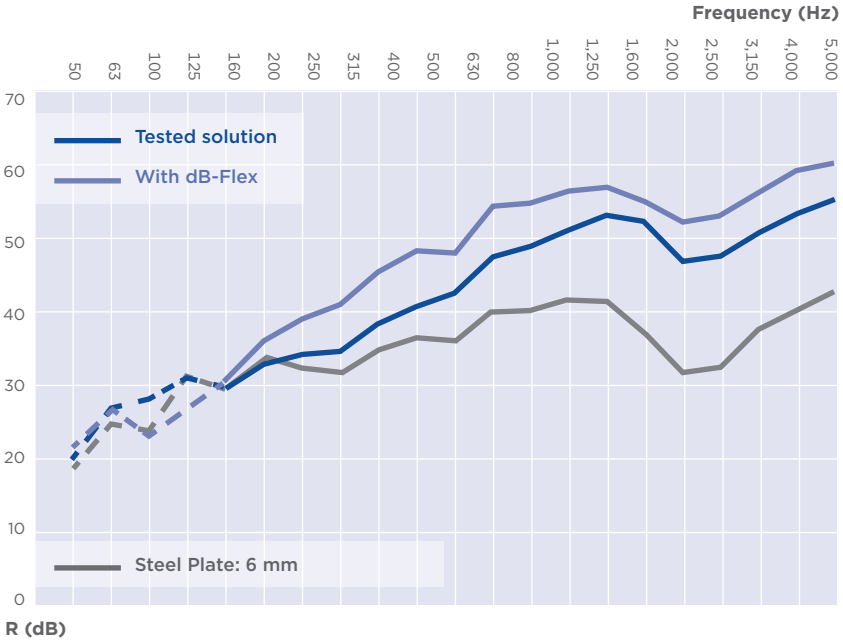
Stiffener: **U SeaProtect™ 24-50 mm**
Weight: 1.20 kg/m²

Complete solution
Weight*: 2.04 kg/m²
U-value*: 0.716 W/m²K
Sound Reduction R_w (C,C_{tr}): 46 (-1; -5) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)	
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)
U SeaProtect™ Roll 36 70 mm	●	●	●	●			
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

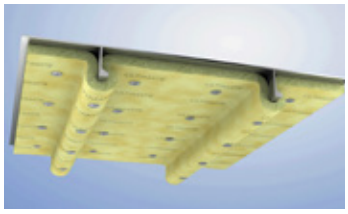


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.6	19.7	21.1
63	24.6	26.9	26.5
80	23.9	27.8	22.9
100	31.4	30.9	26.8
125	29.3	29.4	30.3
160	33.9	32.9	35.9
200	32.3	34.0	38.8
250	31.6	34.3	40.5
315	34.8	38.3	45.2
400	36.2	40.6	48.1
500	35.8	42.4	47.5
630	39.7	47.4	54.1
800	40.4	48.9	54.6
1,000	41.5	51.1	56.4
1,250	41.2	53.2	56.9
1,600	37.3	52.2	55.0
2,000	31.5	46.6	51.9
2,500	32.4	47.4	52.9
3,150	37.3	50.6	56.2
4,000	40.4	53.1	59.1
5,000	42.5	55.3	60.1
$R_w(C;C_{tr})$	37(-2;-1)	46(-1;-5)	51(-2;-8)
R_A	35.4	44.8	48.6
$R_{A,tr}$	35.9	41.4	43.3

A-60 STEEL DECK

PLATE: 36-70 MM – STIFFENER: 36-70 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Easy Handling
- Thermal Insulation
- Sound insulation

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

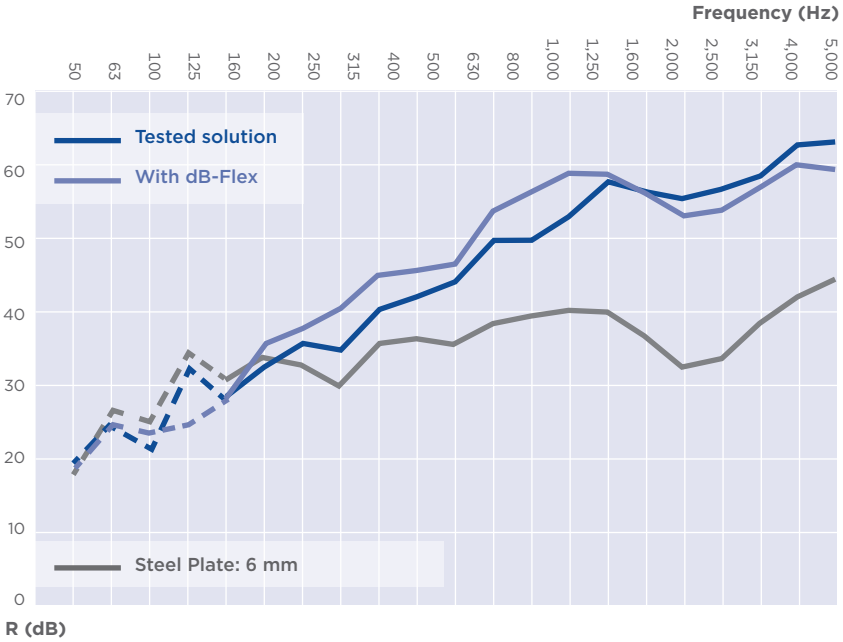
Stiffener: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

Complete solution
Weight*: 4.28 kg/m²
U-value*: 0.504 W/m²K
Sound Reduction R_w (C,C_{tr}): 48 (-2; -6) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

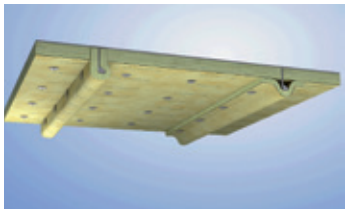


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.2	19.4	18.8
63	26.5	24.6	24.9
80	25.0	21.6	23.3
100	34.1	32.1	24.6
125	30.8	27.6	27.8
160	33.8	32.4	35.6
200	32.9	35.7	37.9
250	30.0	34.7	40.4
315	35.8	40.4	45.1
400	36.4	42.2	45.8
500	35.5	44.3	46.5
630	38.5	49.6	53.7
800	39.6	50.1	56.3
1,000	40.5	53.2	59.1
1,250	40.1	57.9	58.8
1,600	36.9	56.6	56.3
2,000	32.4	55.6	53.2
2,500	33.4	56.7	53.9
3,150	38.4	58.5	57.0
4,000	42.1	63.0	60.2
5,000	44.6	63.3	59.5
$R_w(C;C_{tr})$	37(-1;-1)	48(-2;-6)	50(-2;-8)
R_A	35.8	46.3	47.6
$R_{A.tr}$	36.1	42.0	41.6

A-60 STEEL DECK

PLATE: 36-70 MM – STIFFENER: 56-30 MM

Easy Handling



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Comfort
- Fast installation
- Lightweight

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

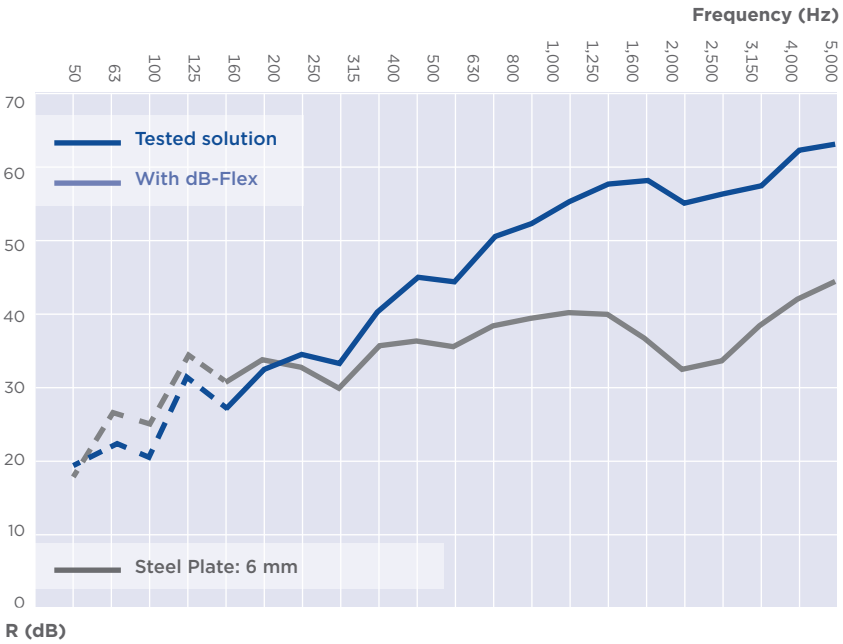
Stiffener: **U SeaProtect™ 56-30 mm**
Weight: 1.68 kg/m²

Complete solution
Weight*: 3.70 kg/m²
U-value*: 0.618 W/m²K
Sound Reduction R_w (C,C_{tr}): 48 (-2; -6) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Roll 56 30 mm	●	●		●				
U SeaProtect™ Slab 56 30 mm	●	●	●	●	●	●	●	●

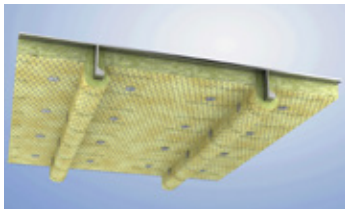
SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)
50	18.2	18.8
63	26.5	22.4
80	25.0	20.6
100	34.1	31.6
125	30.8	27.3
160	33.8	32.6
200	32.9	34.3
250	30.0	33.3
315	35.8	40.1
400	36.4	44.9
500	35.5	44.7
630	38.5	50.5
800	39.6	52.5
1,000	40.5	55.2
1,250	40.1	57.6
1,600	36.9	58.1
2,000	32.4	55.0
2,500	33.4	56.4
3,150	38.4	57.7
4,000	42.1	62.4
5,000	44.6	63.1
$R_w(C;C_{tr})$	37(-1;-1)	48(-2;-6)
R_A	35.8	46.1
$R_{A,tr}$	36.1	41.6

A-60 STEEL DECK

PLATE: 66-40 MM – STIFFENER: 66-40 MM



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Fast Installation
- Sound insulation
- Thin solution

Plate: **U SeaProtect™ Wired Mat 66-40 mm**
Weight: 2.64 kg/m²

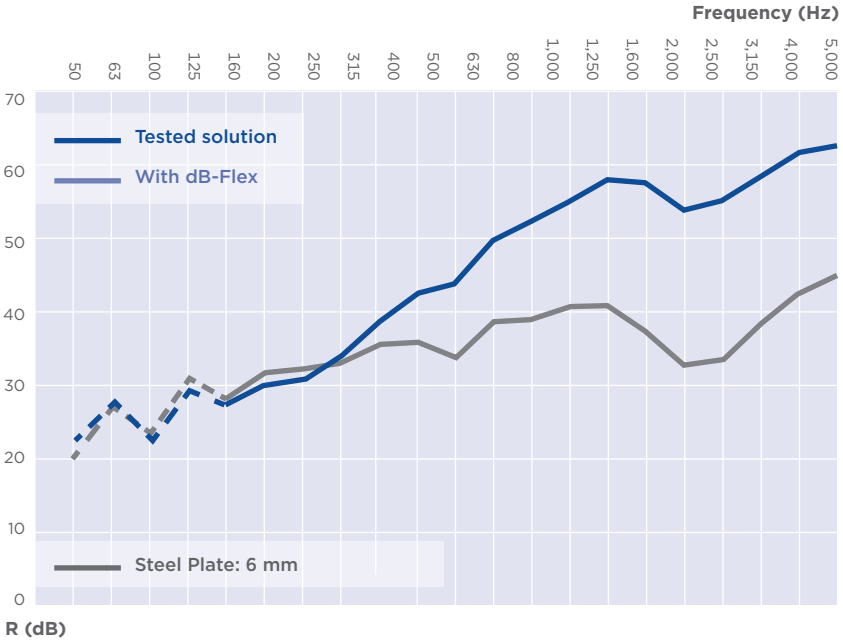
Stiffener: **U SeaProtect™ Wired Mat 66-40 mm**
Weight: 2.64 kg/m²

Complete solution
Weight*: 4.49 kg/m²
U-value*: 0.762 W/m²K
Sound Reduction R_w (C,C_{tr}): 47 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)	
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)
U SeaProtect™ Wired Mat 66 40 mm	●	●					

SOUND REDUCTION MEASUREMENT

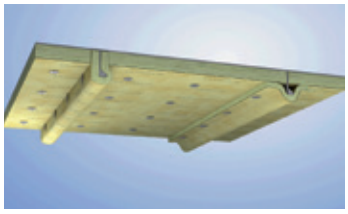


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)
50	20.1	22.3
63	26.9	27.9
80	23.2	22.1
100	30.8	29.2
125	28.2	27.3
160	31.7	30.0
200	32.1	31.6
250	32.8	34.0
315	35.4	38.7
400	35.8	42.8
500	33.8	43.8
630	38.6	49.8
800	39.0	52.4
1,000	40.7	54.8
1,250	40.7	57.8
1,600	37.4	57.5
2,000	32.6	53.6
2,500	33.4	55.0
3,150	38.3	58.2
4,000	42.3	61.5
5,000	44.6	62.4
$R_w(C;C_{tr})$	37(-1;-1)	47(-2;-7)
R_A	35.8	45.0
$R_{A.tr}$	35.8	40.4

A-60 STEEL DECK

PLATE: 56-50 MM – STIFFENER: 76-20 MM

Space Saving



WHY CHOOSE THIS SOLUTION:

- Comfort
- Thermal Insulation
- Sound Insulation
- Thin solution

Plate: **U SeaProtect™ Wired Mat 56-50 mm**
Weight: 2.80 kg/m²

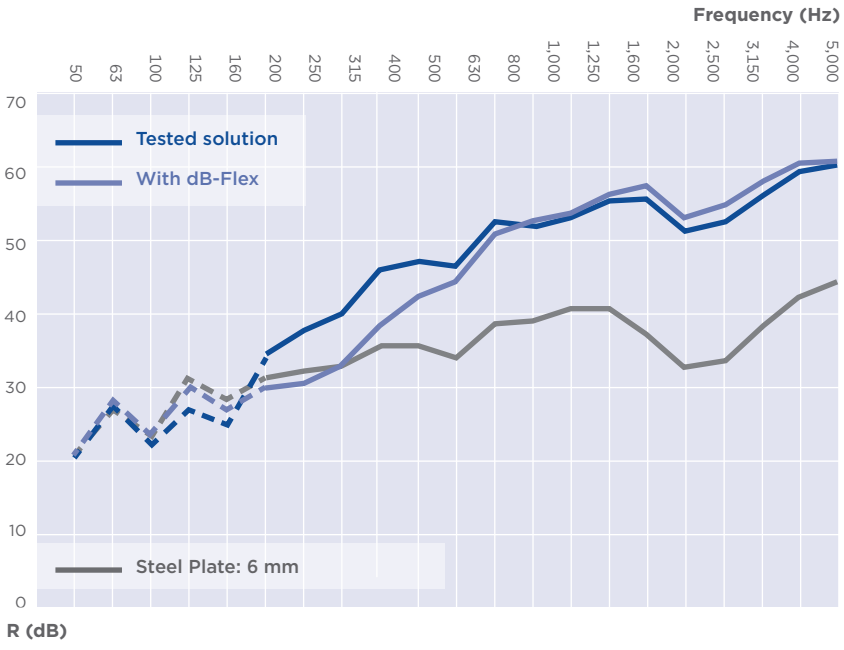
Stiffener: **U SeaProtect™ 76-20 mm**
Weight: 1.52 kg/m²

Complete solution
Weight*: 3.86 kg/m²
U-value*: 0.824 W/m²·K
Sound Reduction R_w (C,C_{tr}): 47 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 56 50 mm	●	●		●				
U SeaProtect™ Slab 56 50 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Slab 76 20 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

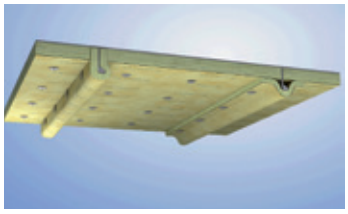


Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	20.1	21.0	20.7
63	26.9	28.2	27.5
80	23.2	23.6	22.0
100	30.8	29.7	26.7
125	28.2	27.1	24.8
160	31.7	29.9	34.2
200	32.1	30.5	37.7
250	32.8	33.2	40.1
315	35.4	38.4	45.9
400	35.8	42.6	47.0
500	33.8	44.5	46.9
630	38.6	50.8	52.2
800	39.0	52.7	52.0
1,000	40.7	53.7	53.3
1,250	40.7	56.2	55.5
1,600	37.4	57.5	55.7
2,000	32.6	53.3	51.2
2,500	33.4	54.5	52.3
3,150	38.3	57.8	56.1
4,000	42.3	60.2	59.4
5,000	44.6	60.8	60.1
$R_w(C;C_{tr})$	37(-1;-1)	47(-2;-7)	50(-3;-9)
R_A	35.8	44.6	46.6
$R_{A,tr}$	35.8	40.0	41.2

A-60 STEEL DECK

PLATE: 36-70 MM – STIFFENER: 76-20 MM

Even lighter!



WHY CHOOSE THIS SOLUTION:

- Lightweight
- Improved Logistics
- Thermal Insulation
- Sound Insulation

Plate: **U SeaProtect™ 36-70 mm**
Weight: 2.52 kg/m²

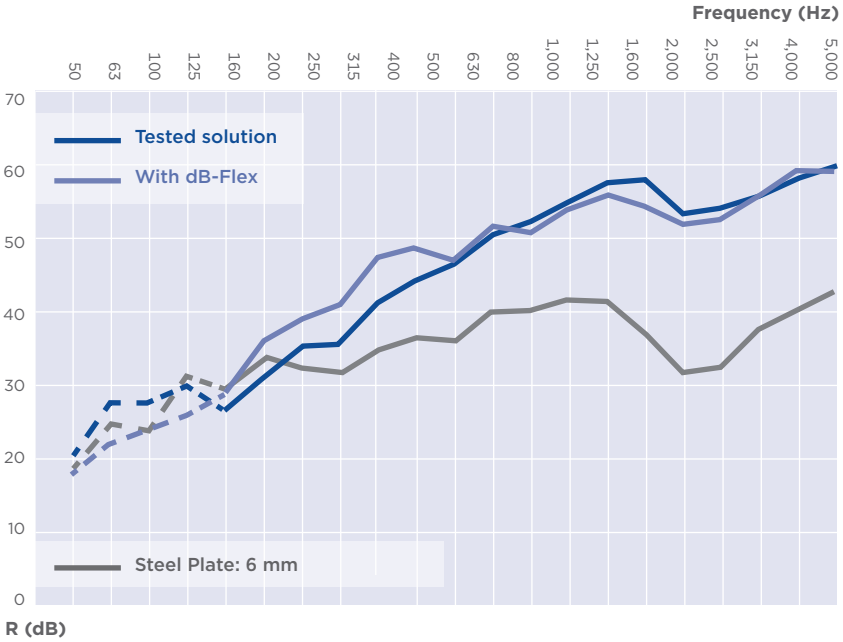
Stiffener: **U SeaProtect™ 76-20 mm**
Weight: 1.52 kg/m²

Complete solution
Weight*: 3.58 kg/m²
U-value*: 0.678 W/m²K
Sound Reduction R_w (C,C_{tr}): 49 (-3; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Roll 36 70 mm	●	●						
U SeaProtect™ Slab 36 70 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Slab 76 20 mm	●	●	●	●	●	●	●	●

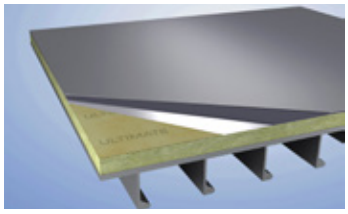
SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	18.6	20.2	18.2
63	24.6	27.7	22.1
80	23.9	27.4	24.0
100	31.4	29.8	25.9
125	29.3	26.9	28.6
160	33.9	30.9	36.1
200	32.3	35.3	38.8
250	31.6	35.6	41.0
315	34.8	41.2	47.5
400	36.2	44.4	48.8
500	35.8	46.5	47.2
630	39.7	50.7	51.8
800	40.4	52.3	51.0
1,000	41.5	54.9	54.3
1,250	41.2	57.7	56.1
1,600	37.3	58.2	54.7
2,000	31.5	53.3	51.8
2,500	32.4	54.1	52.5
3,150	37.3	55.7	56.0
4,000	40.4	58.4	59.6
5,000	42.5	60.0	59.5
$R_w(C;C_{tr})$	37(-2;-1)	49(-3;-7)	50(-2;-7)
R_A	35.4	46.3	48.0
$R_{A.tr}$	35.9	41.6	42.5

A-60 FLOATING FLOOR - STEEL ON TOP

U SEAPROTECT™ SLAB 90-50 MM



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Comfort
- Fast installation
- Lightweight

***Plate:* U SeaProtect™ 90-50 mm**
Weight: 2.52 kg/m²

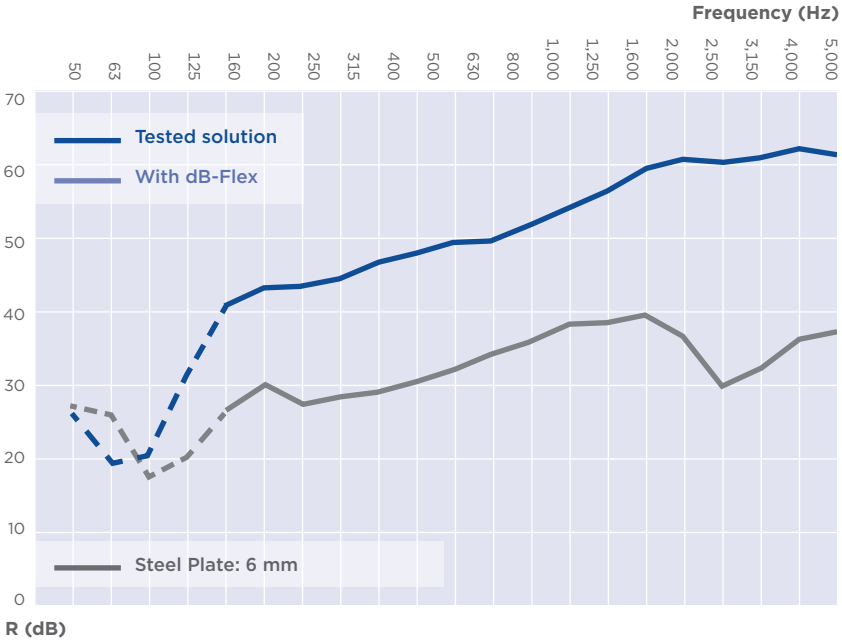
Top layer:
2 + 3 mm galvanised steel sheet
Weight: 7.84 kg/mm/m²

Complete solution
U-value*: 0.300 W/m²K
Sound Reduction R_w (C,C_{tr}): 53 (-1; -5) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

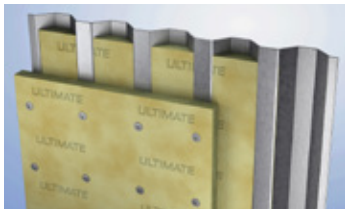
Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)	
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)
U SeaProtect™ Slab 90 50 mm	●	●					

SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Steel 6 mm R (dB)	Tested solution R (dB)
50	27.1	26.1
63	26.2	19.5
80	17.9	21.7
100	20.5	31.3
125	26.4	40.8
160	30.3	43.2
200	27.7	43.4
250	28.5	44.4
315	29.3	46.8
400	30.6	48.1
500	32.4	49.6
630	34.5	49.8
800	36.1	52.3
1,000	38.5	54.4
1,250	38.9	56.7
1,600	39.5	59.6
2,000	36.5	60.7
2,500	30.2	60.5
3,150	32.5	61.0
4,000	36.5	62.1
5,000	37.8	61.5
$R_w(C;C_{tr})$	35(-1;-2)	53(-1;-5)
R_A	34.0	52.0
$R_{A.tr}$	33.0	48.0

A-60 STEEL CORRUGATED BULKHEAD – **FIRE FROM EITHER SIDE**



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lightweight
- Sound Insulation
- Thermal Insulation

System 1 : Steel Corrugated Bulkhead 2 mm thick
Corrugated Bulkhead Design: **58.5 x 175.5 x 35 mm, pitch 234 mm**
Plate: **U SeaProtect™ 66 - 2x30 mm**
Troughs: **optional U SeaProtect™ 66-30 mm**

U-value*: 0.450 W/m²K
Weight*: 3.96 kg/m²
Weight: 1.98 kg/m²

** Calculation done with troughs unfilled*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 30 mm	●	●	●	●	●	●	●	●

System 2 : steel corrugated Bulkhead 4,5 mm thick
Corrugated Bulkhead Design: **97.5 x 450 x 105 mm, pitch 610 mm**
Plate: **U SeaProtect™ 56-70 mm**
Troughs: **optional U SeaProtect™ 56-100 mm**

U-value*: 0.290 W/m²K
Weight*: 3.92 kg/m²
Weight: 5.60 kg/m²

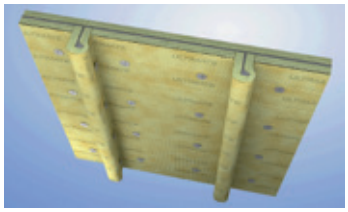
Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 56 70 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Slab 56 100 mm	●	●	●	●	●	●	●	●

U SEAPROTECT™ SOLUTIONS FOR ALUMINIUM CONSTRUCTIONS

A-60 ALUMINIUM BULKHEAD 4 MM

PLATE: 66-70 MM – STIFFENER: 66-70 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 66-70 mm**
Weight: 4.62 kg/m²

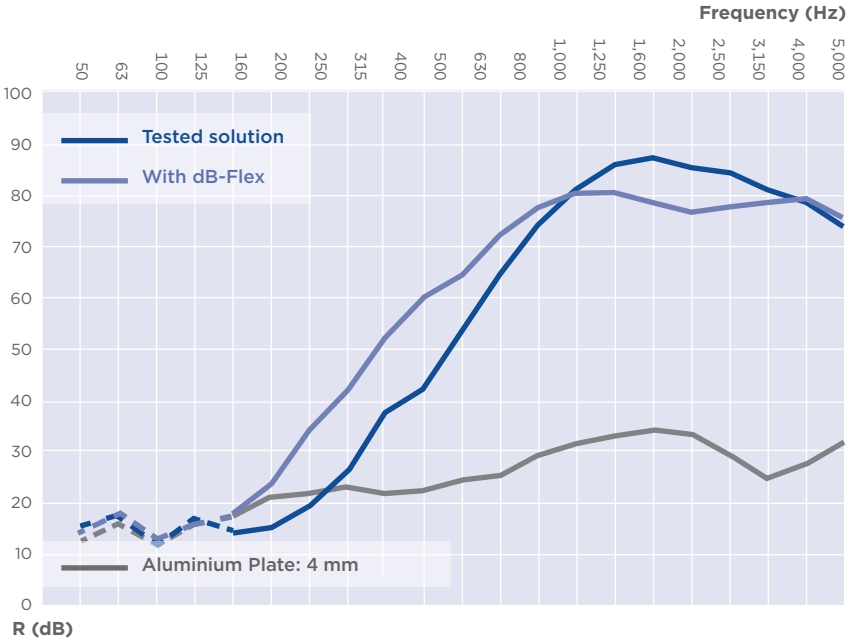
Stiffener: **U SeaProtect™ 66-70 mm**
Weight: 4.62 kg/m²

Complete solution
Weight*: 12.47 kg/m²
U-value*: 0.246 W/m²K
Sound Reduction R_w (C,C_{tr}): 37 (-3; -8) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 70 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

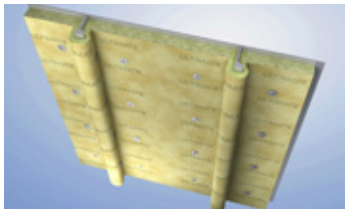


Frequency (Hz)	Aluminium 4 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	12.5	15.6	14.6
63	16.3	17.7	18.2
80	12.2	11.6	13.0
100	16.1	17.0	16.0
125	17.7	14.6	17.4
160	21.3	15.3	23.4
200	21.8	19.4	34.3
250	22.8	26.2	41.8
315	22.0	37.3	52.0
400	22.4	42.3	60.5
500	24.6	53.4	64.4
630	25.2	64.5	71.8
800	29.3	74.4	77.5
1,000	31.4	81.1	80.6
1,250	33.5	85.8	80.6
1,600	34.3	87.2	78.6
2,000	34.1	85.3	76.5
2,500	29.7	84.1	77.2
3,150	24.4	81.1	78.6
4,000	27.6	78.7	78.9
5,000	31.6	74.1	75.4
$R_w(C;C_{tr})$	28(-1;-2)	37(-3;-8)	45(-5;-12)
R_A	27.4	34.1	39.8
$R_{A,tr}$	26.1	28.5	32.8

A-30 ALUMINIUM BULKHEAD RESTRICTED 4 MM

PLATE: 66-50 MM – STIFFENER: 66-50 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 66-50 mm**
Weight: 3.30 kg/m²

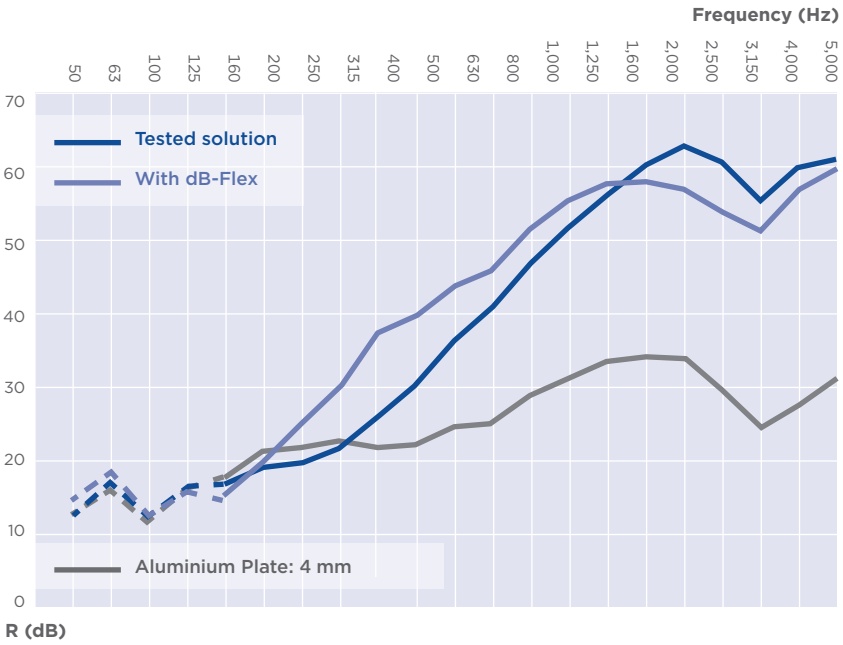
Stiffener: **U SeaProtect™ 66-50 mm**
Weight: 3.30 kg/m²

Complete solution
Weight*: 5.61 kg/m²
U-value*: 0.675 W/m²K
Sound Reduction R_w (C,C_{tr}): 36 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 50 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

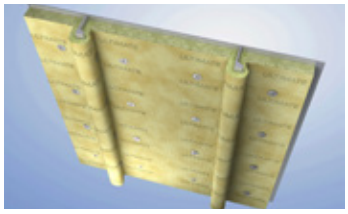


Frequency (Hz)	Aluminium 4 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	12.5	12.2	14.7
63	16.3	17.2	18.7
80	12.2	12.6	12.8
100	16.1	16.7	16.0
125	17.7	16.9	15.2
160	21.3	19.1	19.6
200	21.8	19.8	24.7
250	22.8	21.9	30.1
315	22.0	26.3	37.4
400	22.4	30.3	40.1
500	24.6	36.2	43.8
630	25.2	41.0	45.8
800	29.3	47.0	51.6
1,000	31.4	51.8	55.6
1,250	33.5	56.2	57.6
1,600	34.3	60.1	58.1
2,000	34.1	62.9	56.9
2,500	29.7	60.7	53.9
3,150	24.4	55.6	51.5
4,000	27.6	59.8	57.1
5,000	31.6	61.1	59.6
$R_w(C;C_{tr})$	28(-1;-2)	36(-2;-7)	40(-3;-9)
R_A	27.4	33.9	36.6
$R_{A,tr}$	26.1	29.0	30.6

A-60 ALUMINIUM BULKHEAD RESTRICTED 4 MM

PLATE: 66-70 MM – STIFFENER: 66-70 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 66-70 mm**
Weight: 4.62 kg/m²

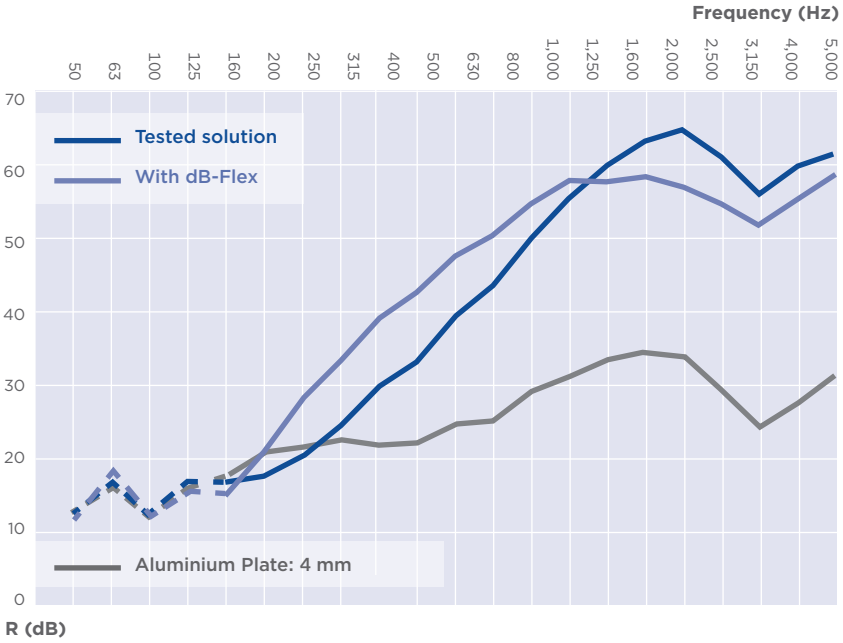
Stiffener: **U SeaProtect™ 66-70 mm**
Weight: 4.62 kg/m²

Complete solution
Weight*: 7.85 kg/m²
U-value*: 0.532 W/m²K
Sound Reduction R_w (C,C_{tr}): 37 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 70 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

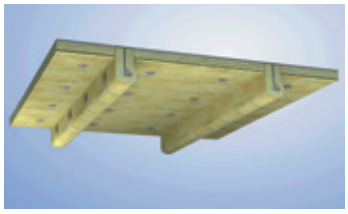


Frequency (Hz)	Aluminium 4 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	12.5	12.8	12.4
63	16.3	17.1	18.4
80	12.2	12.5	12.3
100	16.1	17.1	15.6
125	17.7	16.6	15.0
160	21.3	17.9	20.9
200	21.8	20.4	28.2
250	22.8	24.5	33.3
315	22.0	30.0	39.5
400	22.4	33.3	43.0
500	24.6	39.3	47.6
630	25.2	43.5	50.6
800	29.3	50.5	55.0
1,000	31.4	55.7	57.8
1,250	33.5	60.1	57.8
1,600	34.3	63.3	58.5
2,000	34.1	64.9	57.4
2,500	29.7	61.2	54.8
3,150	24.4	56.2	51.9
4,000	27.6	59.9	55.8
5,000	31.6	61.7	58.8
$R_w(C;C_{tr})$	28(-1;-2)	37(-2;-7)	41(-4;-10)
R_A	27.4	34.9	37.4
$R_{A,tr}$	26.1	29.6	31.0

A-30 ALUMINIUM DECK 4 MM

PLATE: 66-50 MM – STIFFENER: 66-50 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 66-50 mm**
Weight: 3.30 kg/m²

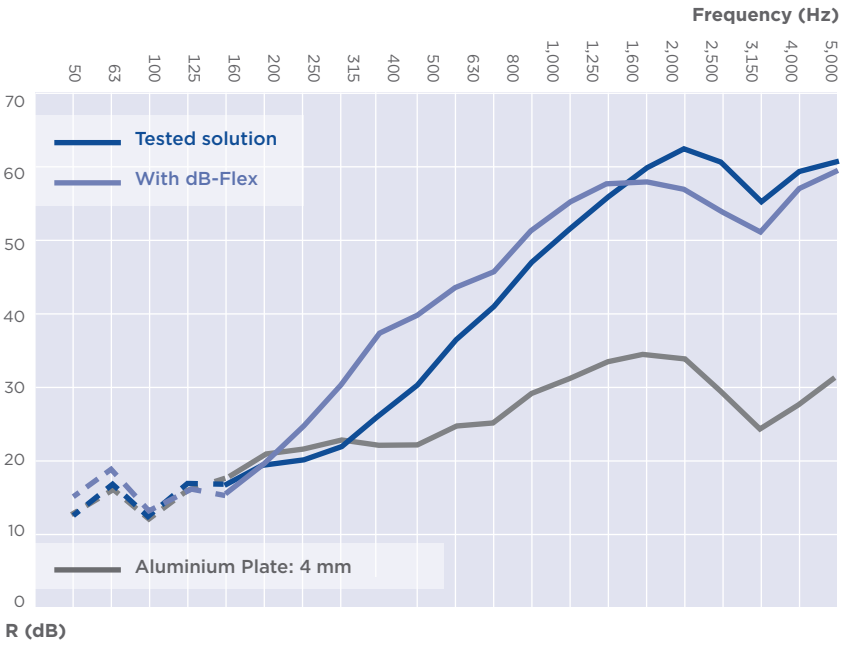
Stiffener: **U SeaProtect™ 66-50 mm**
Weight: 3.30 kg/m²

Complete solution
Weight*: 5.61 kg/m²
U-value*: 0.675 W/m²K
Sound Reduction R_w (C,C_{tr}): 36 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 50 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

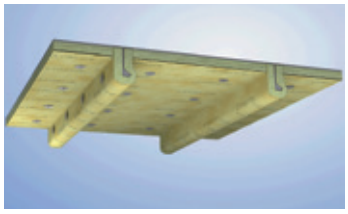


Frequency (Hz)	Aluminium 4 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	12.5	12.2	14.7
63	16.3	17.2	18.7
80	12.2	12.6	12.8
100	16.1	16.7	16.0
125	17.7	16.9	15.2
160	21.3	19.1	19.6
200	21.8	19.8	24.7
250	22.8	21.9	30.1
315	22.0	26.3	37.4
400	22.4	30.3	40.1
500	24.6	36.2	43.8
630	25.2	41.0	45.8
800	29.3	47.0	51.6
1,000	31.4	51.8	55.6
1,250	33.5	56.2	57.6
1,600	34.3	60.1	58.1
2,000	34.1	62.9	56.9
2,500	29.7	60.7	53.9
3,150	24.4	55.6	51.5
4,000	27.6	59.8	57.1
5,000	31.6	61.1	59.6
$R_w(C;C_{tr})$	28(-1;-2)	36(-2;-7)	40(-3;-9)
R_A	27.4	33.9	36.6
$R_{A,tr}$	26.1	29.0	30.6

A-60 ALUMINIUM DECK 4 MM

PLATE: 66-70 MM – STIFFENER: 66-70 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 66-70 mm**
Weight: 4.62 kg/m²

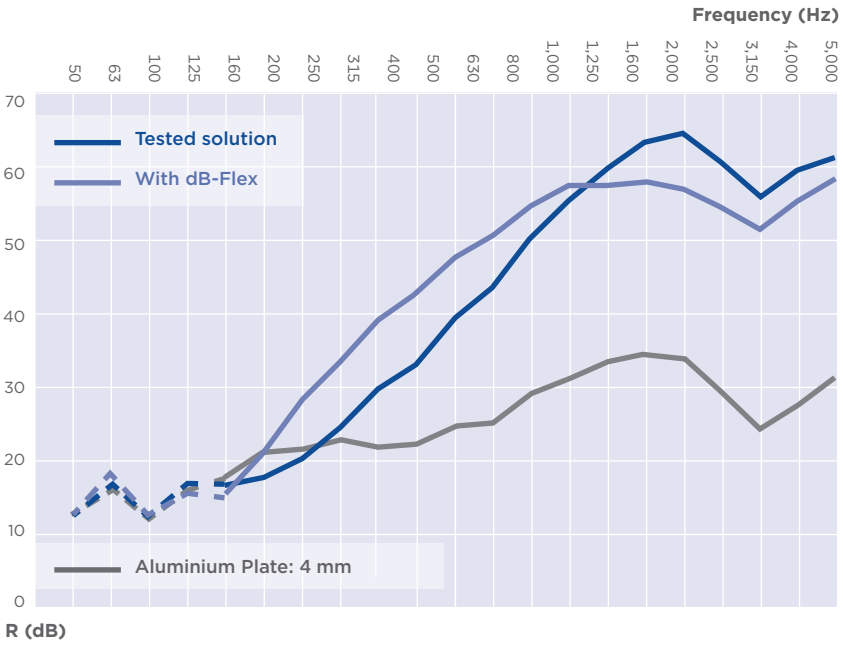
Stiffener: **U SeaProtect™ 66-70 mm**
Weight: 4.62 kg/m²

Complete solution
Weight*: 7.85 kg/m²
U-value*: 0.532 W/m²K
Sound Reduction R_w (C,C_{tr}): 37 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 70 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

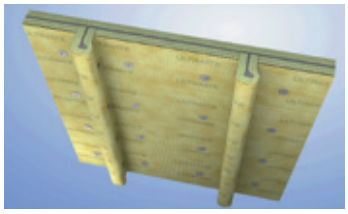


Frequency (Hz)	Aluminium 4 mm R (dB)	Tested solution R (dB)	With dB-Flex R (dB)
50	12.5	12.8	12.4
63	16.3	17.1	18.4
80	12.2	12.5	12.3
100	16.1	17.1	15.6
125	17.7	16.6	15.0
160	21.3	17.9	20.9
200	21.8	20.4	28.2
250	22.8	24.5	33.3
315	22.0	30.0	39.5
400	22.4	33.3	43.0
500	24.6	39.3	47.6
630	25.2	43.5	50.6
800	29.3	50.5	55.0
1,000	31.4	55.7	57.8
1,250	33.5	60.1	57.8
1,600	34.3	63.3	58.5
2,000	34.1	64.9	57.4
2,500	29.7	61.2	54.8
3,150	24.4	56.2	51.9
4,000	27.6	59.9	55.8
5,000	31.6	61.7	58.8
$R_w(C;C_{tr})$	28(-1;-2)	37(-2;-7)	41(-4;-10)
R_A	27.4	34.9	37.4
$R_{A,tr}$	26.1	29.6	31.0

A-60 ALUMINIUM BULKHEAD

PLATE: 66-2 X 30 MM – STIFFENER: 2 X 30 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lighweight
- Sound insulation
- Thermal insulation

Plate:
U SeaProtect™ 66-2 x 30 mm
Weight: 3.96 kg/m²

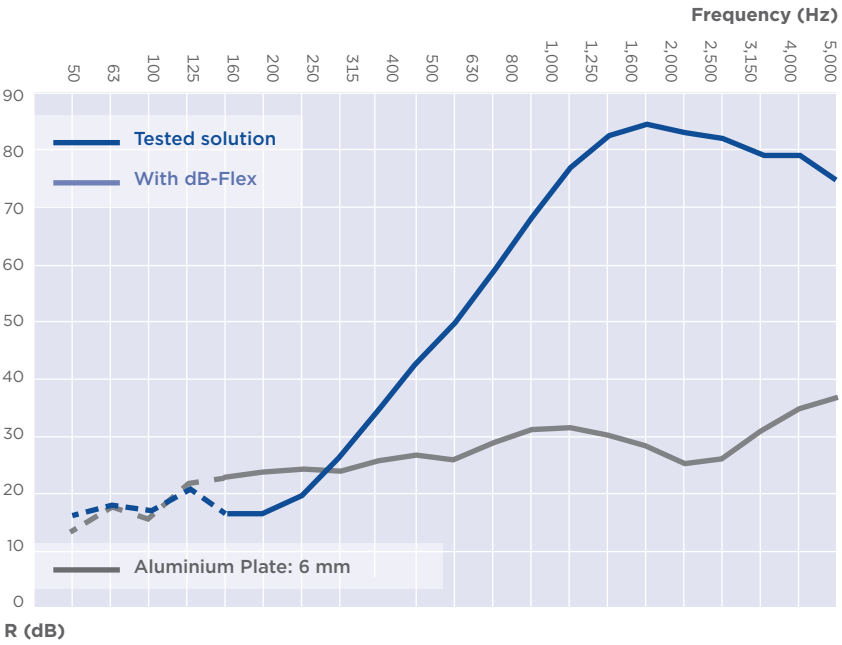
Stiffener:
U SeaProtect™ 66-2 x 30 mm
Weight: 3.96 kg/m²

Complete solution
Weight*: 10.69 kg/m²
U-value*: 0.286 W/m²K
Sound Reduction R_w (C,C_{tr}): 39 (-4; -9) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 30 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Wired Mat 66 30 mm	●	●						

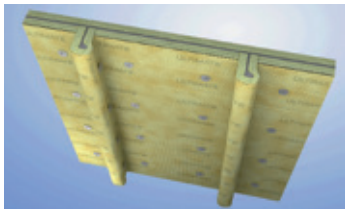
SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Aluminium 6 mm R (dB)	Tested solution R (dB)
50	13.2	15.9
63	17.3	18.1
80	15.8	17.1
100	21.5	21.0
125	22.9	16.5
160	23.9	16.7
200	24.4	19.7
250	24.2	26.2
315	25.7	35.0
400	26.8	42.8
500	26.2	49.7
630	29.0	58.4
800	31.2	68.3
1,000	31.6	77.0
1,250	30.5	81.9
1,600	28.6	84.4
2,000	25.1	83.2
2,500	26.2	82.0
3,150	30.8	79.0
4,000	35.0	79.0
5,000	37.0	74.6
$R_w(C;C_{tr})$	29(-1;-1)	39(-4;-9)
R_A	28.3	35.2
$R_{A,tr}$	28.1	29.9

A-60 ALUMINIUM BULKHEAD

PLATE: 66-70 MM – STIFFENER: 66-70 MM



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 66-70 mm**
Weight: 4.62 kg/m²

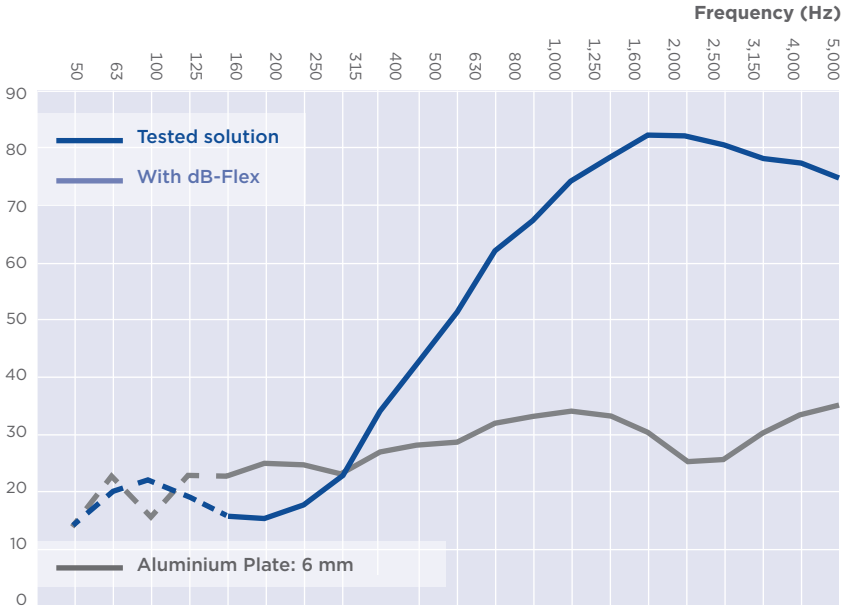
Stiffener: **U SeaProtect™ 66-70 mm**
Weight: 4.62 kg/m²

Complete solution
Weight*: 12.47 kg/m²
U-value*: 0.247 W/m²K
Sound Reduction R_w (C,C_{tr}): 37 (-4; -9) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 70 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Wired Mat 66 70 mm	●	●						

SOUND REDUCTION MEASUREMENT

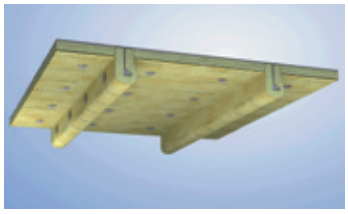


Frequency (Hz)	Aluminium 6 mm R (dB)	Tested solution R (dB)
50	13.4	13.5
63	22.4	19.6
80	15.2	21.8
100	22.4	19.1
125	22.3	15.6
160	24.6	15.1
200	24.3	17.3
250	23.0	22.3
315	27.0	33.4
400	28.0	42.4
500	28.5	51.0
630	31.8	61.8
800	32.8	67.5
1,000	34.1	74.8
1,250	33.2	78.8
1,600	30.1	82.6
2,000	25.2	82.5
2,500	25.5	80.9
3,150	29.9	78.4
4,000	33.3	77.6
5,000	35.3	75.3
$R_w(C;C_{tr})$	30(-2;-1)	37(-4;-9)
R_A	28.5	33.3
$R_{A,tr}$	28.4	28.1

A-60 ALUMINIUM BULKHEAD RESTRICTED

PLATE: 66-2 X 30 MM – STIFFENER: 2 X 30 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lighweight
- Sound insulation
- Thermal insulation

Plate:
U SeaProtect™ 66-2 x 30 mm
Weight: 3.96 kg/m²

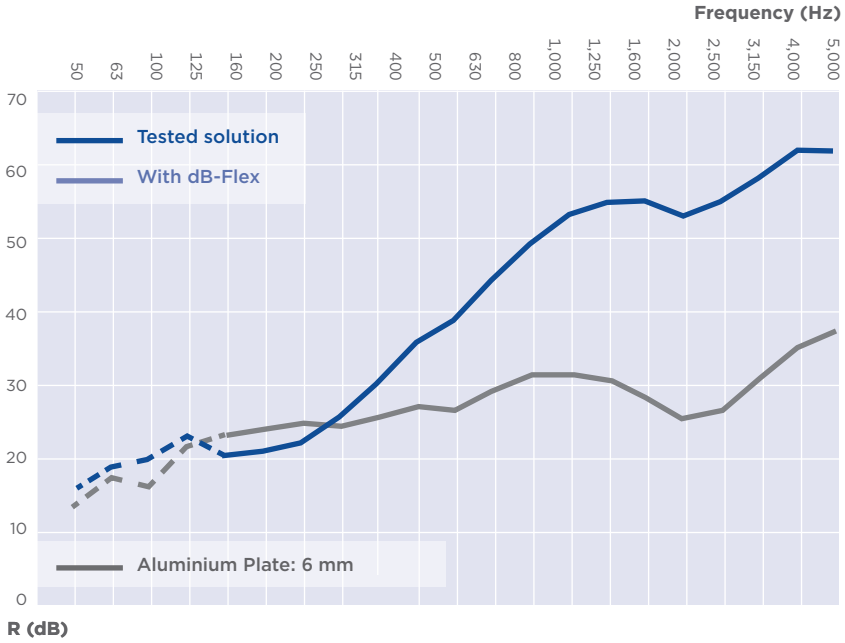
Stiffener:
U SeaProtect™ 66-2 x 30 mm
Weight: 3.96 kg/m²

Complete solution
Weight*: 6.73 kg/m²
U-value*: 0.574 W/m²K
Sound Reduction R_w (C,C_{tr}): 39 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Slab 66 30 mm	●	●	●	●	●	●	●	●
U SeaProtect™ Wired Mat 66 30 mm	●	●						

SOUND REDUCTION MEASUREMENT

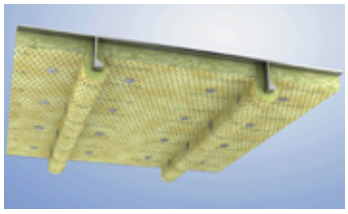


Frequency (Hz)	Aluminium 6 mm R (dB)	Tested solution R (dB)
50	13.2	15.9
63	17.3	18.4
80	15.8	19.3
100	21.5	22.7
125	22.9	20.2
160	23.9	21.0
200	24.4	21.9
250	24.2	25.5
315	25.7	30.1
400	26.8	35.5
500	26.2	38.9
630	29.0	44.1
800	31.2	49.0
1,000	31.6	52.9
1,250	30.5	54.8
1,600	28.6	55.0
2,000	25.1	52.8
2,500	26.2	54.9
3,150	30.8	58.1
4,000	35.0	61.8
5,000	37.0	61.9
$R_w(C;C_{tr})$	29(-1;-1)	39(-2;-7)
R_A	28.3	37.0
$R_{A,tr}$	28.1	32.2

A-30 ALUMINIUM DECK

PLATE: 66-40 MM – STIFFENER: 66-40 MM

Easy handling



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ Wired Mat 66-40 mm**
Weight: 2.64 kg/m²

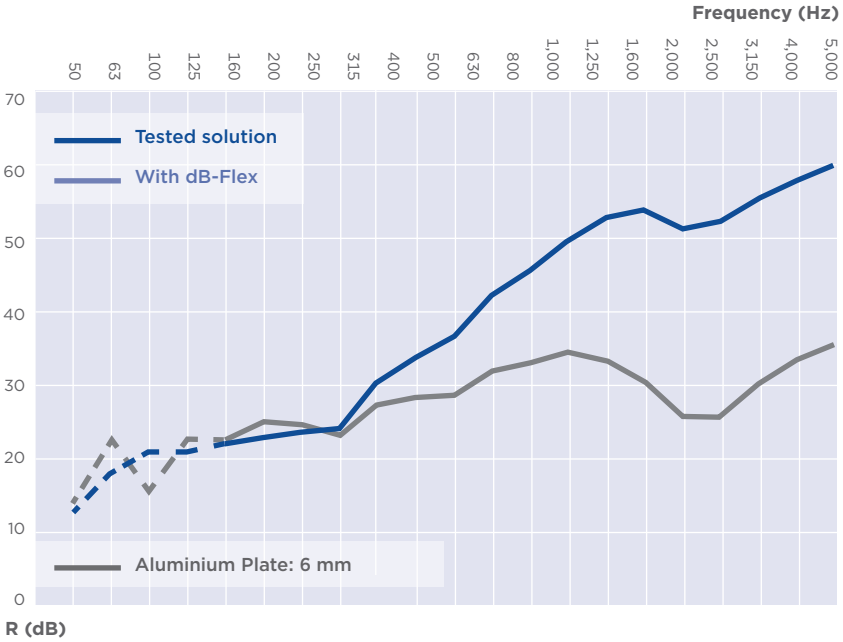
Stiffener: **U SeaProtect™ Wired Mat 66-40 mm**
Weight: 2.64 kg/m²

Complete solution
Weight*: 4.49 kg/m²
U-value*: 0.762 W/m²K
Sound Reduction R_w (C,C_{tr}): 39 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)	
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)
U SeaProtect™ Wired Mat 66 40 mm	●	●					

SOUND REDUCTION MEASUREMENT

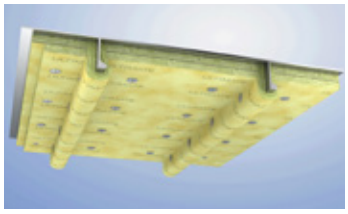


Frequency (Hz)	Aluminium 6 mm R (dB)	Tested solution R (dB)
50	13.4	12.3
63	22.4	17.6
80	15.2	20.8
100	22.4	20.7
125	22.3	21.5
160	24.6	22.5
200	24.3	23.4
250	23.0	23.8
315	27.0	30.1
400	28.0	33.8
500	28.5	36.4
630	31.8	42.1
800	32.8	45.6
1,000	34.1	49.6
1,250	33.2	52.7
1,600	30.1	53.8
2,000	25.2	51.3
2,500	25.5	52.2
3,150	29.9	55.4
4,000	33.3	57.9
5,000	35.3	59.9
$R_w(C;C_{tr})$	30(-2;-1)	39(-2;-7)
R_A	28.5	37.0
$R_{A,tr}$	28.4	32.4

A-60 ALUMINIUM DECK

PLATE: 66-2X30 MM MM – STIFFENER: 66-2X30 MM

Full Comfort



WHY CHOOSE THIS SOLUTION:

- Comfort
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ 66-2x30 mm**
Weight: 3.96 kg/m²

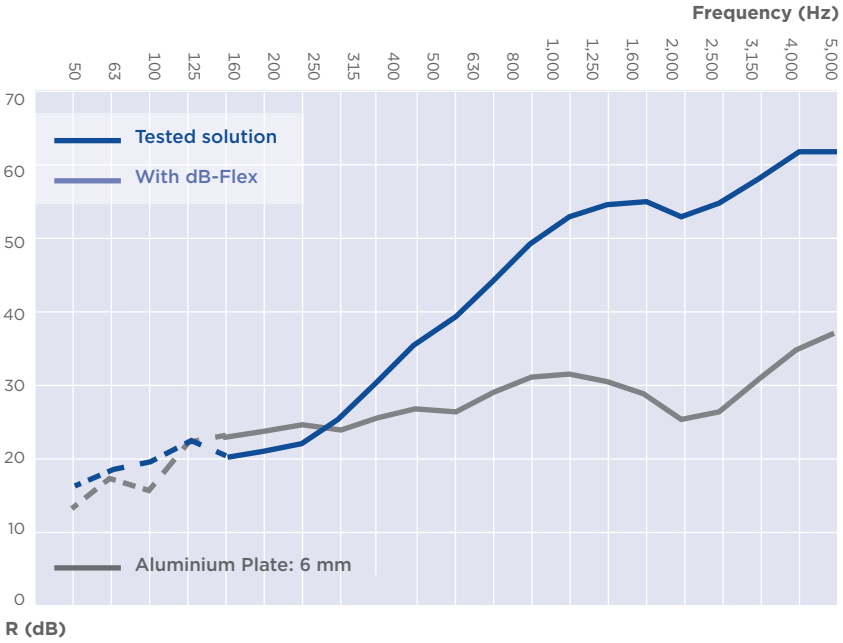
Stiffener: **U SeaProtect™ 66-2x30 mm**
Weight: 3.96 kg/m²

Complete solution
Weight*: 6.73 kg/m²
U-value*: 0.574 W/m²K
Sound Reduction R_w (C,C_{tr}): 39 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)		SeaProtect dB-Flex Alu
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)	
U SeaProtect™ Wired Mat 66 30 mm	●	●	●	●	●	●	●	●

SOUND REDUCTION MEASUREMENT

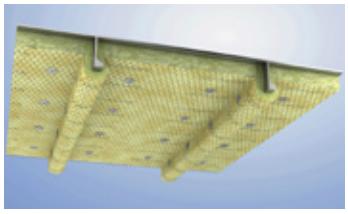


Frequency (Hz)	Aluminium 6 mm R (dB)	Tested solution R (dB)
50	13.2	15.9
63	17.3	18.4
80	15.8	19.3
100	21.5	22.7
125	22.9	20.2
160	23.9	21.0
200	24.4	21.9
250	24.2	25.5
315	25.7	30.1
400	26.8	35.5
500	26.2	38.9
630	29.0	44.1
800	31.2	49.0
1,000	31.6	52.9
1,250	30.5	54.8
1,600	28.6	55.0
2,000	25.1	52.8
2,500	26.2	54.9
3,150	30.8	58.1
4,000	35.0	61.8
5,000	37.0	61.9
$R_w(C;C_{tr})$	29(-1;-1)	39(-2;-7)
R_A	28.3	37.0
$R_{A,tr}$	28.1	32.2

A-60 ALUMINIUM DECK

PLATE: 66-70 MM – STIFFENER: 66-70 MM

Easy Handling



WHY CHOOSE THIS SOLUTION:

- Easy Handling
- Lighweight
- Sound insulation
- Thermal insulation

Plate: **U SeaProtect™ Wired Mat 66-70 mm**
Weight: 4.62 kg/m²

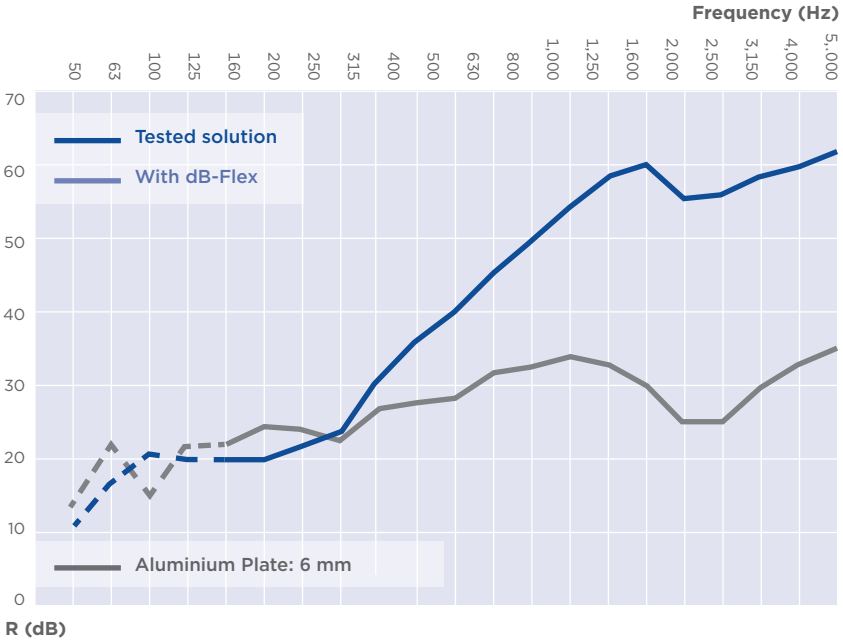
Stiffener: **U SeaProtect™ Wired Mat 66-70 mm**
Weight: 4.62 kg/m²

Complete solution
Weight*: 7.85 kg/m²
U-value*: 0.532 W/m²K
Sound Reduction R_w (C,C_{tr}): 39 (-2; -7) dB

** Weight calculated for 1 m² division with insulation ratio 1.0 for plate / 0.7 for stiffeners*

Facings	Unfaced	Aluminum	Glass cloth			B facing (Alu-Glass cloth composite)	
		Alu1	G120 (black)	G220 (white)	G420 (white)	B-Gl (Glass cloth outside)	B-Al (Alu facing outside)
U SeaProtect™ Wired Mat 66 70 mm	●	●					

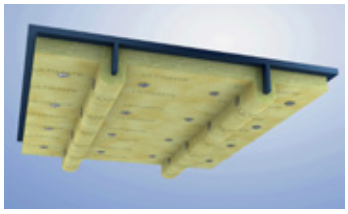
SOUND REDUCTION MEASUREMENT



Frequency (Hz)	Aluminium 6 mm R (dB)	Tested solution R (dB)
50	13.4	11.2
63	22.4	17.1
80	15.2	21.2
100	22.4	20.3
125	22.3	20.2
160	24.6	20.3
200	24.3	22.0
250	23.0	24.0
315	27.0	31.1
400	28.0	36.5
500	28.5	40.3
630	31.8	45.5
800	32.8	50.0
1,000	34.1	54.5
1,250	33.2	58.5
1,600	30.1	60.0
2,000	25.2	55.5
2,500	25.5	56.1
3,150	29.9	58.2
4,000	33.3	59.8
5,000	35.3	62.1
$R_w(C;C_{tr})$	30(-2;-1)	39(-2;-7)
R_A	28.5	36.7
$R_{A,tr}$	28.4	31.7

U SEAPROTECT™ SOLUTIONS FOR COMPOSITE CONSTRUCTIONS

FRD30 - FRD60 BULKHEAD / DECK



WHY CHOOSE THIS SOLUTION:

- **Comfort**
- **Lightweight**
- **Sound Insulation**
- **Thermal Insulation**

Using combustible FRP composite structures instead of steel could significantly reduce weight but could also potentially increase fire risks. That's why, Saint-Gobain ISOVER has developped insulation packages to limit heat transfer to the surface of the composite.
U SeaProtect™ solutions are qualified as «Fire Restricting Material» according to RESOLUTION MSC.40(64). Our bulkhead and deck insulation solutions provide fire separation for either 60 or 30 minutes and have been tested according to IMO MSC 45(65).

System 1: FRD30 - Bulkhead
Plate: **U SeaProtect™ 86 - 25 mm + U SeaProtect™ 66 - 50 mm**
U-value: 0.250 W/m²K
Weight: 5.45 kg/m²

System 2: FRD60 - Bulkhead
Plate: **U SeaProtect™ 86 - 2 x 25 mm + U SeaProtect™ 66 - 50 mm**
U-value: 0.211 W/m²K
Weight: 7.60 kg/m²

System 3: FRD30 - Deck
Plate: **U SeaProtect™ 86-25 mm + U SeaProtect™ 66-50 mm**
Stiffeners: **U SeaProtect™ 66-50 + U SeaProtect™ Wired Mat 66**
U-value: 0.250 W/m²K
Weight: 5.45 kg/m²
Weight: 6.60 kg/m²

System 4: FRD60 - Deck
Plate: **U SeaProtect™ 86-2 x 25 mm + U SeaProtect™ 66-50 mm**
Stiffeners: **U SeaProtect™ 86-25 mm + U SeaProtect™ 66-50 mm + U SeaProtect™ Wired Mat 66-50 mm**
U-value: 0.211 W/m²K
Weight: 7.60 kg/m²
Weight: 8.75 kg/m²

Facings	**Unfaced**	**Aluminum**	**Glass cloth**			**B facing** (Alu-Glass cloth composite)	
		Alu1	**G120** (black)	**G220** (white)	**G420** (white)	**B-Gl** (Glass cloth outside)	**B-Al** (Alu facing outside)
U SeaProtect™ Slab 66 50 mm	●	●	●	●	●	●	●
U SeaProtect™ Wired Mat 66 50 mm	●	●					
U SeaProtect™ Slab 86 25 mm	●	●	●	●	●	●	●

Norwegian Escape, MEYER WERFT GmbH

AIDAdiva, MEYER WERFT GmbH, Germany, 2007

7. INSTALLATION GUIDELINES

Installing insulation can be challenging and time-consuming at the best of times. In vessels and offshore platforms with complex configurations, reduced space and technical equipment, the challenge is even greater. The stakes too. Correctly installed insulation optimises the vessel's thermal, acoustic and fire safety performance. Simple mounting reduces installation costs.

Faster, easier
AND MORE COST-EFFECTIVE

Optimising installation with a lightweight, compressible mineral wool

Totally shot-free with long, fine interwoven fibres, U SeaProtect™ solutions are:

- **Lightweight:** up to 45% lighter than traditional stone wool
- **Compressible:** volume reduced by up to 60%
- **Easy to install:** reduced mounting time and costs

As flexible as glass wool and easier to handle than denser, more rigid stone wools, U SeaProtect™ wraps around complex forms more quickly with no edge breaks.

PROVEN SOLUTION

Since being launched more than 15 years ago, lightweight U SeaProtect™ solutions have been used for a wide variety of ships and offshore constructions around the world. In recent years, they have been supplied to major shipyards - including cruise ships – e.g. **Meyer Werft, Fincantieri, Mitsubishi Shipbuilding, Chantiers de l'Atlantique , Damen and Hyundai Heavy Industry**.

Installing U SeaProtect™ products

Adapting to any geometry, U SeaProtect™ products are compatible with different installation methods including Quick-Cover, wrap and box. To help optimise installation, discover our advice and tips for different steps and methods.

CUTTING

With a unique microstructure comprising long fibres, U SeaProtect™ products are very easy to cut. You don't need complex machinery like a band saw. Using a serrated knife or sharp cutter, you can achieve clean-cut edges in your chosen dimensions.

PLATE INSULATION: CORRECT WIDTH

Cut standard rolls to the distance necessary to insulate the plate between the stiffeners. The exact width between the stiffeners depends on the density of the insulating product installed on the plate and the thickness and density of the insulation around the stiffeners.

Avoid cutting standard 1.2 m wide rolls into pieces bigger than twice the average distance between the insulated stiffeners. This leads to significant cut-off waste and long rolls that are difficult for one person to install.

If you need rolls with special dimensions, contact your local ISOVER representative.

CLOSING JOINTS

We recommend cutting a bit of extra width to «clamp» the product between the stiffeners. Given the resilience of U SeaProtect™ products, you can easily install them without any gaps or open joints.

INDICATION OF THE «EXTRA» WIDTH OF PRODUCTS INSTALLED BETWEEN STIFFENERS

U SEAPROTECT™	U SP 24	U SP 36	U SP 46	U SP 50	U SP 56	U SP 66	U SP 86
Roll	+-10mm	+-10mm	+-10mm	+-5mm	+-5mm		
Slab	5 to 10 mm			+-5mm			

FIXING

All U SeaProtect™ products are easy to fix mechanically on pins with washers. Be careful not to compress the product too much under the washers – it will reduce the thickness, especially for lower density products (≤ 36 kg/m^3). The pins should exceed the thickness of the insulation by approximately 10 mm. Insulation holds in place with 38mm washers (30 mm washers alternatively).

FACED VS. UNFACED PRODUCTS

We recommend using faced products (Alu Facing, Glass Cloth Facing or B Facing) rather than unfaced products for a better finish. By sealing the joints with ISOVER SeaProtect Alu Tape or G120 Tape (Glass Cloth Tape), no fibres will be in contact with the air on the edges and the joints will be perfectly closed.

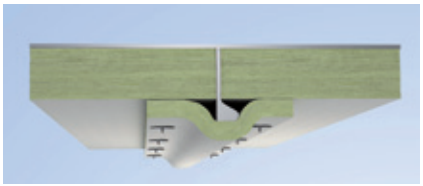
Quantum of the Seas, MEYER WERFT GmbH, Germany, 2014, © Michael Wessels / MiWeFotos.de

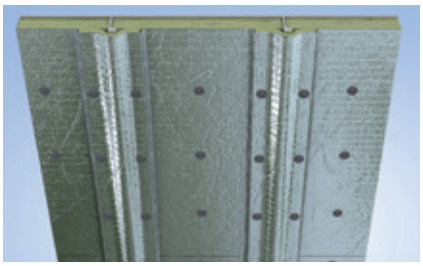
Quick-Cover System

All U SeaProtect™ products are pliable and easy to bend on top of stiffener heads, making installation around the stiffeners fast and simple. This installation method, called the **Quick-Cover System**, provides cost-efficient constructions in terms of installation costs.
This unique mounting system can only be used **for steel constructions.**

DID YOU KNOW?

U SeaProtect™ products have an outstanding flexibility and can be bent on the top head of stiffeners without breaking. Attention should be paid to cut a piece long enough to have a minimum distance ≥ 30 mm from stiffener to the edge of the piece installed.





STIFFENERS: THIN AND EASY TO INSTALL

In general, we recommend using products with a thickness of ≤30 mm to bend on top of the stiffener head. The thinner the product, the easier it is to install.

• *U SeaProtect™ Slab 76 20 mm, U SeaProtect™ Slab 76 25 mm and U SeaProtect™ Roll 56 30 mm are ideal.*

Avoid bending U SeaProtect™ products with a thickness of ≥40 mm on top of the stiffener head.

ABILITY OF U SEAPROTECT™ PRODUCTS TO BE BEND ON TOP OF STIFFENER HEADS (VALID ONLY ON STEEL CONSTRUCTIONS)

DENSITY	24KG/M³	36KG/M³	56KG/M³	66 KG/M³	76KG/M³
THICKNESS	50 mm	70 mm	30 mm	30 mm	20 & 25 mm
Roll	–	–	✔✔✔		
Slab	–	–	✔✔✔	✔✔✔	✔✔✔

– Not recommended
✔✔✔ EASY

PLATE: THICKER FOR BETTER INSTALLATION

On the plate, we recommend using an adapted thickness of your U SeaProtect™ product, so that it's as close as possible to the top of the stiffener head. Avoid using the Quick-Cover system when the distance between the top of the stiffener head and plate insulation is > 50mm.

MAXIMUM HEIGHT OF STIFFENERS TO APPLY QUICK COVER SYSTEM

	PLATE PRODUCT				
REFERENCE	U SEAPROTECT™ 24/50	U SEAPROTECT™ 36/70	U SEAPROTECT™ 50/60	U SEAPROTECT™ 56/60	U SEAPROTECT™ 86/50
Maximum height	100 mm	120 mm	110 mm	110 mm	100 mm

PINS: LOCATION & LENGTH

Two pins on each side of the stiffeners, one in the middle of the plate

Depending on the size of the stiffeners and the thickness installed on the plate, the pins should ideally be located at different distances from the stiffeners **(75 mm - 100 mm or 125 mm max.).** According to our certificates, pins should be located no more than 150 mm from the stiffener – but we would advise less than this, as you will use a lot material, leading to higher costs.

Remember to take the extra thickness of the stiffener insulation into account when choosing your pins. Ideally use pins that are **15 mm to 20 mm** higher than the total thickness of the insulation on the plate and stiffener.

IN ACTION

Opt for approx. 110 mm pins for a Quick-Cover construction using insulation with 70 mm thickness on the plate and 20 mm on the stiffeners. Depending on the distance between the stiffeners, you may need to add a central pin on the plate.

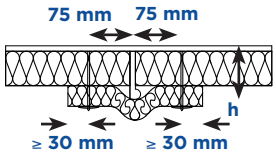
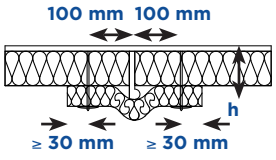
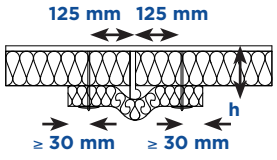
For simplicity, use the same length pins for the entire construction.

PLATE FIRST, THEN STIFFENERS
When you use the Quick-Cover installation method, install the plate insulation first.

STIFFENERS: CORRECT DIMENSIONS

When installing insulation around the stiffeners, make sure the piece is long enough. If it's too short, the product will be squeezed to make both ends touch on each side the steel plate, resulting in a lower thickness around the stiffeners heads. According to fire certificates, the thickness should be constant around the stiffeners.

These are the widths we recommend:

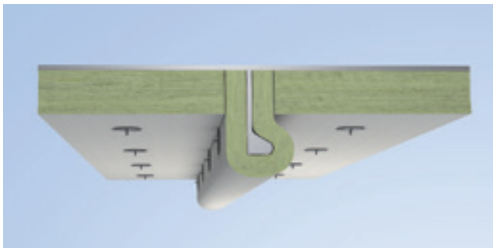
	Pins 75 mm from Stiffener		Pins 100 mm from Stiffener			Pins 125 mm from Stiffener	
							
	„Bulb"/Hp profile Design according to DIN 2019		„Bulb/Hp profil Design according to DIN 2019			„Bulb"/Hp profile Design according to DIN 1019	
LEVEL INSULATION	STIFFENER HEIGHT H (MM)		STIFFENER HEIGHT H (MM)			STIFFENER HEIGHT H (MM)	
THICKENESS (MM)	80 MM	100 MM	80 MM	100 MM	120 MM	100 MM	120 MM
50MM	≥ 250 mm		≥ 300 mm	≥ 300 mm		≥ 350 mm	
50 MM		≥ 250 mm					
70 MM					≥ 300 mm		≥ 350 mm

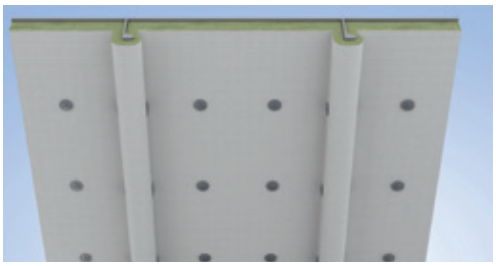
Wrap Installation Method

U SeaProtect™ products are pliable and can be bent around corners or odd shapes without edge breaks. This prevents thermal bridging and improves the performance of the complete insulation system in terms of fire safety, sound protection and thermal insulation with no additional effort.

DID YOU KNOW?

U SeaProtect™ products have an outstanding flexibility and can be bent at angles up to 180° without breaking. This unique property is of particular interest for „wrapping“ stiffeners. Attention should be paid to keep a constant thickness especially when using low density products (≤ 46 kg/m³).





Seabourn Sojourn,
Mariotti Yard,
Italy 2010

STIFFENERS: THIN AND EASY TO INSTALL

It is usually best to use slabs with a thickness ≤ 30 mm (max. 50 mm) to "wrap" around the stiffeners. The thinner the product, the easier it is to install.

- Choose constructions using U SeaProtect™ Slab 76 20 mm or 25 mm with U SeaProtect™ Roll 56 30 mm around the stiffeners
- U SeaProtect™ Slab 36 70 mm for example is not recommended for wrapping as it is too stiff and thick - U SeaProtect™ Roll 36 70 mm can be used but is more difficult to install

ABILITY OF U SEAPROTECT™ PRODUCTS TO BE "WRAPPED" AROUND STIFFENERS

DENSITY	24 KG/M³	36 KG/M³	56 KG/M³	66 KG/M³	66 KG/M³	76 KG/M³
THICKNESS	50 mm	70 mm	30 mm	30 mm	50 & 70 mm	20 & 25 mm
Roll	✔✔✔	✔	✔✔✔			
Slab	✔	–	✔✔✔	✔✔✔	–	✔✔✔

– Not recommended
✔ Difficult
✔✔✔ EASY

STIFFENERS PINS: TWO PINS OR MORE

To make installation easier for one person, we recommend using at least two pins on the stiffeners (one on each side). Although you can only use one pin at the top of the stiffener head, this method is more difficult and usually requires more than one person.

The products installed around the stiffeners will be held in place by the insulation piece subsequently installed between the stiffeners. You could also use three pins - 1 on top and 2 on the sides - to mechanically fix the products around the stiffeners.

All these options are covered by ISOVER MED fire certificates.

STIFFENERS: CORRECT DIMENSIONS

Remember if it's too short, the insulation will be squeezed leading to a lower, non-uniform thickness that no longer complies with fire certifications.

For large-scale projects, on request, we can manufacture special dimension slabs - width equal to twice the length - for each stiffener to **eliminate cut-off waste**. You would only need to cut the slabs into two pieces.

More information? Contact your local ISOVER representative.

STIFFENERS: APPLYING & FIXING

One pin at stiffener head

If you're fixing the insulation around the stiffeners with one pin welded at the top of the stiffener head, bend the product symmetrically around the stiffener head with both hands. It will be secured in place when you fix the insulation on the plate.

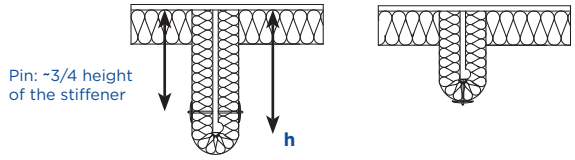
2 pins on each side

If you're fixing the insulation around the stiffeners with two pins welded on each side of the stiffener, apply the product on the flat side of the stiffener core. Secure it in place with a washer, carefully bending it around the stiffener bulkhead. Once fully bent around the stiffener head and applied along the other side of the stiffener core, it can be secured in place with a second washer.

STIFFENERS FIRST, THEN PLATE

When using the Wrap installation method, install the stiffener first, then install the plate.

2 pins (one on each side of the stiffener) or 1 pin at the top



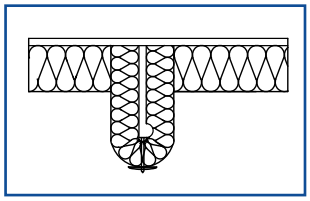
„Bulb"/Hp profile Design according to DIN 1019

STIFFENER INSULATION		STIFFENER HEIGHT H			
DENSITY	THICKNESS	80 MM	100 MM	120 MM	140 MM
24 kg/m³	50 mm	320 + /- 10 mm	360 + /- 10 mm	400 + /- 10 mm	460 +/- 10 mm
76 kg/m³	20 mm	220 +/-10 mm	260 +/-10 mm	300 +/-10 mm	360 +/-10 mm
76 kg/m³	25 mm	240 +/-10 mm	280 +/-10 mm	320 +/-10 mm	380 +/-10 mm
56 kg/m³	30 mm	250 +/- 10 mm	290 +/-10 mm	340 +/-10 mm	400 +/- 10 mm
66 kg/m³	30 mm	250 +/- 10 mm	290 +/-10 mm	340 +/-10 mm	400 +/- 10 mm

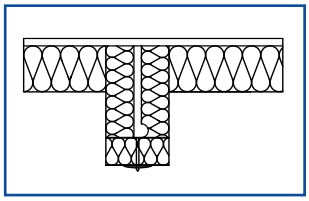
Other Installation Methods

U SeaProtect™ products can be installed using other methods. You'll find all certified mounting methods in the annexes of ISOVER MED construction certificates or download them from our website.

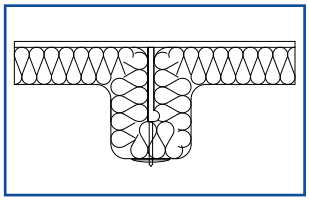
Some alternative mountings involve fewer pins on the stiffener, e.g. only one pin at the top of the stiffener head, but require more skill to secure. The insulation around the stiffener is held in place by the insulation subsequently installed on the plate.



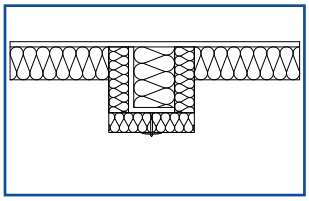
"Wrap"
with one pin on stiffener



"Box"
with one pin on stiffener



"One layer"
with one pin on stiffener



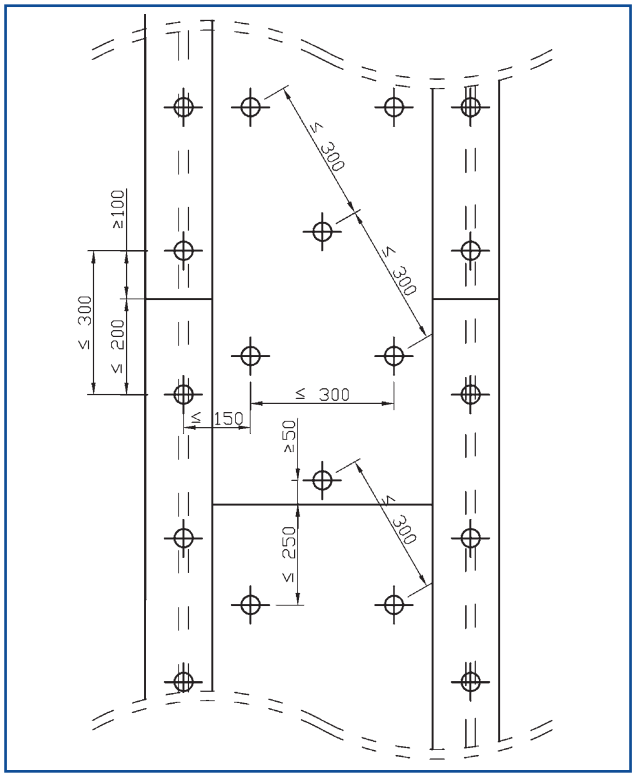
"Box" on a L-shape stiffener with one pin on stiffener

Construction details

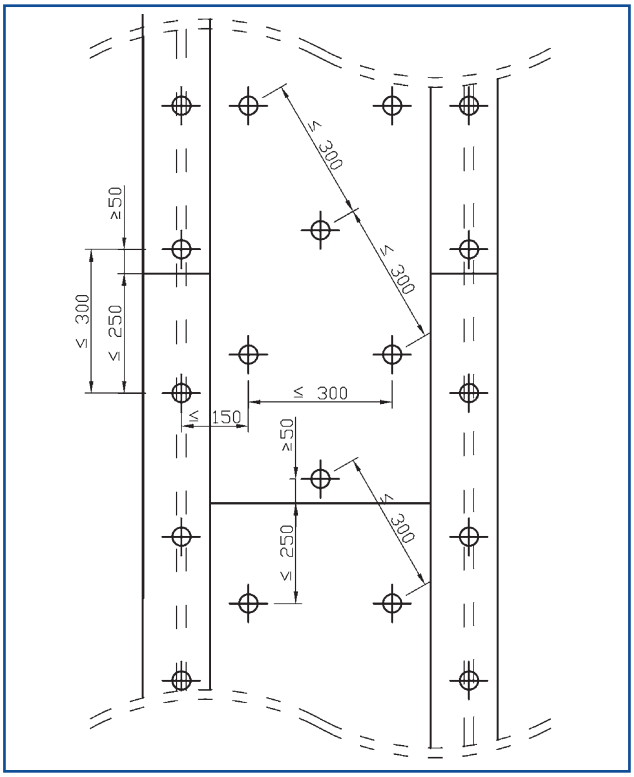
For each U SeaProtect™ certified construction, don't hesitate to ask us for drawings in CAD format (.dwg) with installation details including pin patterns. The following pattern is used for the vast majority of installations.

ALL STEEL CONSTRUCTIONS CERTIFIED TO FTP CODE 2010

"Diagonal" pin pattern 300 mm
for steel deck constructions

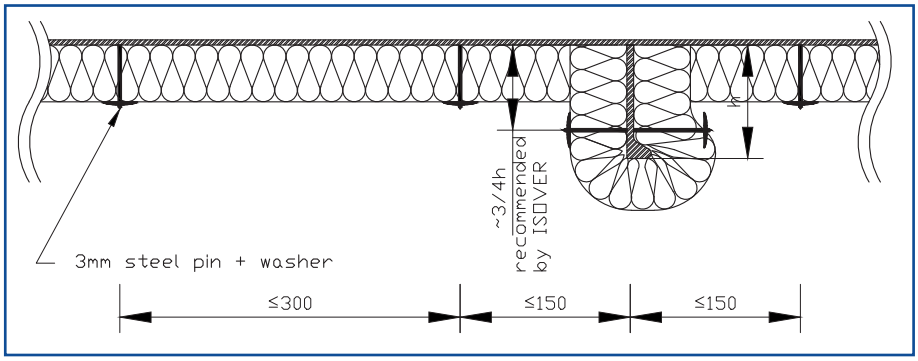


"Diagonal" pin pattern 300 mm
for steel bulkhead constructions

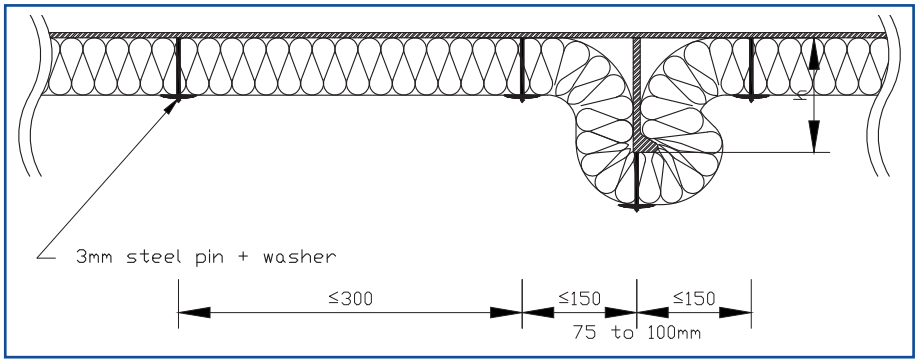


Mein Schiff 3, STX Finland, 2014, ©Jouni Saaristo

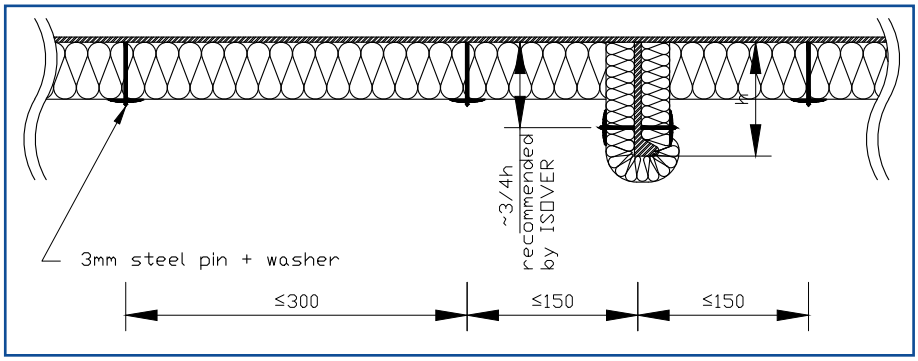
U SeaProtect™ 24 50 mm
on the plate and stiffener using
"Wrap" installation method



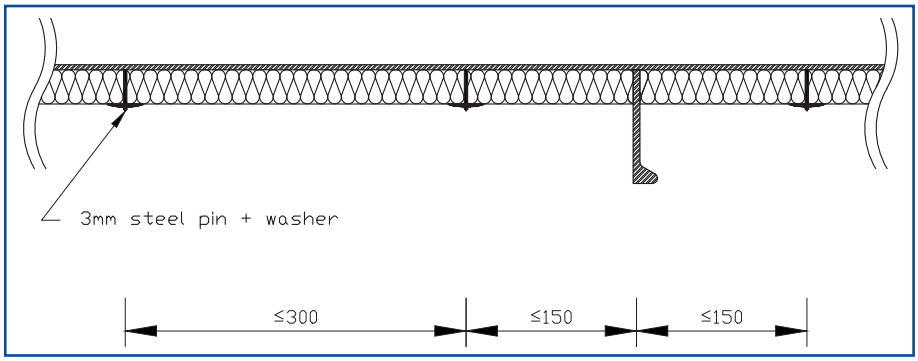
U SeaProtect™ 24 50 mm
on the plate and stiffener using
"One layer" installation method



U SeaProtect™ 24 50 mm
on the plate, U SeaProtect™ 76
20 mm on stiffener using
"Wrap" installation method



U SeaProtect™ 46 30 mm
on the plate only
(A-15 Bulkhead construction)



3D Drawings

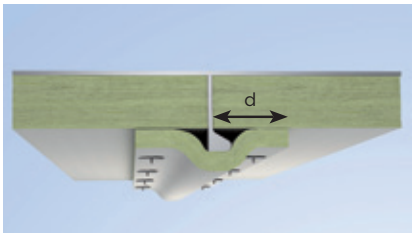
These are the main mounting systems and pin patterns recommended by ISOVER. For other installation methods, refer to our MED certificates.

MOUNTING SYSTEMS AROUND STIFFENERS

1) Quick-Cover System and 2) Wrap Method

The outstanding pliability of ULTIMATE™ stone wool means that U SeaProtect™ products can be bent around stiffeners without any edge breaks. This generates substantial labour cost savings versus the traditional box method 3).

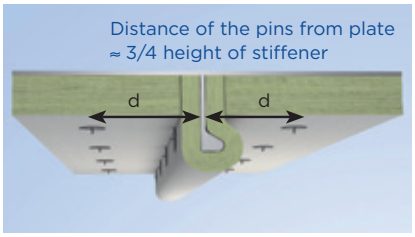
1) Quick-Cover system



Distance of the pins from stiffeners

- d = 75 mm to 125 mm max
  recommended by ISOVER
- d ≤ 150 mm according to certificates

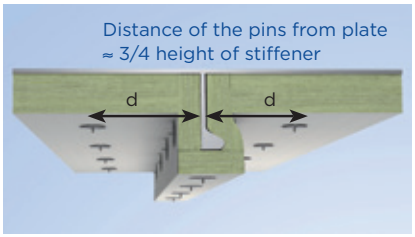
2) Wrap



Distance of the pins from stiffeners

- d = 150 mm
  recommended by ISOVER
- d ≤ 150 mm according to certificates

3) Box



Distance of the pins from stiffeners

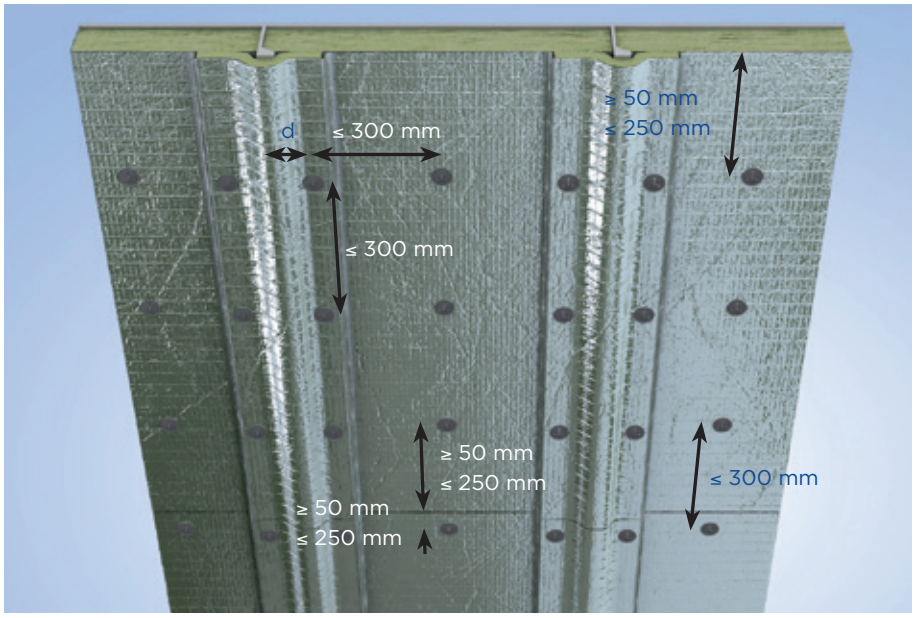
- d = 150 mm
  recommended by ISOVER
- d ≤ 150 mm according to certificates

Cecon Excellence,
Davie shipyard,
Canada, 2014

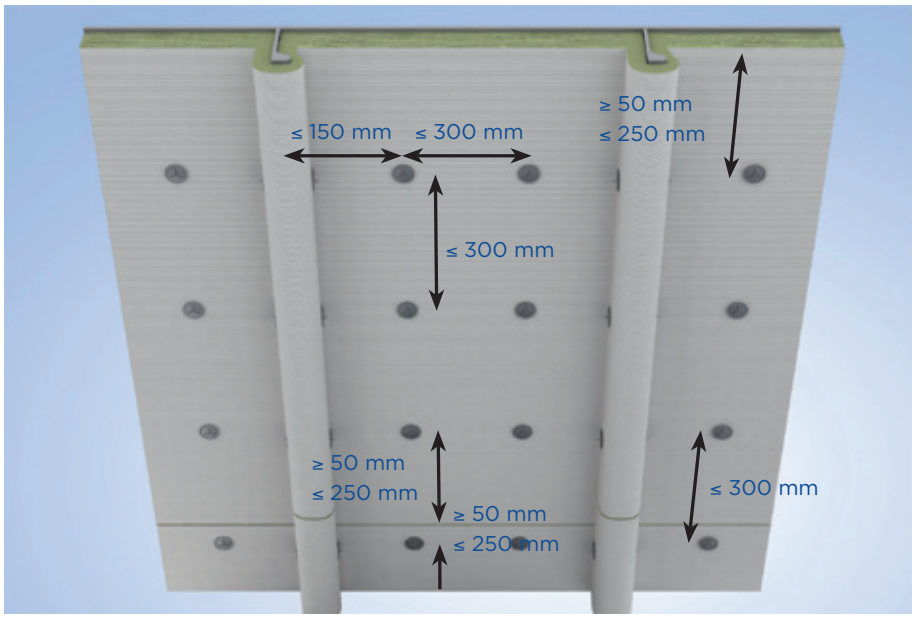
UNIVERSAL PIN PATTERN «SQUARE 300 MM X 300 MM»

For all U SeaProtect™ constructions tested according to FTP Code 2010

A/ Pin Pattern recommended by ISOVER for 1) Quick-Cover System



B/ Pin Pattern recommended by ISOVER for 2) Wrap and 3) Box Mounting Systems



Insulating steel junctions

According to SOLAS rules, steel connections and intersections may require special treatment to reduce the risk of heat transmission.

SOLAS CHAP II-2/ REGULATION 9/3.4

3.4 In approving structural fire protection details, the Administration shall have regard to the risk of heat transmission at intersections and terminal points of required thermal barriers. The insulation of a deck or bulkhead shall be carried past the penetration, intersection or terminal point for a distance of at least 450mm. If a space is divided with a deck or a bulkhead of "A" class standard having insulation of different values, the insulation with the higher value shall continue on the deck or bulkhead with the insulation of the lesser value for a distance of at least 450mm.

This regulation applies to all kinds of junctions: bulkhead and deck connections, terminal points such as corners, as well as stiffeners and girders (T-shapes). In 2004, the Marine Safety Committee published a circular **(SOLAS MSC/circ. 1120 annex reg. 9.3.4)** with drawings showing construction details for the most common configurations.

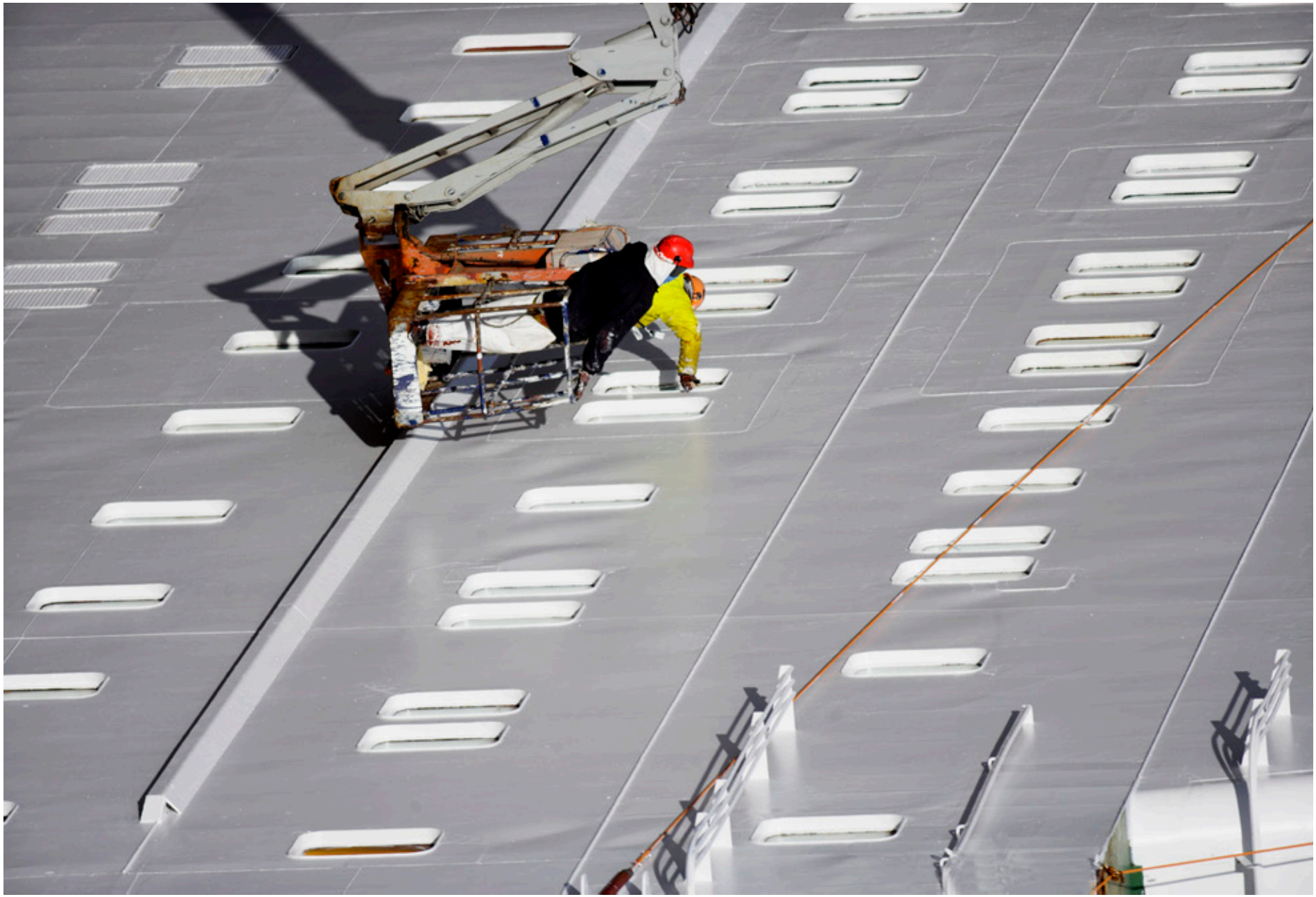
Theoretically, heat transfer from one unexposed surface through the steel structure to another unexposed surface should be protected by at least 450 mm of insulation, leading to additional insulation pieces in key identified areas.

However, in practice, it's impossible to have a general design that covers all situations. Discuss and validate the exact construction details with the official representative of appointed notified body. When your fire insulation is reviewed, you may be asked to install additional pieces based on the assessed potential fire hazard.

Questions about how to interpret Chap II-2/Registration 9/3.4 of the SOLAS code?

Consult the drawings in the previously mentioned 1120 circular. And don't hesitate to contact the ISOVER Marine & Offshore team for further advice.

Norwegian Getaway, Meyer Werft, Germany, 2014, © Meyer Werft




7

8. LOGISTICS & STORAGE

When it comes to marine insulation, every extra kilogram means more costs and more emissions. This is particularly true during transportation and storage. That's why opting for efficient, lightweight and highly compressible insulation materials is so important.

Developing
A LIGHTER, MORE COMPRESSIBLE MINERAL WOOL

U SeaProtect™ combines advantages of glass wool and stone wool to make storage and transportation easier:

- **Lightweight**
- **Compressible**
- **Flexible**

U SeaProtect™ marine insulation not only protects your marine constructions and users, but also makes transportation and storage easier and less costly.

CHOOSING U SEAPROTECT™ FOR OPTIMISED LOGISTICS

The U SeaProtect™ range adapts to your needs on board and during transportation.

LIGHTER FOR LOWER COSTS AND EASIER HANDLING

U SeaProtect™ mineral wool solutions are up to 45% lighter than traditional stone wool. This reduces your transportation and storage costs – less manpower/ fewer operations required, more products in each truck.

MORE COMPACT FOR LOWER COSTS AND LESS SPACE

U SeaProtect™ mats can also be compressed into rolls during packaging without losing their mechanical properties. Using rolls rather than slabs significantly reduces the space needed for storage and increases the amount of insulation per pallet and truck.

ULTIMATE ULTIMATE ULTIMATE
ULTIMATE ULTIMATE ULTIMATE
ULTIMATE ULTIMATE ULTIMATE
ULTIMATE ULTIMATE ULTIMATE
ULTIMATE ULTIMATE ULTIMATE
ULTIMATE ULTIMATE ULTIMATE
ULTIMATE ULTIMATE ULTIMATE
ULTIMATE ULTIMATE ULTIMATE

U SeaProtect™: logistics overview

To make the most appropriate choice for your project, discover the key logistics details for each product.

MAIN ULTIMATE DENSITIES KG/M³	THICKNESS MM	FORM	PRODUCTS NAME	FACINGS						LENGTH
				UNFACED	ALU1	G120 (BLACK)	G220 (WHITE)	G420 (WHITE)	B-AL B-GL	M
13 kg/m³	50 mm	Roll	U SeaProtect™ Roll 13 50 mm	●						14 / 12.5*
			U SeaProtect™ Roll 13 50 mm		●					14.0
	100 mm		U SeaProtect™ Roll 13 100 mm	●						7 / 6.25*
			U SeaProtect™ Roll 13 100 mm							7.0
24 kg/m³	50 mm	Roll	U SeaProtect™ Roll 24 50 mm	●	●	●	●			14
		Slab	U SeaProtect™ Slab 24 50 mm	●	●					1.2
						●	●			1.2
								●	●	1.2
	100 mm	Roll	U SeaProtect™ Roll 24 100 mm	●	●		●			7.0
		Slab	U SeaProtect™ Slab 24 100 mm	●	●					1.2
						●	●	●	●	1.2
36 kg/m³	70 mm	Roll	U SeaProtect™ Roll 36 70 mm	●						3.2
					●					5.5 / 5.1*
		Slab	U SeaProtect™ Slab 36 70 mm	●	●					1.2
						●	●	●	●	1.2
46 kg/m³	30 mm	Roll	U SeaProtect™ Roll 46 30 mm	●	●					7 / 6*
							●			7 / 6*
		Slab	U SeaProtect™ Slab 46 30 mm	●	●					1.2
						●	●		●	1.2
								●		1.2
50 kg/m³	60 mm	Roll	U SeaProtect™ Roll 50 60 mm	●	●					3.2 / 2.8*
							●			3.2 / 2.8*
		Slab	U SeaProtect™ Slab 50 60 mm	●	●					1.2
						●	●	●	●	1.2
56 kg/m³	30 mm	Roll	U SeaProtect™ Roll 56 30 mm	●	●					6.3 / 5.3*
							●			6.3
		Slab	U SeaProtect™ Slab 56 30 mm	●	●					1.2
						●	●	●	●	1.2
	60 mm	Roll	U SeaProtect™ Roll 56 60 mm	●	●					3.2
							●			3.2
		Slab	U SeaProtect™ Slab 56 60 mm	●	●					1.2
						●	●	●	●	1.2
	70 mm	Slab	U SeaProtect™ Slab 56 70 mm	●	●					1.2
						●	●	●		1.2
									●	1.2
66 kg/m³	30 mm	Slab	U SeaProtect™ Slab 66 30mm	●	●					1.2
						●	●		●	1.2
								●		1.2
	40 mm	Wired Mat	U SeaProtect™ Wired Mat 66 40 mm	●	●					7.5
	50 mm	Slab	U SeaProtect™ Slab 66 50mm	●	●					1.2
						●	●	●		1.2
									●	1.2
		Wired Mat	U SeaProtect™ Wired Mat 66 50 mm	●	●					6.0
	70 mm	Slab	U SeaProtect™ Slab 66 70mm	●	●					1.2
						●	●	●	●	1.2
		Wired Mat	U SeaProtect™ Wired Mat 66 70 mm	●	●					4.3
76 kg/m³	20 mm	Slab	U SeaProtect™ Slab 76 20 mm	●	●					1.2
						●	●	●	●	1.2
	25 mm		U SeaProtect™ Slab 76 25 mm	●	●					1.2
						●	●	●	●	1.2
86 kg/m³	50 mm	Slab	U SeaProtect™ Slab 86 50 mm	●	●					1.2
						●	●	●	●	1.2
90 kg/m³	50 mm	Slab	U SeaProtect™ Slab 90 50 mm	●	●					1.2
						●	●	●	●	1.2

* Quantities are given for full trucks that can carry 22 pallets. Possibility to use smaller trucks, quantity per truck is then less than the one provided here.

** Quantity per HC 40ft container is only an approximate estimation. This quantity may vary depending on the exact size of the roll container and if different products are mixed when loading the container. Exact quantity will be provided when shipment is to be done.

*** special pallet size for Container loading 1,2 x 1,1 x 2,55 - only for loading in a 40 ft Container possible.

WIDTH M	QUANTITY PER PACK NR OF PRODUCTS	QUANTITY PER PALLETT NR OF PACKS	QUANTITY PER TRUCK* (FOR 22 PAL) NR OF PALLETTS	QUANTITY PER HC 40FT CONTAINER** NR OF PACKS	QUANTITY PER HC 40FT CONTAINER*** NR OF PALLETS	CONTENT M²/PACK M²	QUANTITY PER PALLETT M²	QUANTITY PER TRUCK* (FOR 22 PAL) M²	QUANTITY PER HC 40FT CONTAINER** M²
1.2	1	12	22		18	16.8 / 15*	201.6 / 180*	4,435.20	3,240.00
1.2	1	12	22		18	16.80	201.60	4,435.20	3,628.80
1.2	1	12	22		18	8.4 / 7.5*	100.8 / 90*	2,217.60	1,620.00
1.2	1	12	22		18	8.40	100.80	2,217.60	1,814.40
1.2	1	12	22	200 -230	-	16.80	201.60	4,435.20	3,360-3,864
0.6	10	16	22	-	18	7.20	115.20	2,534.40	2,073.60
0.625	10	16	22	-	18	7.50	120.00	2,640.00	2,160.00
0.625	10 / 9*	16	22	-	18	7.50 /6.75*	120 / 108*	2,640.00	1,944.00
1.2	1	12	22	200-230	-	8.40	100.80	2,217.60	1,680-1,932
0.6	5	16	22	-	18	3.60	57.60	1,267.20	1,036.80
0.625	5	16	22	-	18	3.75	60.00	1,320.00	1,080.00
1.2	1	18	22	-	18	3.84	69.12	1,520.64	1,244.16
1.2	1	12	22	-	18	6.6 / 6.12*	79.2 / 73.44*	1,742.40	1,321.92
0.6	5	12	22	-	18	3.60	43.20	950.40	777.60
0.625	5	12	22	-	18	3.75	45.00	990.00	810.00
1.2	1	18	22	-	18	8.40 / 7.20	151.2 / 129.6*	3,326.40	2,332.80
1.25	1	18	22	-	18	8.75/ 7.40	157.5 / 133.2*	3,465.00	2,397.60
0.6	13	12	22	-	18	9.36	112.32	2,471.04	2,021.76
0.625	13	12	22	-	18	9.75	117.00	2,574.00	2,106.00
0.625	13 /12*	12	22	-	18	9.75 / 9*	117 / 108*	2,574.00	1,944.00
1.2	1	18	22	-	18	3.84 / 3.36*	69.12 / 60.48*	1,520.64	1,088.64
1.25	1	18	22	-	18	4 / 3.5	72 / 63*	1,584.00	1,134.00
0.6	5 / 6*	16 / 12*	22	-	18	3.6 / 4.32*	57.60 / 51.84*	1,267.20	933.12
0.625	5 / 6*	16 / 12*	22	-	18	3.75 / 4.5*	60 / 54*	1,320.00	972.00
1.2	1	18	22	-	18	7.56 / 6.36*	136.08 / 114.48*	2,993.76	2,060.64
1.25	1	18	22	-	18	7.88	141.66	3,116.52	2,549.88
0.6	13	12	22	-	18	9.36	112.32	2,471.04	2,021.76
0.625	13	12	22	-	18	9.75	117.00	2,574.00	2,106.00
1.2	1	18	22	-	18	3.84	69.12	1,520.64	1,244.16
1.25	1	18	22	-	18	4.00	72.00	1,584.00	1,296.00
0.6	5	16	22	-	18	3.60	57.60	1,267.20	1,036.80
0.625	5	16	22	-	18	3.75	60.00	1,320.00	1,080.00
0.6	4	16	22	-	18	2.88	46.08	1013.76	829.44
0.625	4	16	22	-	18	3.00	48.00	1,056.00	864.00
0.625	4 / 5*	16 / 12*	22	-	18	3 / 3.75*	48 / 45*	1,056.00	810.00
0.6	13	12	22	-	18	9.36	112.32	2,471.04	2,021.76
0.625	13	12	22	-	18	9.75	117.00	2,574.00	2,106.00
0.625	13 /12*	12	22	-	18	9.75 / 9*	117 / 108*	2,574.00	1,944.00
0.6	2	18	22	388	-	9.00	162.00	3,564.00	3,492.00
0.6	8 / 7*	12	22	-	18	5.76 / 5.04	69.12 / 60.48	1,520.64	1,088.64
0.625	8 / 7*	12	22	-	18	6 / 5.25*	72 / 63*	1,584.00	1,134.00
0.625	8	12	22	-		6.00	72.00	1,584.00	
0.6	2	18	22	388	-	7.20	129.60	2,851.20	2,793.60
0.6	4	16	22	-	18	2.88	46.08	1,013.76	829.44
0.625	4	16	22	-	18	3.00	48.00	1,056.00	864.00
0.6	2	18	22	388	-	5.16	92.88	2,043.36	2,002.08
0.6	20 / 18*	12	22	-	18	14.4 / 12.96*	172.8 / 155.52*	3,801.60	2,799.36
0.625	20 / 18*	12	22	-	18	15 / 13.5*	180 / 162*	3,960.00	2,916.00
0.6	16 / 14*	12	22	-	18	11.52 / 10.08*	138.24 / 120.96*	3,041.28	2,177.28
0.625	16 / 14*	12	22	-	18	12 / 10.5*	144 / 126*	3,168.00	2,268.00
0.6	8 / 7*	12	22	-	18	5.76 / 5.04*	69.12 / 60.48*	1,520.64	1,088.64
0.625	8 / 7*	12	22	-	18	6 / 5.25*	72 / 63*	1,584.00	1,134.00
0.6	8 / 7*	12	22	-	18	5.76 / 5.04*	69.12 / 60.48*	1,520.64	1,088.64
0.625	8 / 7*	12	22	-	18	6 / 5.25*	72 / 63*	1,584.00	1,134.00

U SeaProtect™
STORING AND HANDLING

To keep your U SeaProtect™ products in good condition:

- **Store in dry indoor conditions in closed warehouse facilities**
- **Transport in closed compartments like trailers and containers to avoid exposure to water (rain, excessive moisture and/or condensation) or bad weather**
- **Stack pallets in more than two layers with a maximum total height of 3 m**
- **Store individual packs of slabs on the flat side, stacked to a maximum of 3 m**
- **Lay individual rolls horizontally, stacked to a maximum of 3 m**
- **Don’t touch or remove the product packaging during storage**
- **Avoid treading on, sitting on or apply any other mechanical action to the packaging & contents**

MAXIMUM PERFORMANCE

You can store U SeaProtect™ products for up to 12 months after the manufacturing date. After this, the mechanical properties may decrease including thickness recovery for compressed products and the ability to bend. This could also have an impact on the ease and speed of installation.

LEADING PLAYERS TRUST US

Some of
OUR REFERENCE PROJECTS

COSTA CRUISES

ISOVER INCREASED ENERGY-EFFICIENCY AND REDUCED NOISE ON THE LUXURIOUS 337-METRE COSTA SMERALDA

- **Type of insulation:** thermal, fire & HVAC insulation, as well as soundproofing
- **Type of vessel:** cruise ship
- **Shipyard:** Meyer Turku Oy, Turku, Finland

Committed to low emissions, Finnish shipbuilder Meyer Turku Oy needed lightweight insulation that would reduce the weight of 337-metre Costa Smeralda. The choice was essential to the success of the project given that the cruise ship required 450,000 square metres of fire, sound and thermal insulation, from cabin dividing walls and ceilings to HVAC channels and decks.

REDUCING WEIGHT FOR LOWER COSTS & EMISSIONS

“For each kilo of weight lost, you save one euro a year in fuel costs,” explained Herkko Miettinen, Key Account Manager, ISOVER Marine and OEM. Using U SeaProtect™ halved the weight of insulation solutions - amounting to yearly savings of up to €200,000 in fuel costs – in this case, liquefied natural gas (LNG).

The Costa Smeralda was delivered to Italian Costa Cruises in October 2019.

DID YOU KNOW?

Meyer Turku has been a pioneer in building LNG ships for many years and has already completed two LNG vessels.

More information about this case study? Details about the U SeaProtect™ range? Contact us.

Costa Smeralda

MYSTIC CRUISES

ISOVER HELPED EQUIP 3 LUXURY CRUISE SHIPS FOR POLAR EXPEDITIONS WITH ALL-FIRE-CLASS, THERMAL AND ACOUSTIC INSULATION ADAPTED TO EXTREME WEATHER CONDITIONS.

- **Type of insulation:** thermal, fire & acoustic insulation
- **Type of vessel:** cruise ships for polar exploration
- **Shipyard:** WEST-SEA, Portugal

Mystic Cruises decided to create its first luxury cruise ships for cold climates like Antarctica. For this, they worked with WEST-SEA to develop luxurious vessels capable of withstanding challenging weather conditions. ISOVER was chosen to specify and supply all fire-class, thermal and acoustic insulation for the three Ice Class, Explorer Range ships: World Explorer, World Voyager, and World Navigator.

TAILORING INSULATION FOR EXTREME CONDITIONS

Working with WEST-SEA at their shipyard in Portugal, ISOVER SPAIN customised insulation solutions offering optimised thermal comfort for icy temperatures as well as being lightweight and fire-resistant. U SeaProtect™ was used for fire protection (A60 deck and bulkhead, A30 deck and bulkhead), while the thermal solutions were based on products from the glass wool SeaComfort range.

The first ship, World Explorer, was delivered in 2019 and immediately chartered for Antarctic voyages.

DID YOU KNOW?

World Explorer incorporates the latest maritime technology including two Rolls Royce 9,000 kw hybrid diesel/electric engines and FarSounder's Forward-looking Sonar (FLS) to deftly navigate harbours, rivers, and iceberg fields.

More information about this case study?
Details about the U SeaProtect™ range?
Contact us.

WORLD EXPLORER

PRINCESS CRUISES

ISOVER ENHANCED PASSENGER COMFORT AND SAFETY WITH THERMO-ACOUSTIC INSULATION AND FIRE PROTECTION FOR THE 145,000-TON SKY PRINCESS

- **Type of insulation:** thermal-acoustic insulation, fire protection & OEM solutions
- **Type of vessel:** cruise ship
- **Shipyard:** Fincantieri, Monfalcone, Italy

In partnership with Italian shipbuilder Fincantieri, Princesses Cruises (Carnival Corporation) have set a benchmark in Europe and worldwide for innovative layout, outstanding performance and state-of-the-art technology. Following successful collaborations for sister ships Royal Princess, Regal Princess and Majestic Princess, Fincantieri decided once again to choose Saint-Gobain ISOVER to provide insulation for the newest 145,000-ton ship.

BUILDING AN EXCEPTIONAL SHIP AND PASSENGER EXPERIENCE

With accommodation catering for 4,610 passengers, the vessel required thermo-acoustic insulation, fire protection and OEM solutions to ensure best-in-class interior comfort. Working hand in hand with Fincantieri to drive innovation, ISOVER was able to maximise comfort and safety with customised solutions drawing on the high technical performances of U SeaProtect™.

And so, in October 2019, Sky Princess was delivered at the Monfalcone shipyard and made its inaugural voyage in the Mediterranean. It is the 17th ship built by Fincantieri for Princess Cruises, and the fourth in the «Royal» class.

DID YOU KNOW?

Our sister company Kaimann provided the insulation of the piping and refrigeration unit components serving the refrigerator and kitchen cells and some chilled water pipes.

More information about this case study? Details about the U SeaProtect™ range? Contact us.

COLOR LINE

GLAVA®, OUR SISTER COMPANY IN NORWAY, HELPED COLOR LINE REDUCE THE WEIGHT OF THE WORLD'S LARGEST PLUG-IN HYBRID CRUISE SHIP, M/S COLOR HYBRID, WITH LIGHTWEIGHT FIRE, SOUND AND THERMAL INSULTATION.

- **Type of insulation:** fire-resistant, sound and thermal insulation
- **Type of vessel:** hybrid cruiseferry
- **Shipyard:** Ulstein Shipyard, Norway

Color Line is committed to reducing emissions and noise, while increasing comfort. Designed by Fosen Ulstein Design and Engineering (FUDE), the new hybrid cruiseferry serves the Sandefjord – Strømstad route using plug-in technology. To reduce the weight of the vessel and optimise its thermal performance, Color Line chose GLAVA®, Saint-Gobain's Norwegian insulation specialist, to provide fire, sound and thermal insulation.

KEEPING WEIGHT TO A MINIMUM

"Weight reduction higher up improves stability. This increases the loading capacity and saves on fuel," explained Robin Tomren, Project Director. GLAVA® therefore focused on reducing the weight of the U SeaProtect™ solutions, which are up to 45% lighter than traditional stone wool.

LESS HEAT LOSS, LOWER EMISSIONS

To minimise the vessel's footprint, Color Line was also looking for excellent thermal performance. With U SeaProtect™ insulation, this quickly became a reality. "In comparison with our existing vessel, M/S Color Hybrid has a three times better thermal insulation capability between the inside of the ship and the outer air," explained Tomren.

OPTIMISED LOGISTICS WITH A SMALLER FOOTPRINT

This commitment to the environment extended to logistics. As U SeaProtect™ can be compressed, "we could carry three times more on a pallet compared with traditional stone wool solutions. This amounted to 25 to 30 fewer trailer trips," concluded Kjetil Bjørgen, Key Account Manager Marine/Offshore, GLAVA®.

DID YOU KNOW?

The M/S Color Hybrid uses battery power in and out of Sandefjord meaning no greenhouse gases, nitrogen or sulphur compounds are emitted.

More information about this case study?
Details about the U SeaProtect™ range? Contact us.


HYBRID

MEYER WERFT

ISOVER SUPPLIED DECK AND BULKHEAD INSULATION PRODUCTS TO REDUCE THE WEIGHT AND INCREASE THE ENERGY EFFICIENCY OF AIDANOVA, THE LARGEST AND CLEANEST CRUISE SHIP EVER BUILT IN GERMANY.

- **Type of insulation:** fire, sound and thermal insulation for deck and bulkhead
- **Type of vessel:** cruise ship
- **Shipyard:** MEYER WERFT GmbH, Papenburg, Germany

CLEANER ENERGY ON THE HIGH SEAS

With the aim of building greener vessels, MEYER WERFT spent ten years developing the impressive AIDAnova, the world's first ever ocean liner with an LNG drive system. To build its first gas-powered ship in the Helios Class - two structurally identical sister ships are set to follow – Meyer Werft needed to reduce the weight of the insulation and ensure minimum heat loss. To achieve this, the German ship builder turned to trusted partner Saint-Gobain ISOVER.

STEERING LONG-TERM PERFORMANCE TOGETHER

To insulate the 20-deck vessel, ISOVER supplied the full set of U SeaProtect™ insulation products for the deck and bulkhead – thermal, acoustic and fire protection - allowing for important weight savings and optimised energy efficiency. Through this long-term collaboration between ISOVER and MEYER WERFT, including co-development and specification work, U SeaProtect™ is the preferred insulation choice for the whole AIDA fleet.

Joining the fleet in 2018, AIDAnova became the first cruise ship to be awarded the "Blauer Engel" environmental seal by the German government.

DID YOU KNOW?

An LNG drive system prevents the release of particulate matter and sulphur oxides and significantly reduces emissions of nitrogen oxides and carbon dioxide.

More information about this case study? Details about the U SeaProtect™ range? Contact us.

AIDAnova

Combined expertise
FOR YOUR MARINE & OFFSHORE PROJECTS

Saint-Gobain Marine Applications

Created in 2005, Saint-Gobain Marine Applications brings together leading marine product & solution providers specialising in every step of the shipbuilding process - from glazing to insulation, flooring, interior finishing and climate control.

ACCESSING A ONE-STOP-SHOP FOR YOUR SHIPBUILDING PROJECT

From the earliest stages of the project, Saint-Gobain offers architects, designers, owners and administrative authorities a choice of innovative products and services for constructing or renovating ships and offshore constructions.

- Meet the environmental, energy efficiency, weight saving, safety, aesthetic and vessel comfort requirements in specifications
- Know that all products and solutions are tested and certified according to IMO regulations
- Benefit from weight and energy-saving solutions and the smart appliance of high-performance coatings

This 360° approach provides integrated solutions for lighter and more efficient ships that consume less energy, while increasing fire safety and user comfort.

SAINT-GOBAIN ISOVER SAINT-GOBAIN weber SAINT-GOBAIN vetrotech SAINT-GOBAIN

Our specialists

Discover customisable solutions for your different requirements and projects.

TECHNICAL INSULATION

Insulation solutions for bulkhead, deck, HVAC, equipment and OEM constructions

- **ISOVER**: lightweight, fire, acoustic and thermal insulation

HIGH-PERFORMANCE GLASS

Glazing solutions for hull, upper structure & interior

- **Vetrotech**: lightweight glass solutions for thermal insulation, fire resistance & solar control
- **Sage Glass**: smart glass solutions - tinted on demand - for light, heat & glare control
- **Saint-Gobain Sully**: armoured glass for navy ships offering thermal insulation, fire resistance and anti-radiation

LIGHTWEIGHT FLOORING

Functional and durable lightweight flooring systems

- **Weber**: floating floors, lightweight floors, raised floors and boards for fire insulating constructions with non-combustible materials, sound insulating constructions and primary deck coverings

HIGH-PERFORMANCE WALLS & CEILINGS

Interior finishing solutions for walls and ceiling

- **Ecophon**: acoustic ceilings and wall panels for optimal room acoustics
- **Gyproc**: lightweight non-combustible gypsum board (MED approved) for walls and ceilings

PIPING SYSTEMS

Pipes, fittings, valves, actuators and valve control systems

- **Brødrene Dahl**: One-stop-shop wholesaler for pipes, fittings, valves, actuators, valve control systems, worldwide delivery arranged by professional logistics partners

SPECIAL APPLICATIONS

High-performance solutions

- **Saint-Gobain Coating Solutions**: thermal spray equipment protecting against corrosion, oxidation and abrasion
- **Sheergard**: High-performance radomes with unique styling options delivering high RF performance to optimise maritime operations / bandwidth and connection speeds

SageGlass
Gyproc SAINT-GOBAIN
Ecophon SAINT-GOBAIN
SHEERGARD
BRØDRENE DAHL

MAKING THE WORLD A BETTER HOME

Saint-Gobain designs, manufactures and distributes solutions for the construction, mobility, healthcare and other industrial application markets. Developed through a continuous innovation process, they provide wellbeing, performance and safety while addressing the challenges of sustainable construction, resource efficiency and the fight against climate change.

This strategy of responsible growth is guided by the Saint-Gobain purpose, “MAKING THE WORLD A BETTER HOME”, which responds to the shared ambition of the women and men in the Group to act every day to make the world a more beautiful and sustainable place to live in.

SAINT-GOBAIN

Aligned with this commitment, Saint-Gobain Technical Insulation has been delivering sustainable insulation solutions to customers since 1937. Across all technical markets - from Marine to Industry, HVAC, automotive and household appliances - and with a worldwide presence deployed locally, we support our customers at every step of the project, from design to installation. This means customizing our approach based on specific needs. This means adding value through high levels of comfort, health, safety and performance. This also means helping limit environmental impact of each project, while managing costs.

With expertise in an array of insulation materials, we are constantly pushing the limits of our solutions. These unwavering R&D efforts also enable us to reduce the carbon footprint of each product, whether through high levels of recycled content, recyclability or lower energy consumption.

Drawing on a unique combination of global resources, local deployment and multi-material expertise, Saint-Gobain Technical Insulation strives to always be more efficient and responsible. Together with our customers, we are making this an everyday reality.

Saint-Gobain Technical Insulation

PUSHING THE LIMITS OF SUSTAINABILITY TOGETHER.

SAINT-GOBAIN

Saint-Gobain ISOVER
Tour Saint-Gobain
12 place de l'Iris
92096 La Défense - Cedex
France
www.isover-technical-insulation.com

Publication date: March 2021

Graphic design : VERHAERT design GmbH 2021