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SeaRox

Marine & Offshore Insulation

Products & Solutions

ROCKWOOL®
TECHNICAL INSULATION

Technical insulation shaped by experts

Order your SeaRox Technical Guidelines
at www.rockwool-rti.com

ROCKWOOL Technical Insulation – a subsidiary of the ROCKWOOL International Group – offers innovative technical insulation solutions for the process & power generated industry and the shipbuilding & offshore market worldwide.

To that end, we have subsumed our product range into two specialist categories. SeaRox comprises the full marine and offshore range and ProRox covers all our insulation solutions for the process industry and for technical installations on board and offshore. Through our two product lines, our experts offer a full spread of products and systems guaranteeing the highest possible thermal, acoustical and fire safe insulation of all technical installations. Our more than 75 years of experience is reflected in a complete set of high grade products and expert advice. Today, we remain fully committed to providing the very best service in the market and a total range of cutting-edge insulation solutions.

For many years we have been one of the biggest suppliers within the shipbuilding industry and offshore. As part of our global strategic approach we offer a uniform, transparent and harmonized product range throughout the world – from the United Kingdom to China. In the marine and offshore industry this is crucial. It makes it easier for you to ensure the right material in your own country and for your international projects across the borders.

We share our knowledge to your advantage

In addition to providing innovative products, ROCKWOOL Technical Insulation is able to draw on in-depth expertise to ensure that end users in the shipbuilding, offshore and the process industries are given the best and most advanced insulation solutions.

The key to our success is the combination of excellent insulation products and outstanding people who know exactly what they are talking about. Thanks to their expertise and extensive experience, we can offer exceptional stone wool solutions and an impeccable service. With technical support on high level we are prepared to help you to choose the optimal solutions and secure the necessary documentation.

Content

ROCKWOOL Technical Insulation - more than just Products and Constructions

Technical Service

IMO as well as other marine authorities and classification societies are constantly updating the regulations for passive fire protection, noise reduction and thermal insulation. With technical support on a high level we are prepared to help our clients choose the optimal solutions and secure the necessary documentation.

Research and Development

Being part of the ROCKWOOL Group intensive research and developments efforts mean that our product and constructions are continuously being developed and improved to meet our customer's wishes and needs both today and in the future.

Green Passport (Hong Kong International Convention)

During recent years we have experienced an increased focus on health and safety onboard. As a result Green Passports have been introduced according to IMO Res A.980 (24).

The idea of a green passport is for all vessels to carry a document listing all the potentially hazardous materials on board a vessel. Inventory of Hazardous Materials as per resolution MEPC.197(62). This document will stay with the ship throughout its lifespan and up until it is decommissioned and sent to the ship breaking yard.

All ROCKWOOL Technical Insulation stone wool products for the marine and offshore market produced at any European ROCKWOOL production plant will not be classified as hazardous or potentially hazardous material in relation to the mentioned IMO resolution (MEPC.197(62) Tables A, B and C). Therefore ROCKWOOL insulation has no impact to the inventory of hazardous material.

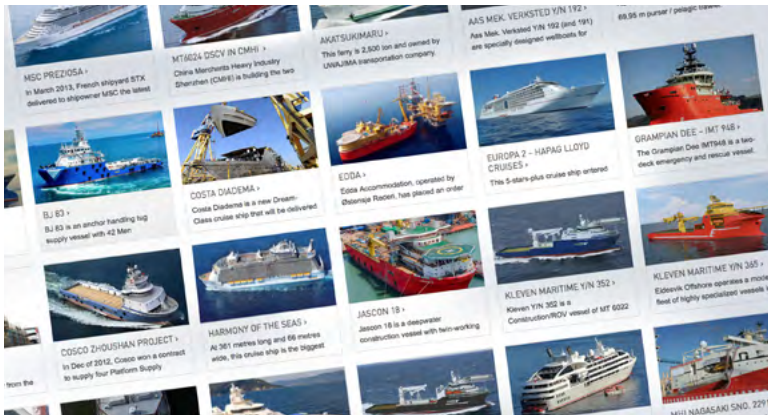
Health and Safety

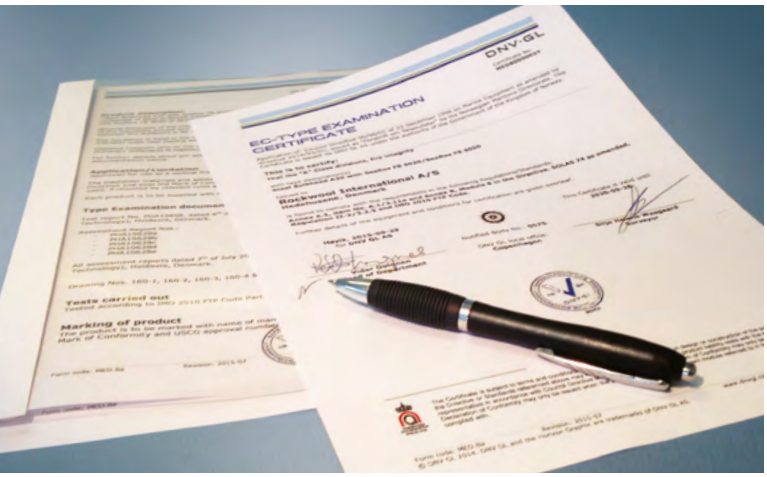
As a result of the intensive development within the Group a high-alumina low silica wool has been developed. This is a high bio-soluble fibre, Roxul@1000, with an increased safety margin in comparison with traditional mineral wool. Roxul@1000 fibres are world wide exonerated from every classification.

References

ROCKWOOL Technical Insulation has been active in the marine and offshore sector world wide during the last 30 years. During recent years our material has been used frequently in all different kind of projects like:

- Commercial ships
- Passenger vessels and cruise liners
- Yachts
- Navy ships
- Platforms and accommodation units





Certificates and Documentation

All SeaRox products and constructions have been tested according to the latest IMO regulations for both quality and environment management and approved by all major classification societies just as ROCKWOOL Technical Insulation is certified according to the latest MED directive (EC Council Directive 96/98/EC - Marine Equipment Directive).

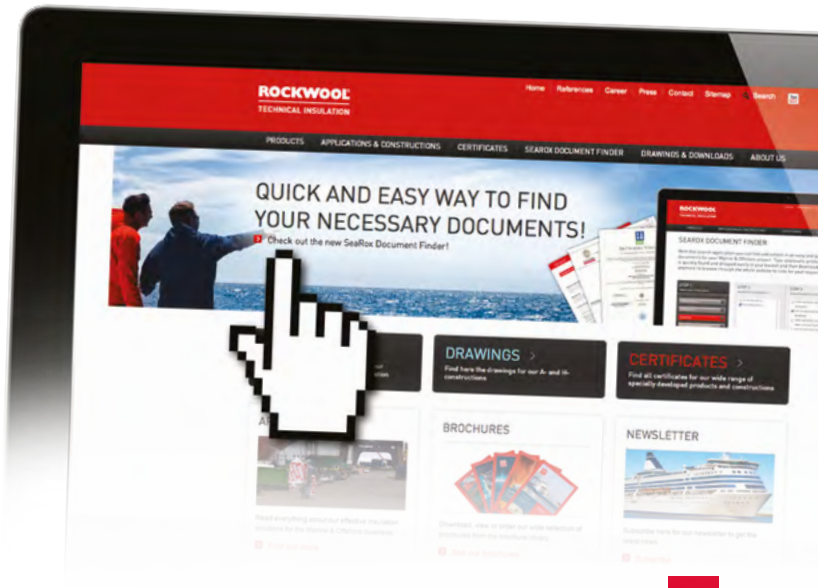
All our products produced at any European ROCKWOOL production are produced and certified according to the EUCEB regulation. All SeaRox products are asbestos free.

Find all the documents you need for your marine & offshore projects

Check out the SeaRox Document Finder!
ROCKWOOL Technical Insulation has developed a easy-to-use and handy search tool on the international SeaRox Marine & Offshore website.

The SeaRox Document Finder enables you to find all the documents you need for your projects, quickly and conveniently. Type approvals, product datasheets, drawings... – simply add what you need to your basket and download as a zip file or forward by email. You no longer need to go through the whole website to find your documents.

Visit us at www.rockwool-rti.com



New Generation SeaRox, Lightest stone wool solution

Economic and ecological pressures on the shipbuilding and offshore industry worldwide are playing a dominant role in the sector's energy use and its environmental impact.

The **commitment to a sustainable approach** has become increasingly prominent on the agenda of ship owners, ship-builders, naval architects and marine engineers. These areas include safety, environmental protection, efficient operation and resource conservation.

Energy-efficiency measures also address the **reduction of CO_2 emissions** from international shipping; a key factor in ensuring international shipping contributes to efforts to mitigate climate change. Efforts to control energy consumption are likely to drive incremental efficiency improvement.

ROCKWOOL Technical Insulation meets this challenge with a new range of high performing lightweight stone wool solutions: the SeaRox FB (Fire Boards) 6000 range. This new generation SeaRox products combines the solid product performances in fire, thermal and acoustic insulation of ROCKWOOL stone wool with an exceptional lower weight.

Flexible properties

A part of the development of our new product range is another look and feel compared to our traditional range of SeaRox products for fire protection. The product will still be delivered in the practical **dimension of slabs** but due to the optimized production process and reduced density you will find the material **softer and more flexible.**

New naming SeaRox FB 6000 range

To secure a clear differentiation from our traditional SeaRox range we have not only introduced a new product range SeaRox FB 6000. We have also decided to identify the product range consisting of 4 digits. The product identification will all start with "6" as the other products within our range of products for fire protection:

- SeaRox FB 6020, 40 kg/m^3,
- SeaRox FB 6040, 60 kg/m^3,
- SeaRox FB 6050, 70 kg/m^3

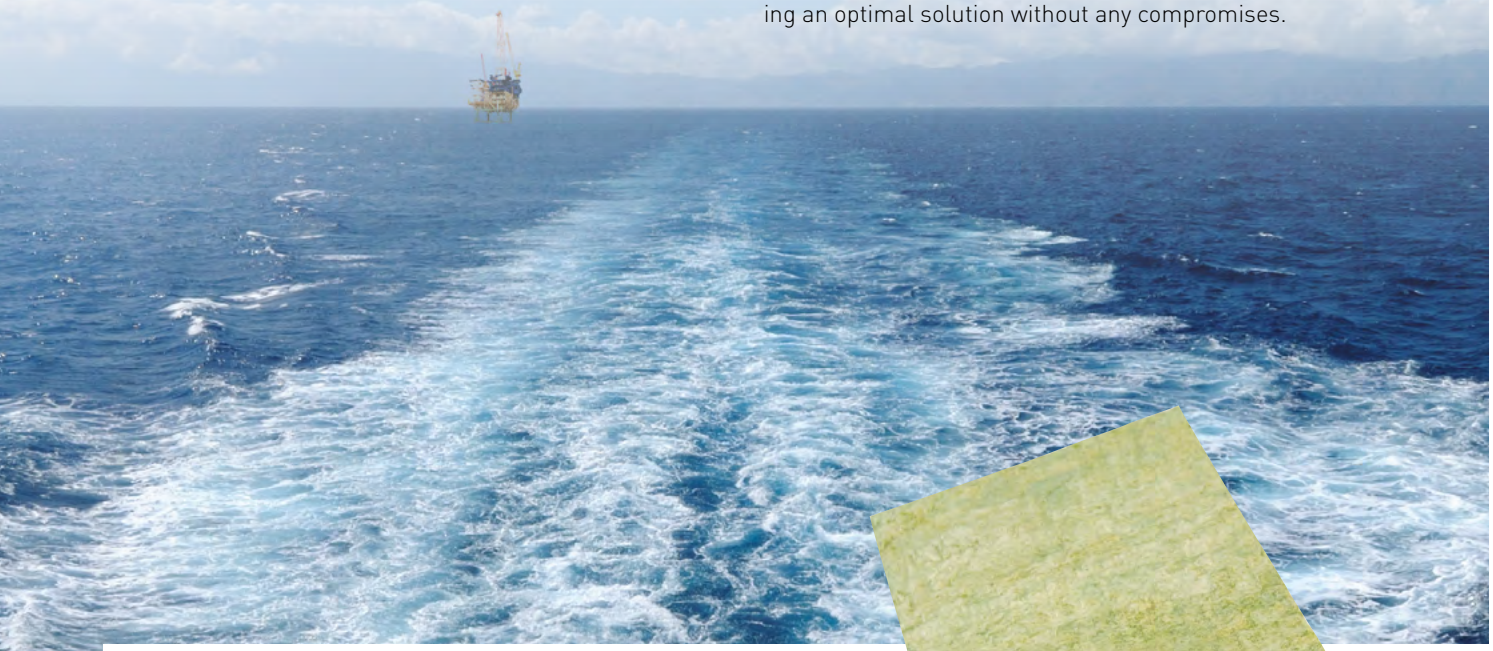
Your advantages

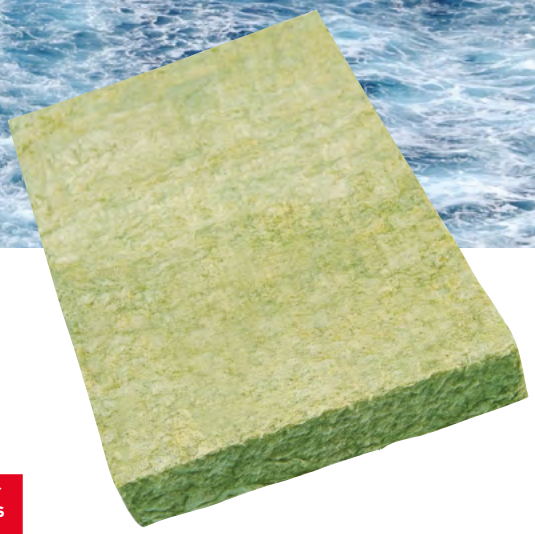
- Significantly reduced weight
- Lower fuel consumption
- Decrease in emissions
- Increase of speed
- Substantial financial benefits
- Increase in flexibility
- Less can deliver more!

Highest water repellency grade - lowest water absorption

The marine and offshore industry is an environment highly exposed to high levels of humidity and water. You risk rain exposure during installation, condensation on the cold steel behind the insulation during installation and before the water vapour barriers have been installed and of course risk of water ingress if vapour barriers are destroyed. As a result it is important that not only the products are handled and stored with normal precautionary measures, but also that products themselves feature sufficient water repellent characteristics, to lower the risk of water penetration.

Water penetration can seriously reduce its thermal properties, increase risk of corrosion and undo any initial advantages regarding weight reduction. All SeaRox products come with a very low water absorption as a standard, offering an optimal solution without any compromises.





Range of constructions

Below you will find an overview of our range of new lightweight solutions:

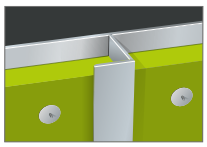
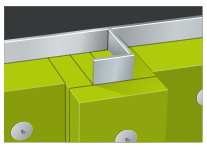
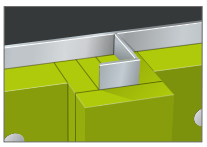
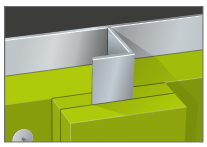
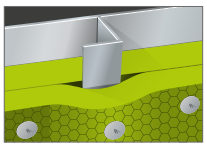
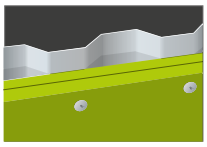
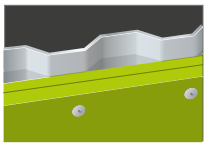
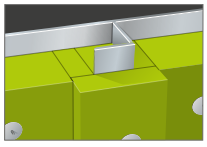
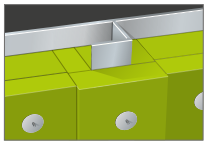
Construction	Plate product	Plate thickness (mm)	Stiffener product	Stiffener thickness (mm)
A30 Bulkhead	SeaRox FB 6020	70	SeaRox FB 6050	30
A30 Deck	SeaRox FB 6050	30	SeaRox FB 6050	30
A60 Bulkhead	SeaRox FB 6040	70	SeaRox FB 6050	30
A60 Bulkhead restricted	SeaRox FB 6020	70	SeaRox FB 6050	30
A60 Deck	SeaRox FB 6020	70	SeaRox FB 6050	30

Topped with advantages:

- Lightest stone wool product
- Highest fire safety
- Outstanding thermal insulation
- Excellent acoustic properties
- Highest water repellency grade - lowest water absorption

A-Constructions (Steel Bulkhead)

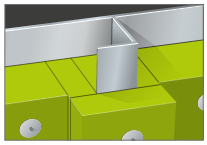
Steel Bulkhead

Product	Density (kg/m³)	Thickness	Weighted sound reduction Rw (dB)	Weighted sound absorption (level product)	Thermal conductivity (W/mK) at 10°C mean temp.	R-level steel plate product (m²K /W) at 10°C mean temp.	Water absorption (short term)
 **A-15 steel Bulkhead** [1] NEW							
SeaRox SL 620	100	Plate 50 mm	-	-	0.034	1.71	< 1 kg/m²
 **A-30 steel Bulkhead** [1] LIGHT WEIGHT							
SeaRox FB 6020	40	Plate 70 mm	46 *	0.95	0.034	2.05	< 1 kg/m²
SeaRox FB 6050	70	Stiffener 30 mm					
 **A-30 steel Bulkhead** [1]							
SeaRox SL 620	100	Plate 50 mm Stiffener 30 mm	45 *	0.85	0.035	1.43	< 1 kg/m²
 **A-30 steel Bulkhead** [2]							
SeaRox SL 740	45	Plate 50 mm Stiffener 25 mm	45 **	0.75	0.034	1.47	< 1 kg/m²
 **A-30 steel Bulkhead**							
SeaRox WM 620	90	Plate 50 mm Stiffener 30 mm	-	0.90	0.034	1.47	< 1 kg/m²
 **A-60 steel Bulkhead corrigated** 2 mm steel plate							
SeaRox SL 620	100	50 mm + 30 mm ***	-	-	0.034	2.35	< 1 kg/m²
 **A-60 steel Bulkhead corrigated** 4.5 mm steel plate							
SeaRox SL 620	100	50 mm + 30 mm ****	-	-	0.034	2.35	< 1 kg/m²
 **A-60 steel Bulkhead** [1] LIGHT WEIGHT							
SeaRox FB 6040	60	Plate 70 mm	46 *	0.90	0.034	2.05	< 1 kg/m²
SeaRox FB 6050	70	Stiffener 30 mm					
 **A-60 steel Bulkhead** [1]							
SeaRox SL 620	100	Plate 75 mm Stiffener 30 mm	46 *	0.90	0.035	2.14	< 1 kg/m²
 **A-60 steel Bulkhead** [1]							
SeaRox SL 620	100	Plate 50 + 30 mm Stiffener 30 mm	47 *	0.90	0.035	2.28	< 1 kg/m²

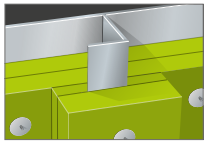
** Test specimen 5 mm steel plate ** Test specimen 6 mm steel plate*

1) Tested according to IMO 2010 FTP Code 2) Existing certificates will not be renewed, please refer to one of our alternative offerings

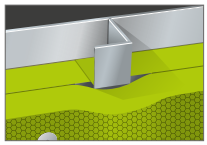
Steel Bulkhead



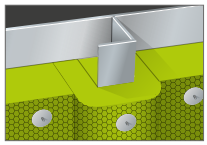
Product	Density (kg/m³)	Thickness	Weighted sound reduction Rw (dB)	Weighted sound absorption (level product)	Thermal conductivity (W/mK) at 10°C mean temp.	R-level steel plate product (m²K /W) at 10°C mean temp.	Water absorption (short term)
A-60 steel Bulkhead							
SeaRox SL 620	100-115	Plate 60 mm Stiffener 25 mm	45 *	0.90	0.035	1.71	< 1 kg/m²



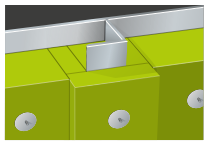
A-60 steel Bulkhead							
SeaRox SL 640	130	Plate 2 x 30 mm Stiffener 30 mm	48 *	0.90	0.035	1.71	< 1 kg/m²



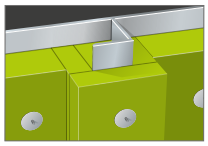
A-60 steel Bulkhead							
SeaRox WM 620	90	Plate 2 x 45 mm Stiffener 45 mm	49 **	0.95	0.034	2.64	< 1 kg/m²



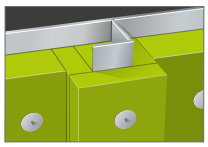
A-60 steel Bulkhead							
SeaRox WM 640	105	Plate 75 mm Stiffener 30 mm	47 **	0.90	0.034	2.20	< 1 kg/m²



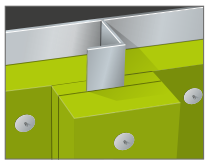
A-60 steel Bulkhead restricted [1]		LIGHT WEIGHT					
SeaRox FB 6020	40	Plate 70 mm	46 *	0.95	0.034	2.05	< 1 kg/m²
SeaRox FB 6050	70	Stiffener 30 mm					



A-60 steel Bulkhead restricted [1]							
SeaRox SL 620	100	Plate 50 mm Stiffener 30 mm	45 *	0.85	0.035	1.43	< 1 kg/m²



A-60 steel Bulkhead restricted							
SeaRox SL 620	100-115	Plate 40 mm Stiffener 40 mm	47 **	0.80	0.035	1.14	< 1 kg/m²



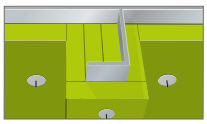
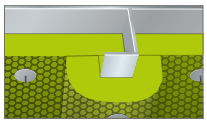
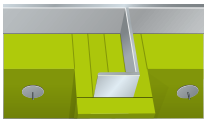
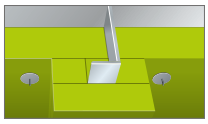
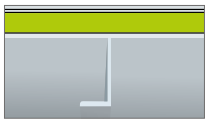
A-60 steel Bulkhead restricted							
SeaRox SL 640	130	Plate 40/50 mm Stiffener 40/50 mm (Check certificate for specific thickness)		0.80	0.035	1.43	< 1 kg/m²

** Test specimen 5 mm steel plate* *** Test specimen 6 mm steel plate*

1) Tested according to IMO 2010 FTP Code *2) Existing certificates will not be renewed, please refer to one of our alternative offerings*

A-Constructions (Steel Deck)

Steel Deck

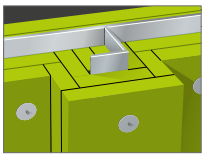
	Product	Density (kg/m³)	Thickness	Weighted sound reduction Rw (dB)	Weighted sound absorption (level product)	Thermal conductivity (W/mK) at 10°C mean temp.	R-level steel plate product (m²K /W) at 10°C mean temp.	Water absorption (short term)
	**A-15 steel Deck** [1] NEW							
	SeaRox SL 620	100	Plate 50 mm	-	-	-	1.71	< 1 kg/m²
	**A-30 steel Deck** [1] LIGHT WEIGHT							
	SeaRox FB 6050	70	Plate 30 mm	46 *	0.55	0.034	0.88	< 1 kg/m²
	SeaRox FB 6050	70	Stiffener 30 mm					
	**A-30 steel Deck** [1]							
	SeaRox SL 620	100	Plate 30 mm Stiffener 30 mm	44 *	0.60	0.035	0.86	< 1 kg/m²
	**A-30 steel Deck** [2]							
	SeaRox SL 740	45	Plate 50 mm Stiffener 30 mm	45 **	0.75	0.034	1.47	< 1 kg/m²
	**A-30 steel Deck** [1]							
	SeaRox WM 620	90	Plate 30 mm Stiffener 30 mm	-	-	0.034	0.88	< 1 kg/m²
	**A-60 steel Deck** LIGHT WEIGHT							
	SeaRox FB 6020	40	Plate 70 mm	46 *	0.95	0.034	2.05	< 1 kg/m²
	SeaRox FB 6050	70	Stiffener 30 mm					
	**A-60 steel Deck**							
	SeaRox SL 620	100	Plate 50 mm Stiffener 30 mm	45 *	0.85	0.035	1.43	< 1 kg/m²
	**A-60 steel Deck** [1]							
	SeaRox SL 620	100-115	Plate 40 mm Stiffener 25 mm	46 **	0.80	0.035	1.14	< 1 kg/m²
	**A-60 steel Deck**							
	SeaRox SL 640	130	Plate 40 mm Stiffener 40 mm	-	0.80	0.035	1.14	< 1 kg/m²
	**A-60 steel Deck**							
	SeaRox WM 620	90	Plate 45 mm Stiffener 45 mm	46 **	0.90	0.034	1.32	< 1 kg/m²
	**A-60 Floating Floor** [1]							
	SeaRox SL 436	140	60 mm (+ 1.5 + 3 mm steel top plate)	-	-	0.035	1.71	< 1 kg/m²
	**A-60 Floating Floor**							
	SeaRox SL 480	200	2 x 30 mm (+ 2 mm steel top plate)	-	-	0.037	1.62	< 1 kg/m²

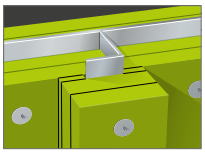
** Test specimen 5 mm steel plate* *** Test specimen 6 mm steel plate*

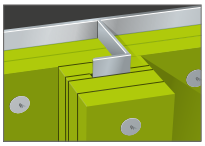
1) Tested according to IMO 2010 FTP Code *2) Existing certificates will not be renewed, please refer to one of our alternative offerings*

A-Constructions (Alu Bulkhead and Deck)

Alu Bulkhead



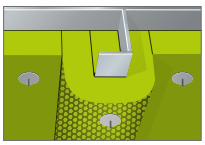


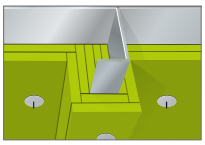


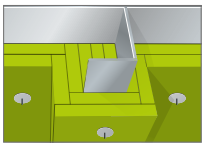
Product	Density (kg/m³)	Thickness	Weighted sound reduction Rw (dB)	Weighted sound absorption (level product)	Thermal conductivity (W/mK) at 10°C mean temp.	R-level steel plate product (m²K /W) at 10°C mean temp.	Water absorption (short term)
A-60 Alu Bulkhead							
SeaRox SL 620	100-115	Plate 2 x 30 mm Stiffener 2 x 30 mm *Insulation on both sides of the alu plate*	-	0.90	0.035	1.71	< 1 kg/m²
A-60 Alu Bulkhead [1]							
SeaRox SL 640	130	Plate 2 x 30 mm Stiffener 2 x 30 mm *Insulation on both sides of the alu plate*	40 *	0.90	0.035	1.71	< 1 kg/m²
A-60 Alu Bulkhead restricted [1]							
SeaRox SL 640	130	Plate 2 x 30 mm Stiffener 2 x 30 mm	-	0.90	0.035	1.71	< 1 kg/m²

** Test specimen 6 mm alu plate*

Alu Deck







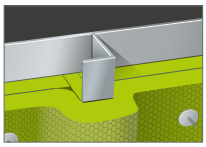
Product	Density (kg/m³)	Thickness	Weighted sound reduction Rw (dB)	Weighted sound absorption (level product)	Thermal conductivity (W/mK) at 10°C mean temp.	R-level steel plate product (m²K /W) at 10°C mean temp.	Water absorption (short term)
A-30 Alu Deck							
SeaRox SL 740	45	Plate 50 mm	-	0.75	0.034	1.32	< 1 kg/m²
SeaRox WM 620	90	Stiffener 45 mm					
A-60 Alu Deck							
SeaRox SL 620	100-115	Plate 2 x 30 mm Stiffener 2 x 30 mm	40 *	0.90	0.035	1.71	< 1 kg/m²
A-60 Alu Deck [1]							
SeaRox SL 640	130	Plate 2 x 30 mm Stiffener 2 x 30 mm	-	0.90	0.035	1.71	< 1 kg/m²

** Test specimen 6 mm alu plate*

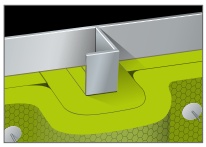
1) Existing certificates will not be renewed, please refer to one of our alternative offerings

H-Constructions (Bulkhead and Deck)

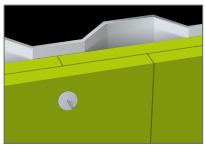
Bulkhead



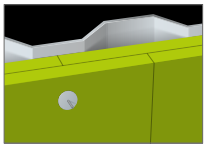
Product	Density (kg/m³)	Thickness	Weighted sound reduction Rw (dB)	Weighted sound absorption (level product)	Thermal conductivity (W/mK) at 10°C mean temp.	R-level steel plate product (m²K /W) at 10°C mean temp.	Water absorption (short term)
H-60 Bulkhead restricted							
SeaRox SL 660	150	Plate 30 + 40 mm	48 **		0.035	2.00	< 1 kg/m²
SeaRox WM 660		Stiffener 40 mm					



H-120 Bulkhead restricted							
SeaRox SL 660	150	Plate 30 + 40 mm	49 **		0.035	2.00	< 1 kg/m²
SeaRox WM 660		Stiffener 2 x 40 mm					



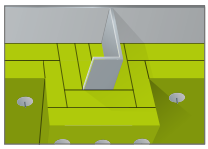
H-60 non load bearing corrugated steel restricted							
SeaRox SL 660	150	50 mm	44 *		0.035	2.57	< 1 kg/m²
SeaRox WM 660		40 mm					



H-120 non load bearing corrugated steel restricted							
SeaRox SL 660	150	50 mm	44 *		0.035	2.57	< 1 kg/m²
SeaRox WM 660		40 mm					

** Test specimen 1.5 mm corrugated steel plate* *** Test specimen 6 mm steel plate*

Steel Deck



Product	Density (kg/m³)	Thickness	Weighted sound reduction Rw (dB)	Weighted sound absorption (level product)	Thermal conductivity (W/mK) at 10°C mean temp.	R-level steel plate product (m²K /W) at 10°C mean temp.	Water absorption (short term)
H-60 steel Deck							
SeaRox SL 660	150	Plate 2 x 50 mm Stiffener 2 x 50 mm	48 **	0.90	0.035	2.85	< 1 kg/m²

*** Test specimen 6 mm steel plate*

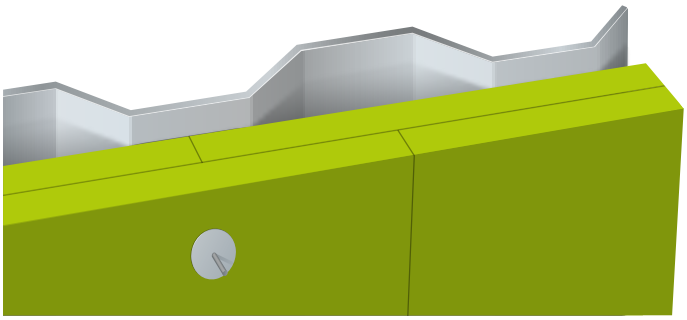
Please note that the drawings are only intended as a guide

Additional Fire Insulation

A-60 Fire Rated Solutions for Corrugated Steel

In some projects and applications the standard IMO structural core is replaced with a light structural core consisting of a corrugated steel plate.

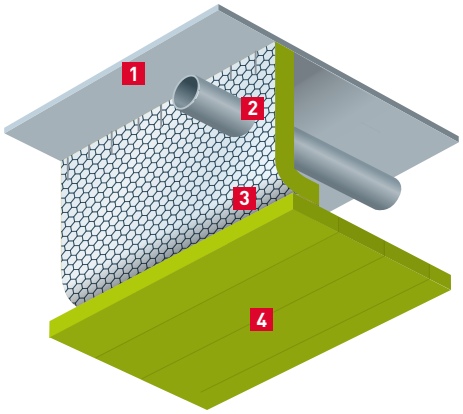
Corrugated steel plate is often being used to obtain a lighter structure in offshore living quarters, firewalls or containers.



The market is characterized with a variety of different steel designs with different corrugation geometry and steel thicknesses and no standard fire test procedure exist. ROCKWOOL Technical Insulation has performed and passed two A-60 unrestricted fire rated design for Corrugated Steel plate. One design is performed with a 2 mm corrugated steel plate and the other with a 4.5 mm corrugated steel plate. Both solutions are tested and approved according to IMO 2010 FTP Code part 3. Solutions are tested and approved based on SeaRox SL 620, 50 + 30 mm without filling of the voids. Alternative design needs to be approved by local surveyor.

The Advantages of the solutions are:

- Tested according to newest fire test procedure, IMO 2010 FTP Code
- MED certified by Det Norske Veritas
- Easy installation – no filling out of voids
- Test of alternative structural design from 2 mm to 4.5 mm



1. *Deck construction*
2. *Service penetration*
3. *Cut around penetration and wire mesh stitched together along joint*
4. *Suspended ceiling*

Draught Stoppers

Draught stoppers are used above ceilings to avoid the spread of smoke and flames in case of fire. Normally the classification companies request a B-0 fire insulation above the ceiling. This can be made with SeaRox WM or SeaRox SL after request from the local surveyor or from the customer.

Construction:

- SeaRox WM 640 ALU, min. 50 mm or SeaRox SL 620 ALU, min. 60 mm
- SeaRox SL 620 must be covered with wire mesh. Insulation fixed with ø3 mm pins and secured with ø38 mm washers

Fire Protection of Sprinkler Pipes

Seen in the light of the increasing sizes of passenger ships and growing number of passengers, a new amendment to SOLAS regulation „Safe return to port" is applicable to all passenger ships built on or after 1st July 2010 stating that sprinkler pipes on passenger vessels need to remain operational in case of fire.

To fulfil the requirement ROCKWOOL Technical Insulation has introduced a Pipe Section called SeaRox PS 620 ALU. This product can be used not only for thermal insulation but also for fire protection according to IMO FTP Code. By using the already A-60 approved basis product, SeaRox SL 620 in approved thicknesses for Bulkhead and Deck, just cut into Pipe Sections the product is fulfilling the requirements.

The amendment is valid for:

- All passenger ships of 120 m or more, or...
- Having three or more main vertical zones

Applicable also for ROPAX vessels and large offshore accommodations.

Comfort Insulation

Lambda value (λ) measurements on ROCKWOOL Technical Insulation products (nominal values):

Product λ [W/mK]	λ 10
SeaRox FB 6000 range	0.034
SeaRox SL 720	0.037
SeaRox SL 740	0.034
SeaRox SL 320	0.034
SeaRox SL 340	0.034
SeaRox SL 436	0.035
SeaRox SL 440	0.035
SeaRox SL 480	0.040
SeaRox SL 620	0.034
SeaRox SL 970	0.035
SeaRox SL 640	0.034
SeaRox LM 900	0.040
SeaRox WM 950	0.035
SeaRox WM 620	0.035
SeaRox WM 640	0.035
SeaRox SL 660	0.034
ProRox PS 960/ ProRox PS 960 ALU	0.034

The requirements of the indoor climate and comfort have become more stringent during the recent years. The insulation constitutes an important factor of this, as it ensures obtaining the correct temperature – as comfort insulation.

The great advantage of the ROCKWOOL SeaRox products is that the high level of thermal insulation can be combined with excellent noise reduction capabilities and often fire protection constructions will also act as thermal comfort insulation.

All ROCKWOOL Technical Insulation products fulfil the IMO rules of "non-combustibility" and "low flame spread" and besides this the products have excellent water repellent properties which are also important as comfort insulation is often placed directly up against the outer construction with changing temperatures.

1: Thermal insulation can be used alone where there is no other demand for the deck and bulkhead.

2: Thermal insulation can also be used together with fire insulation or sound insulation.

In all cases when insulating against cold temperatures the wool must always be covered by a vapour tight surface. This surface can be aluminium foil or another kind of vapour barrier. The gaps should be tightly sealed with alu tape.

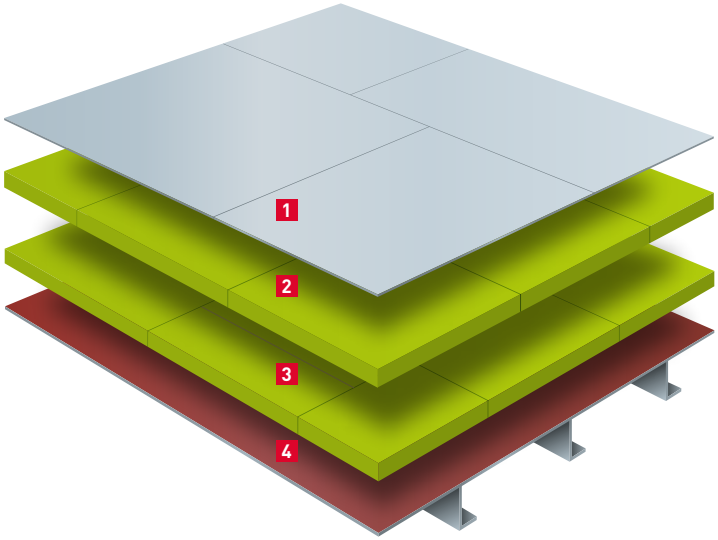
When adding additional insulation to a fire construction it should be documented and approved by the local surveyor.

The most common way of expressing thermal properties is by using the following nomenclature:

- Coefficient of the Thermal Transmission (U-value)
- Thermal Resistance (R)
- Thermal Conductivity (λ)

It is important to note that the λ-value for any given material varies with temperature.

Outfitting (Floating Floors and Panels)



1 *Steel Plate 2 mm*

2 *SeaRox SL 480, 30 mm*

3 *SeaRox SL 480, 30 mm*

4 *Steel Deck*

Floating Floors

To obtain a good comfort a good noise reduction is required between the individual decks. To prevent noise – particularly impact noise and structure borne noise travelling from one cabin to another you must use an insulation solution which has the necessary rigidity, elasticity and noise reduction. For this purpose ROCKWOOL Technical Insulation offers alternative solutions. One is based on SeaRox SL 436 which is widely used by dedicated floating floor companies as the core material, combined with different types pf load spreading top layers and bas layers. This solution has been optimized to get the best dynamic stiffness and acoustic performance. The special design of SeaRox SL 436 cause lower compression strength compared to more rigid SeaRox Slabs

Another flooring system is based on SeaRox SL 480 which is a "safe" solution in the sense the the product is very rigid and strong and combined with a medium thick steel plate normally is adequate for all normal accommodation load.

Both SeaRox SL 436 and SeaRox SL 480 form part of A60 approved floating floor solutions.

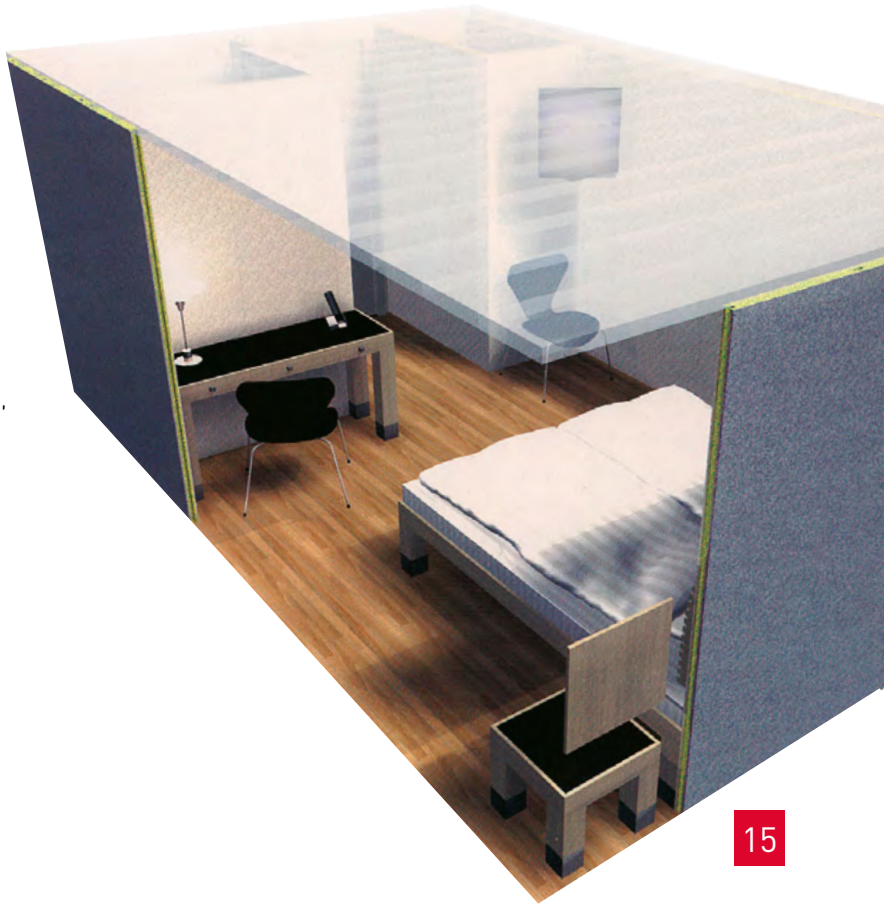
Many of the dedicated flooring companies are using SeaRox Slabs in densities 140-200 kg/m^3 in combination with more complex top layers.

Panels

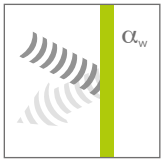
Throughout the accommodation areas of a vessel or living quarter, it is required to have B-Class fire restriction zones and fire protection between each cabin and at the same time it is needed to have comfort and noise insulation between each cabin towards public areas etc.

For this purpose the SeaRox Slabs range of products has proven to be highly successful. ROCKWOOL Technical Insulation has with the customers developed a great number of special products possessing high compressive and delaminating strength as well as great fire resistance, which has been approved as non-combustible according to latest IMO regulations.

The panel and door manufacturers hereby have an outstanding core material for the fabrication of sandwich constructions.



Sound Insulation



Sound absorption
is a material property which describes how well sound waves are absorbed in a material.

Today an increasing focus on noise reduction is present, which results in more requirements for noise levels.

The new IMO noise code - resolution MSC.337(91) - entered into force 1 July 2014 (new contracts) 1 January 2015 (keel laying) and 1 July 2018 (full implementation). The new code replace the 1981 noise code A.468(XII). The new noise code is mandatory and introduces new requirements for the noise reduction measures on ships; the design, documentation and performance, as well as actual noise levels on-board.

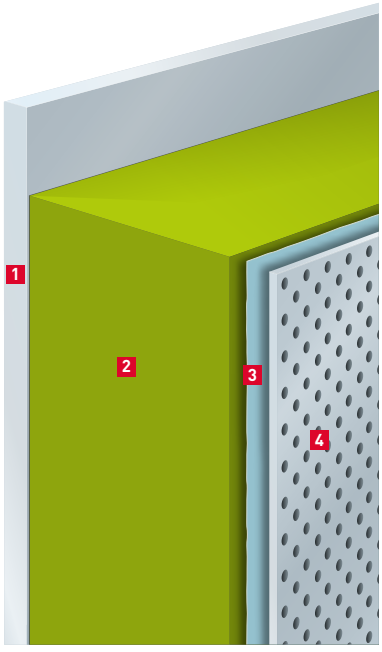
The technical aspects in this area are quite complex and often require specialist companies to perform sound design work, calculations and final on board measurements.

ROCKWOOL SeaRox products have excellent properties as; sound absorbers, stopping structural borne noise (i.e. with floating floor and bulkhead constructions) and as noise reduction by panels.

A large range of basic product measurements has been performed to create the necessary data for the further calculations. A series of typical constructions have also been tested for the noise reduction capabilities.

SeaRox Acoustic Foil system especially designed for sound absorption in engine rooms

Optimal sound properties
Resistant to oil/oil mist
Tested and approved
Easy installation



1 *Steel plate*

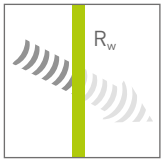
2 *SeaRox insulation*

3 *SeaRox Acoustic Foil*

4 *Perforated steel plate*

Overview - absorption measurements

No	ROCKWOOL products	Weighted absorption
	SeaRox FB products	
1	SeaRox FB 6020, 70 mm [1] LIGHT WEIGHT	α_w = 0.95
2	SeaRox FB 6040, 70 mm [1] LIGHT WEIGHT	α_w = 0.90
3	SeaRox FB 6050, 30 mm [1] LIGHT WEIGHT	α_w = 0.55
	SeaRox SL products	
4	SeaRox SL 740, 50 mm	α_w = 0.75
5	SeaRox SL 740, 50 mm + alu foil	α_w = 0.65
6	SeaRox SL 320, 50 mm	α_w = 0.85
7	SeaRox SL 340, 50 mm	α_w = 0.90
8	SeaRox SL 340, 2 x 50 mm	α_w = 0.95
9	SeaRox SL 436, 50 mm	α_w = 0.85
10	SeaRox SL 440, 50 mm	α_w = 0.75
11	SeaRox SL 480, 50 mm	α_w = 0.75
12	SeaRox SL 480, 2 x 30 mm	α_w = 0.80
13	SeaRox SL 620, 30 mm	α_w = 0.60
14	SeaRox SL 620, 50 mm	α_w = 0.85
15	SeaRox SL 620, 30 + 50 mm	α_w = 0.90
16	SeaRox SL 620, 75 mm	α_w = 0.90
17	SeaRox SL 620 ALU, 75 mm	α_w = 0.55
18	SeaRox SL 620, 40 mm	α_w = 0.80
19	SeaRox SL 620, 40 mm + alu foil	α_w = 0.50
20	SeaRox SL 620, 60 mm incl.pin's and washer	α_w = 0.90
21	SeaRox SL 620, 60 mm incl. pin's and washer, covered by 19 µ foil	α_w = 0.90
22	SeaRox SL 640, 30 mm	α_w = 0.70
23	SeaRox SL 640, 2 x 30 mm	α_w = 0.90
24	SeaRox SL 660, 2 x 50 mm	α_w = 0.90
	SeaRox WM products	
25	SeaRox WM 950, 50 mm	α_w = 0.90
26	SeaRox WM 950 ALU, 50 mm	α_w = 0.75
27	SeaRox WM 950, 100 mm	α_w = 0.95
28	SeaRox WM 950 ALU, 100 mm	α_w = 0.75
29	SeaRox WM 620, 45 mm	α_w = 0.90
30	SeaRox WM 620, 45 mm + SeaRox Acoustic Foil (19 µ) + perf. steel plate (suspended)	α_w = 0.77
31	SeaRox WM 620, 2 x 45 mm	α_w = 0.95
32	SeaRox WM 640, 30 mm	α_w = 0.80
33	SeaRox WM 640, 75 mm	α_w = 0.90
34	SeaRox WM 640, 100 mm	α_w = 0.90



Sound reduction
is an impression rating the reduction of sound through a wall or a building element from one room to the other.

Overview - reduction measurements

No	Construction	Products	Weighted reduction
A-30 constructions			
1	A-30 steel deck	SeaRox FB 6050, 30 mm/ 30 mm [1] LIGHT WEIGHT	R_w = 44 dB *
2	A-30 steel bulkhead A-60 steel deck A-60 steel bulkhead restr.	SeaRox FB 6020, 70 mm [1] SeaRox FB 6050, 30 mm LIGHT WEIGHT	R_w = 46 dB *
3	A-30 steel bulkhead/ A-60 steel deck/ A-60 steel bulkhead restr. + thermal	SeaRox FB 6020, 70 mm [1] SeaRox FB 6050, 30 mm and 50 mm SeaRox MA 720 ALU and SeaRox MA 720 ALU, 50 mm LIGHT WEIGHT	R_w = 48 dB *
4	A-30 steel deck	SeaRox SL 620, 30 mm/ 30 mm [1]	R_w = 44 dB *
5	A-30 bulkhead with panel	SeaRox SL 740, 50/25 mm and 25 mm panel	R_w = 62 dB
A-60 constructions			
6	A-60 steel bulkhead	SeaRox FB 6040, 70 mm/SeaRox FB 6050, 30 mm [1] LIGHT WEIGHT	R_w = 46 dB *
7	A-60 steel bulkhead + thermal	SeaRox FB 6040 70 mm/SeaRox FB 6050, 30 mm and 50 mm SeaRox MA 720 ALU [1] LIGHT WEIGHT	R_w = 48 dB *
8	A-60 steel deck/bulkhead restr.	SeaRox SL 620, 50 mm/ 30 mm	R_w = 45 dB *
9	A-60 steel bulkhead	SeaRox SL 620, 50 + 30 mm/ 30 mm [1]	R_w = 47 dB *
10	A-60 steel bulkhead	SeaRox SL 620, 75 mm/ 30 mm [1]	R_w = 46 dB *
11	A-60 steel bulkhead	SeaRox SL 620, 75 mm/ 30 mm + 19 my SeaRox Acoustic Foil [1]	R_w = 46 dB *
12	A-60 steel bulkhead	SeaRox SL 620 GW 200, 75 mm/ 30 mm with glass cloth 200 g/m^2 [1]	R_w = 48 dB *
13	A-60 steel bulkhead	SeaRox SL 620 ALU, 75 mm/ 30 mm with reinf. alufoil	R_w = 46 dB *
14	A-30 steel bulkhead/deck	SeaRox SL 740, 50 mm/ 30 mm	R_w = 45 dB **
15	A-60 steel bulkhead	SeaRox WM 640, 75 mm/ 30 mm	R_w = 47 dB **
16	A-60 steel bulkhead	SeaRox WM 620, 2 x 45 mm/45 mm	R_w = 49 dB **
17	A-60 steel bulkhead	SeaRox SL 640, 2 x 30 mm/ 30 mm	R_w = 48 dB *
18	A-60 steel bulkhead	SeaRox SL 620, 60 mm/ 25 mm	R_w = 45 dB *
19	A-60 steel bulkhead	SeaRox SL 640, 2 x30 mm/ 30 mm with 19 µ SeaRox Acoustic Foil system	R_w = 47 dB **
20	A-60 steel bulkhead	SeaRox WM 620, 2 x 45 mm/ 45 mm with 1 mm steel sheet	R_w = 58 dB **
21	A-60 steel bulkhead	SeaRox SL 620 GW 200, 60 mm/ 25 mm with glass cloth 200 g/m^2 plus tape	R_w = 45 dB *
22	A-60 steel bulkhead	SeaRox SL 620 ALU, 60 mm/ 25 mm with reinf. alufoil	R_w = 46 dB *
23	A-60 steel deck	SeaRox SL 620, 40 mm/ 25 mm	R_w = 46 dB **
24	A-60 steel deck	SeaRox WM 620, 45 mm	R_w = 46 dB **
25	A-60 steel deck	SeaRox SL 640, 40 mm with 1 mm steel sheet	R_w = 56 dB **
26	A-60 aluminium bulkhead	SeaRox SL 620, 2 x 30 mm/ 30 mm (on both sides)	R_w = 40 dB
27	A-60 aluminium deck	SeaRox SL 620, 2 x 30 mm/ 30 mm	R_w = 40 dB
28	A-60 bulkhead corrugated	SeaRox SL 620, 60 mm	R_w = 40 dB
29	A-60 bulkhead corrugated	SeaRox SL 640, 2 x 30 mm	R_w = 40 dB
H-60 construction			
30	H-60 bulkhead restricted	SeaRox SL 660, 30 mm and SeaRox WM 660, 40 mm / 40 mm	R_w = 48 dB **
31	H-60 bulkhead restricted + thermal	SeaRox SL 660, 30 mm and SeaRox WM 660, 40 mm / 40 mm and 50 mm SeaRox SL 720	R_w = 50 dB **
32	H-60 bulkhead restricted + comfort	SeaRox SL 660, 30 mm and SeaRox WM 660, 40 mm / 40 mm and 50 mm SeaRox MA 720 ALU, 50 mm	R_w = 51 dB **
34	H-60 steel deck	SeaRox SL 660, 2 x 50 mm	R_w = 48 dB **
H-120 construction			
33	H-120 bulkhead restricted	SeaRox SL 660, 30 mm and SeaRox WM 660, 40 mm / 2 x 40 mm	R_w = 49 dB **
35	H-120 bulkhead corrugated	SeaRox SL 660, 50 mm and SeaRox WM 660, 40 mm	R_w = 44 dB
Other solutions			
36	Acoustic solution	SeaRox SL 340, 2 x 50 mm with 5-10 mm air gap	R_w = 49 dB **

1) Tested according to IMO 2010 FTP Code ** Test specimen 5 mm steel plate* *** Test specimen 6 mm steel plate*

ROCKWOOL Technical Insulation has in many years been market leader in thermal insulation for technical installations in the process industry as well as within the shipbuilding and offshore market worldwide.

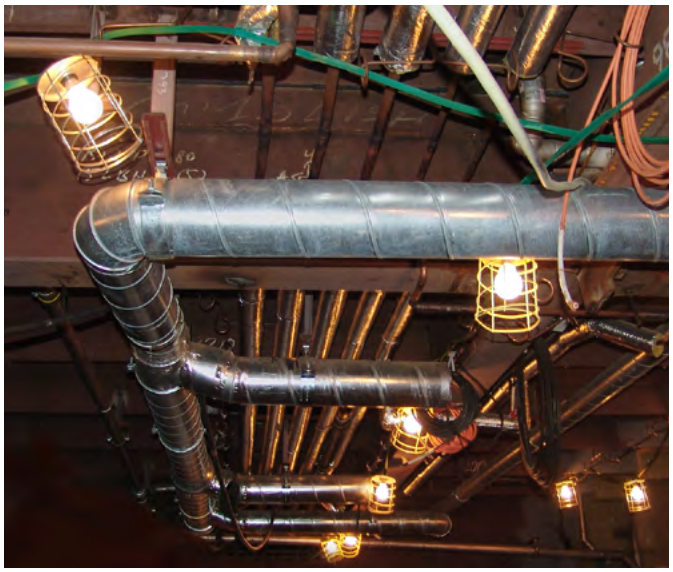
Our different solutions are used to ensure comfort, safety and economic efficiency for duct, tanks and pipe insulations on board.

Pipe Insulation

Pipe insulation is rarely visible, but often decisive for the comfort and safety on board. The safety rules of SOLAS (Chp II-2) regarding hot surfaces in engine rooms have to be fulfilled. Pipe insulation is also necessary to reduce the surface temperature on the pipes so that people working in the vicinity are not injured by contact with ot pipes. To prevent corrosion and blockage of pipes for heavy oil, cargo lines for product tankers etc. it can further more be decisive to avoid too great a heat loss from the pipes.

ROCKWOOL Technical Insulation has a wide selection of marine approved solutions for pipe insulation, which satisfy all these requirements, for large pipes as well as small pipes. Ridged pipe sections are available both with and without reinforced aluminium foil covering.

The Pipe Sections are especially suitable for ambient to very high temperatures, but can also be utilised for chilled media. Please see the web site where a calculation application can be downloaded, to determine heat loss, surface temperatures and required thicknesses.



Air Ducts

Today, many requirements are made on air ducts. Most important is that the comfort on board the vessels or platform living quarters is considered and that no compromises are made to meet the demands on fire safety.

In connection with ventilation of cabins and other rooms it must furthermore be ensured that no condensation is formed and that the required temperature is maintained all the time. This is obtained by using one of the ROCKWOOL Technical Insulation SeaRox products.

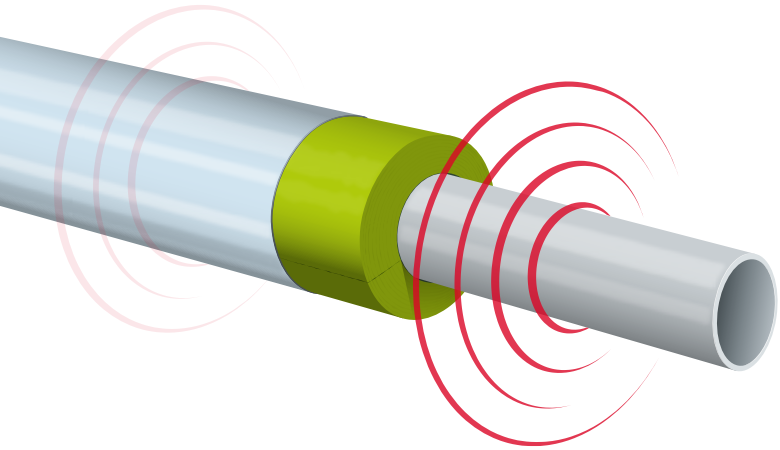
Technical Installations

For a large range of technical equipment on board a vessel or offshore installation, there will be requirements for insulation. This will often be a combination of thermal control, noise reduction and fire safety. For these purposes ROCKWOOL Technical Insulation will be able to supply a perfect solution. Also for odd size and shape installations.

For thermal calculations of technical installations we recommend the use of ROCKASSIST the on-line calculation program for thermal calculations of technical installations.

Typical ROCKWOOL products for technical installations
SeaRox WM 950 / ProRox WM 950
SeaRox LM 900 ALU
SeaRox SL 970
ProRox PS 960/ ProRox PS 960 ALU

Products for technical installations are covered by our range of thermal insulation products - see product overview page 22-23.



Acoustic Insulation of Pipes

Today noise is an increasing focus area within the marine and offshore industry also in relation to technical installations, like for instance pipes onboard living quarters.

ROCKWOOL Technical Insulation has tested and documented a long series of alternative solutions fulfilling ISO 15665:2003. Similar requirements are included in for instance NORSOK standard R-004 class 6, 7 and 8 and CINI 9.2.02.

Tests have been performed by marine approved products from our ProRox range for thermal insulation of technical installations (ProRox Pipe Sections and ProRox Wired Mats) passing requirements Class A, B and C.

In general we are able to provide solutions with:

- Excellent thermal and acoustic performance
- Easy to handle and install: Thermal insulation, max. 1 heavy mass layer and metal cladding does the job
- Watertight finish possible in combination with ProRox GRP 1000

Watertight Cladding - ProRox GRP 1000

The watertight insulation system

Because of the extreme weather conditions (rain, wind, temperature fluctuations,...) and the action of sea salt and chemicals, the insulation of (upper deck) ship's pipelines and cabling, storage tanks and offshore installations sometimes have to endure a lot of punishment. To that purpose ROCKWOOL Technical Insulation offers an innovative protection system for SeaRox and ProRox insulation: ProRox GRP 1000, a fiberglass reinforced polyester mat. The cladding is typically being used on insulated equipment on decks, process and steam pipes and passive fire protection on bulkheads and deck to protect the insulation and CUI mitigation.

The advantages of ProRox GRP 1000

- ProRox GRP 1000 prevents the problems which can compromise safety. The watertightness, high chemical resistance, mechanical strength and seamless finish guarantee that. Moisture penetration leading to corrosion under insulation is virtually impossible.
- ProRox GRP 1000 can be installed on site around pipes, cables and equipment. Missing or complicated prefabricated parts of the cladding now are a thing of the past.
- The unique fire properties of ProRox GRP 1000 in comparison with conventional polyester finishes, and the noncombustibility of ROCKWOOL insulation, ensures an extremely high level of fire performance.
- ProRox GRP 1000 is MED certified: Low Surface Flame Spread in accordance with IMO A653.

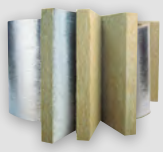
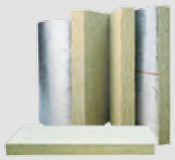
Product Selector

ROCKWOOL Technical Insulation has developed a special range of marine products, which meets the requirements of IMO's regulation at any time. For every construction there is consequently a ROCKWOOL SeaRox product that has the required approval.

The below table gives a general idea of the applications of the products in different constructions.

	SeaRox FB 6020 / FB 6040 / FB 6050	SeaRox MA 700	SeaRox SL 720 / SeaRox MA 720 ALU	SeaRox SL 740	SeaRox MA 740	SeaRox SL 320	SeaRox SL 340	SeaRox SL 436	SeaRox SL 440	SeaRox SL 470	SeaRox SL 480	SeaRox SL 620	SeaRox SL 640	SeaRox SL 660	SeaRox SL 970	SeaRox WM 620	SeaRox WM 640	SeaRox WM 660	SeaRox LM 900 ALU	SeaRox PS 620	ProRox WM 950	ProRox PS 960	ProRox GRP 1000
Bulkhead and Deck																							
Fire (A class divisions)	●	●		●				●			●	●	●			●	●						
Fire (H class divisions)														●				●					
Comfort Insulation (Thermal)		●	●	●	●																		
Outfitting								●	●	●	●												
Sound Insulation						●	●																
Watertight cladding																							●
Technical Installations																							
Thermal (Pipes) < 250°C																			●			●	
> 250°C																					●	●	
Thermal (Tanks) < 250°C				●	●														●				
> 250°C															●						●		
Thermal (Air ducts)																			●				
Fire (A-60 pipelines)																●				●			
Fire (Air ducts)												●				●							
Sound Insulation (Pipes)																					●	●	
Watertight cladding																							●

Product Overview

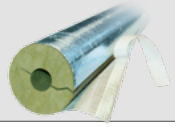
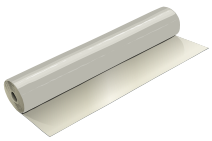
	Product	Thickness mm	Length mm	Width mm	Application
Comfort Insulation					
	SeaRox SL 720 SeaRox SL 720 ALU	50, 100 50	1000	600	Lightweight and semi-rigid slab for comfort insulation. Can be supplied with reinforced alu on 1 side.
	SeaRox MA 720 ALU	50, 100	4000	1000	Lightweight and highly compressed roll used for comfort insulation. Supplied with reinforced alu on 1 side.
	SeaRox SL 740 SeaRox SL 740 ALU SeaRox SL 740 GW 200	25-100 25-100 30, 50	1000	600	Lightweight and semi-rigid slab for comfort insulation. Can be supplied with reinforced alu or white glass cloth on 1 side. Approved for A-30 constructions.
	SeaRox MA 740 ALU	50	3000	1000	Semi-rigid compressed roll used for comfort insulation. Supplied with reinforced alu on 1 side.
Sound Insulation					
	SeaRox SL 320	50, 75	1000	600	Semi-rigid slab for e.g. sound insulation.
	SeaRox SL 340 SeaRox SL 340 ALU SeaRox SL 340 TB	30-100 50 25,50	1000	600	Semi-rigid slab for e.g. sound insulation, can be supplied with reinforced alu or black tissue on 1 side.
	SeaRox Acoustic Foil			1000	Thin, strong and durable film for e.g. engine rooms
Outfitting					
	SeaRox SL 436	30, 40, 50, 60	1000	600	Rigid slab for insulation of floating floors only. Approved for A-60 floating floor.
	SeaRox SL 440	50, 100	1000	600	Strong and rigid slabs for e.g. floating floor or to be cut into lamellas and used for panels.
	SeaRox SL 470	25	1000	600	Strong and rigid slabs for e.g. B15 Extension or panels.
	SeaRox SL 480	30, 50	1000	600	Strong and rigid slabs for e.g. floating decks or to be cut into lamellas and used for panels. Approved for A-60 Floating floor.
Fire Insulation					
	SeaRox FB 6020 SeaRox FB 6040 SeaRox FB 6050	70 70 30	1000	600	New generation SeaRox Fire Boards. Lightest stone wool solutions for approved A-constructions. Can be supplied with reinforced alu on 1 side.
	SeaRox FB 6020 ALU SeaRox FB 6040 ALU SeaRox FB 6050 ALU	70 70 30	1000	600	New generation SeaRox Fire Boards. Lightest stone wool solutions for approved A-constructions. Can be supplied with reinforced alu on 1 side.
	SeaRox SL 620 SeaRox SL 620 ALU SeaRox SL 620 GW 200	25-75 25-75 25-75	1000	600	Rigid slab for fire insulation in approved A-constructions. Can be supplied with reinforced alu or white glass cloth on 1 side.
	SeaRox SL 640 SeaRox SL 640 ALU SeaRox SL 640 GW 200	30, 40, 50 30, 40, 50 30, 40, 50	1000	600	Rigid slab for fire insulation in approved A-constructions. Can be supplied with reinforced alu or white glass cloth on 1 side.

Local variations in products and dimensions might occur.

Comfort Insulation
Products mainly for thermal insulation of accommodations.

Sound Insulation
Products mainly for sound absorption

Outfitting
Products mainly as components of systems

		Product	Thickness mm	Length mm	Width mm	Application
Fire Insulation		SeaRox SL 660 SeaRox SL 660 ALU	30, 50	1000	600	Special product used for insulation of H-constructions. Can be supplied with reinforced alu on 1 side.
		SeaRox WM 660 SeaRox WM 660 ALU	40	4000	500	Flexible mat, one side faced with wire netting. Special product used for insulation of H-constructions. Can be supplied with reinforced alu on 1 side.
		SeaRox WM 620 SeaRox WM 620 ALU	30, 45, 50 45	2-7000	1000	Flexible Mat, one side faced with wire netting. Used for approved A-constructions and penetrations. Can be delivered with reinforced alu on 1 side
		SeaRox WM 640 SeaRox WM 640 ALU	30, 50, 75	2-7000	1000	Flexible Mat, one side faced with wire netting. Used for approved A-constructions and penetrations. Can be delivered with reinforced alu on 1 side
		SeaRox PS 620	40	1000	22-60	Pipe Section specially developed for fire protection of sprinkler pipes
Technical - Thermal Insulation		SeaRox SL 970	50	1000	600	Rigid slab for high temperatures insulation
		SeaRox WM 950/ ProRox WM 950 SeaRox WM 950 ALU ProRox WM 950 ALU	50, 80 50, 80	2-4000	1000	Flexible Mat, one side faced with wire netting. Used for technical installations mainly pipes. Can be delivered with reinforced alu on 1 side
		SeaRox LM 900 ALU	30	8-10000	1000	Lamellas placed edgewise on alu (roll). For insulation of pipes, tanks and ventilation ducts.
		ProRox PS 960 ProRox PS 960 ALU	20-100	1000	17-356	Rigid Pipe Sections for steam and process pipes. Can be delivered with reinforced alu and self adhesive tape.
Watertight cladding		ProRox GRP 1000			1000	A watertight insulation system. Strong and easy to clean, with great durability and chemical resistance. Easy to apply on site.

Local variations in products and dimensions might occur.

Fire Insulation
Products mainly for fire rated constructions

Technical - Thermal Insulation
Products mainly for thermal insulation of technical installations.

Watertight Cladding

ROCKWOOL Technical Insulation

ROCKWOOL Technical Insulation, an independent organisation of the international ROCKWOOL Group, is the world wide market leader in technical insulation. With our two product lines, ProRox and SeaRox, we cover the whole industrial market and marine & offshore industry, providing a full range of products and systems for the thermal and firesafe insulation of technical applications. Besides sustainable products we offer reliable expert advice, from documentation to delivery and after sales service. Throughout the whole chain from specifier, through dealer to contractor and installer we aim to add value. We don't just sell products, we supply solutions. It's this total approach that makes us the ideal choice for professionalism, innovation and trust.

All explanations correspond to our current range of knowledge and are therefore up-to-date. The examples of use outlined in this document serve only to provide a better description and do not take special circumstances of specific cases into account. ROCKWOOL Technical Insulation places great value upon continuous development of products, to the extent that we too continuously work to improve our products without prior notice. We therefore recommend that you use the most recent edition of our publications, as our wealth of experience and knowledge is always growing. Should you require related information for your specific application or have any technical queries, please contact our sales department or visit our website **www.rockwool-rti.com**

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The ROCKWOOL Group

The ROCKWOOL Group is the world's leading supplier of innovative products and systems based on stone wool. We create sustainable solutions to protect life, assets, and the environment today and tomorrow.

Stone wool is a versatile material based on one of nature's most abundant resources. It forms the basis of the following ROCKWOOL Group businesses: building insulation; industrial & technical insulation for process industry, marine and offshore; acoustic ceiling systems; exterior cladding; horticultural substrate solutions; engineered fibers; noise and vibration control.

The ROCKWOOL Group was founded in 1909 and insulation production started in 1937. The Group's head office is located close to Copenhagen. In 2014, the Group generated net sales of EUR 2,180.4 million. The company is listed on the NASDAQ Copenhagen stock exchange.

The Group's operations have a large presence in Europe and we also have facilities in Russia, North America, India and East Asia. Our more than 11,000 employees in more than 35 countries cater for customers in a large part of the world.

For more information, please visit **www.rockwool.com**.

ROCKWOOL Technical Insulation

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