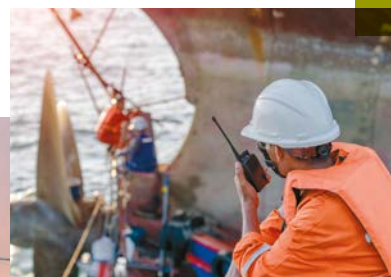
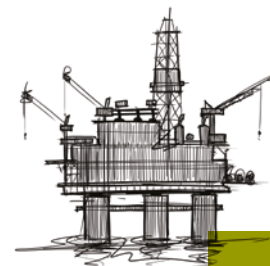


# Technical Guidelines

A complete overview of insulation solutions  
for the shipbuilding and offshore market

**SeaRox**

Marine & Offshore  
Insulation

# Technical insulation

shaped by experts



## We share our knowledge to your advantage

ROCKWOOL Technical Insulation – part of the ROCKWOOL International Group – offers innovative technical insulation solutions for the process & power generation 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 onboard and offshore technical installations. Through our two product lines, our experts offer a full spread of products and systems guaranteeing the highest possible thermal, acoustic and fire-safe insulation for all kinds of technical installations.

We have more than 80 years' experience, reflected in a complete set of high-grade products and expert advice. We remain fully committed to providing the very best service on the market and a complete range of cutting-edge insulation solutions.

For many years we have been one of the biggest suppliers in shipbuilding 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. This is essential in the marine and offshore industry. It makes it easier for you to ensure you have the right material in your own country and for your international projects across the border.

# Introduction

For marine and offshore we market a wide range of tested and approved products and constructions that meet your needs. We offer competitive solutions for firesafe, sound and thermal insulation on-board.

A dedicated team of specialists works daily to optimize our range of products and constructions. Development and sales occur in close cooperation with the local ROCKWOOL companies and a worldwide network of agents and dealers.

One of our main tasks is to assist and guide our customers with the right information and advice about our products, constructions and the practical insulation work.

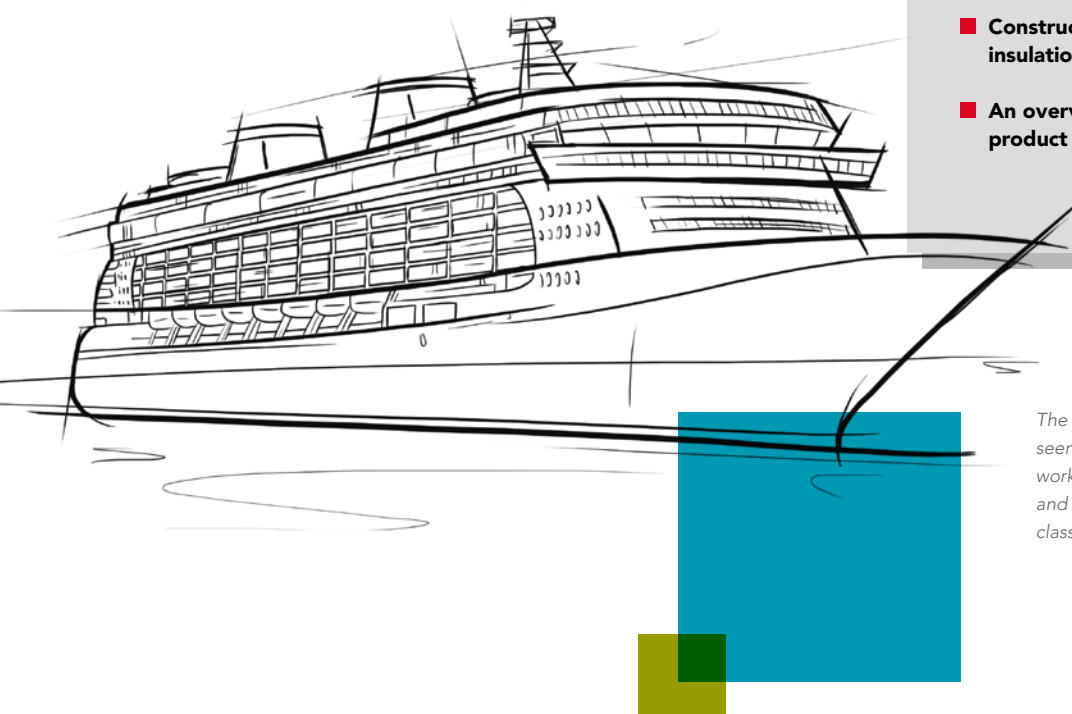
This manual combines all relevant information on marine and offshore insulation and is designed to update you on our knowledge in the field.

We hope that you will find the Technical Guidelines useful in your daily work and inspirational to your future work within marine and offshore insulation.



## These Technical Guidelines include:

- General information about standards and test methods within marine and offshore.
- Practical information and advice about insulation and installation procedures.
- Detailed information about our range of products and constructions for bulkhead and deck fire divisions including junctions.
- General information about sound insulation and measurements of our products.
- Construction details for thermal and technical insulation.
- An overview of applications and our product range.



*The recommendations in this manual should be seen as guidelines only. It is important that insulation work is always done in accordance with IMO rules and regulations imposed by national authorities and classification societies.*

# Contents of the Technical Guidelines

Quickly find your way around the Technical Guidelines:

<b>The 7 strengths of stone</b>	<b>6</b>
<b>"SeaRox" - what's in a name?</b>	<b>8</b>
<b>Marine &amp; offshore insulation - an overview</b>	<b>10</b>
<b>Insulation in general</b>	<b>12</b>
Preparation	12
Cutting	12
Installation	13
Pins	16
Securing the product	16
Washers	16
Vapour barrier	17
Storage and stacking	17
<b>Calculation of materials</b>	<b>18</b>
<b>Choosing the right product</b>	<b>19</b>
<b>Regulations for fire insulation according to SOLAS</b>	<b>20</b>
<b>Fire classifications for divisions</b>	<b>21</b>
<b>Optimized standard solutions</b>	<b>23</b>
<b>Lightweight fire-safe solutions</b>	<b>24</b>
<b>Symbol guide</b>	<b>26</b>

## A-constructions Steel Bulkhead

# 27

### LIGHTWEIGHT

A-15	SeaRox FB 6040	28
A-30	SeaRox FB 6020/SeaRox FB 6050	29
A-30	SeaRox FB 6020/SeaRox FM 6030 ALU	30
A-60	SeaRox FB 6040/SeaRox FB 6050	31
A-60	SeaRox FB 6040/SeaRox FM 6040 ALU	32
A-60 restr.	SeaRox FB 6020/SeaRox FB 6050	33
A-60 restr.	SeaRox FB 6020/SeaRox FM 6040 ALU	34

### STANDARD

A-15	SeaRox SL 620	35
A-30	SeaRox SL 620	36
A-60	SeaRox SL 620	37
A-60 restricted	SeaRox SL 620	38
A-60 corrugated - Type 1	SeaRox SL 620	39
A-60 corrugated - Type 2	SeaRox SL 620	40

### NON-STANDARD

A-60	SeaRox WM 620	41
A-60	SeaRox WM 640	42
A-60	SeaRox SL 640	43
A-60 restricted	SeaRox SL 640	44

## A-constructions Steel Deck

# 45

### LIGHTWEIGHT

A-15	SeaRox FB 6020	46
A-15	SeaRox FB 6040	47
A-30	SeaRox FB 6050	48
A-30	SeaRox FM 6030 ALU	49
A-60	SeaRox FB 6050/SeaRox FM 6030 ALU	50
A-60	SeaRox FB 6020/SeaRox FB 6050	51
A-60	SeaRox FM 6040 ALU	52
A-60	SeaRox FB 6020/SeaRox FM 6040 ALU	53

### STANDARD

A-15	SeaRox SL 620	54
A-30	SeaRox SL 620	55
A-60	SeaRox SL 620	56

### NON-STANDARD

A-60	SeaRox WM 620	57
A-60	SeaRox SL 640	58



## Floating floor

# 59

A-60	SeaRox SL 436/SeaRox SL 440/SeaRox SL 480	61
------	---	----

## A-constructions Aluminium Bulkhead & Deck

# 63

### LIGHTWEIGHT 6 mm

A-60 Bulkhead	SeaRox FM 6040 ALU	64
A-60 Bulkhead restricted	SeaRox FM 6040 ALU	65
A-60 Deck	SeaRox FM 6040 ALU	66

### LIGHTWEIGHT 4 mm

A-60 Bulkhead	SeaRox FM 6050 ALU	67
A-60 Bulkhead	SeaRox FM 6050 ALU	68
A-60 Deck	SeaRox FM 6050 ALU	69

### STANDARD 6 mm

A-60 Bulkhead	SeaRox SL 620	70
A-60 Deck	SeaRox SL 620	71

## H-constructions Steel Bulkhead

# 73

H-60	SeaRox SL 660 + SeaRox WM 660	74
H-120	SeaRox SL 660 + SeaRox WM 660	75
H-60 corrugated	SeaRox SL 660 + SeaRox WM 660	76
H-120 corrugated	SeaRox SL 660 + SeaRox WM 660	77

## H-constructions Steel Deck

# 79

H-60	SeaRox SL 660	80
H-120	SeaRox SL 620	81

## Construction details

# 81

Stiffeners	82
Bulkhead and deck connections	84
Installation of surface steel plate	86

## Additional fire protection

# 87

Draught stops	88
Ventilation ducts and other steel pipes insulated	89
Penetrations for A-class fire divisions	90

## Outfitting insulation

# 91

Floating floor	92
Marine panels, ceilings and fire doors	94

## Technical insulation

# 95

Technical insulation in general	96
ProRox® PS 960/970 mandrel wound pipe sections	97
Insulation with ProRox pipe section	98
Insulation with SeaRox lamella mat	99
Insulation with SeaRox and ProRox wired mat	100
Insulation with SeaRox slabs	101
Cladding	101

## Sound insulation

# 103

Rules and regulations	104
Sound absorption	106
Sound reduction	106
Impact sound reduction	108

## Thermal and comfort insulation

# 109

SeaRox MA 7000 ALU, the lightweight solution for thermal insulation	110
Thermal insulation in combination with fire and sound protection	111
Floor connection	111
Thermal calculations	112

## Product guide

# 113

Product selector	114
Products	115
Surfaces	122

## Health and safety

# 124



# strengths of stone

There is something truly remarkable  
about the natural power of stone



## Fire-resilience

Withstands temperatures above 1000°C.



## Thermal properties

Saves energy by maintaining optimum indoor temperature and climate.



## Acoustics capabilities

Blocks, absorbs or enhances sound.



## Robustness

Longer-lasting performance and robustness with easier installation.



## Aesthetics

Matches performance with aesthetics: see our sister brands Rockfon & Rockpanel.



## Water properties

When engineered to repel water, stone wool can defend valuable industrial equipment from CUI.



## Circularity

Reusable and recyclable material.

## SeaRox insulation

Each of our SeaRox products combines most of the 7 strengths of stone with one ambitious goal in mind: to minimise the human impact on our surroundings, whilst maximising the safety and wellbeing of all the people interacting with our products.

ROCKWOOL stone wool is made from materials that nature itself produces in abundant quantities, one of the earth's inexhaustible resources - volcanic rock. In addition, stone wool withstands temperatures above 1000°C, making it highly fire resilient. This means our SeaRox product line provides the highest level of fire safety to protect people on ships and offshore platforms. Our fire safe solutions are tested according to the latest international fire test procedures, IMO 2010 FTP Code. At the same time we are able to offer both solutions in a low weight construction to reduce energy consumption and cut construction thicknesses to maximize space.

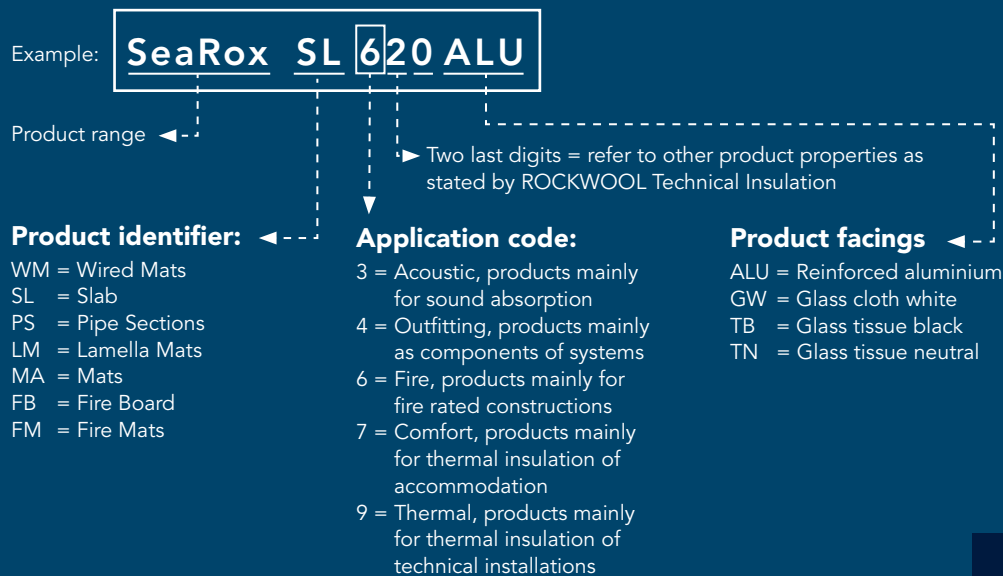
Our SeaRox products protect against noise and secure a pleasant thermal environment on board, as well as the outstanding water repellency guarantee to maintain the optimal insulation performance of the product.



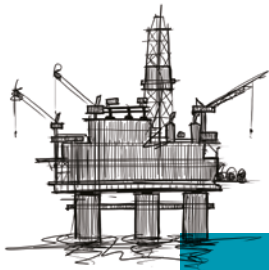
## "SeaRox" - what's in a name?

Our customers operate all over the globe. We therefore offer them a uniform, transparent product range that matches and meets their requirements throughout the world – from the UK to China, from India to Brazil. It's only logical that we came up with a clear and consistent nomenclature for our SeaRox products. Our universal product coding makes it even easier to find the exact product you need, wherever you are working.

Each product name is structured in the same clear way:







## SeaRox

### Marine & Offshore insulation

Under the SeaRox name we market a full range of fire-safe solutions for the shipbuilding industry that also offer optimal acoustic and thermal insulation as well as solutions for insulation of on-board technical installations.

The key property of all these products is outstanding thermal insulation, which helps keep energy consumption under control. Naturally, they also meet the most stringent demands with respect to acoustic insulation and fire resistance. We have fine-tuned our marine and offshore range, too, bearing in mind the increasing necessity for an efficient, clear product offering.

### Overview of products

#### Comfort insulation

- SeaRox MA 7000 ALU	115
- SeaRox SL 720	115
- SeaRox MA 720 ALU	115
- SeaRox SL 740	115
- SeaRox MA 740 ALU	116

#### Acoustic insulation

- SeaRox SL 320	116
- SeaRox SL 340	116
- SeaRox SL 340 TB	116

#### Outfitting insulation

- SeaRox SL 436	117
- SeaRox SL 440	117
- SeaRox SL 480	117

#### Fire-safe insulation

- SeaRox FB 6020	118
- SeaRox FM 6030 ALU	118
- SeaRox FB 6040	118
- SeaRox FM 6040 ALU	118
- SeaRox FB 6050	119
- SeaRox FB 6050 ALU	119
- SeaRox FM 6050 ALU	119
- SeaRox SL 620	119
- SeaRox SL 640	119
- SeaRox SL 660	120
- SeaRox WM 620	120
- SeaRox WM 640	120
- SeaRox WM 660	120

#### Thermal insulation

- ProRox WM 950	121
- SeaRox LM 900 ALU	121
- ProRox PS 960	121
- ProRox PS 960 ALU	121



# Marine & offshore insulation

## - an overview

### Stairways



The stairways are part of the emergency escape routes on a vessel. The number of vertical fire zones the stairway passes determines the fire insulation class.

**A-constructions, page 27-58**

### Disco



The discothèque, cinema and bar areas on board cruise ships are big sources of noise. Such areas need to be properly sound insulated.

**A-constructions, page 27-58**  
**Floating floor, page 59-61**  
**Sound insulation, page 103-108**

### Galley



In the galley you always have a risk of fire, as you can have a mixture of heat and flammable materials. In this case it is also necessary to be aware of the facings, as there may be oil vapour in the air.

**A-constructions, page 27-58**  
**Floating floor, page 59-61**  
**Sound insulation, page 103-108**

### Storage and tank rooms



In the boiler room, storage rooms and tank rooms it is often important to insulate hot surfaces, boilers and pipes.

**Technical insulation, page 95-101**

### Bridge



On the bridge it is important to secure a high level of fire protection and sound insulation.

**A-constructions, page 27-58**  
**Floating floor, page 59-61**  
**Sound insulation, page 103-108**

### Engine room



The engine room contains a lot of fire risks so fire protection is essential. The engine room is also a source of a lot of often disturbing noise. It is also an area containing pipes, tanks, containers and other equipment where technical insulation is required.

**A-constructions, page 27-58**  
**Technical insulation, page 95-101**  
**Sound insulation, page 103-108**



## Corridors



Corridors are part of the emergency escape routes on a vessel. The number of horizontal fire zones the corridor passes determines the fire insulation class.

**A-constructions, page 27-58**

**Outfitting, page 91-94**

**Sound insulation, page 103-108**

## Offshore



Conditions on offshore applications are more or less the same as on a ship. Furthermore you have the risk of hydrocarbon fire and you need to protect people and material from this type of fire exposure.

**H-constructions, page 73-80**

## Control room



In the case of fire, the control room must be able to stay in operation for as long as possible, as this is the last place where all the technical equipment can be controlled. The sound level also needs to be low, as the crew will spend a lot of time here. Fire protection and acoustic insulation of the control room is therefore very important.

**A-constructions, page 27-58**

**Sound insulation, page 103-108**

**Surfaces, page 122**

## Cabins



On board a ship it is essential to have the right insulation between the cabins. It is crucial to ensure the required fire protection and it is more and more important to have a high level of sound and thermal (comfort) insulation.

**A-constructions, page 27-58**

**Technical insulation, page 95-101**

**Outfitting, page 91-94**

**Sound insulation, page 103-108**

## Public area



The public area requires various kinds of insulation, depending on the situation.

**A-constructions, page 27-58**

**Outfitting, page 91-94**

**Sound insulation, page 103-108**

**Surfaces, page 122**

# Insulation in general

Insulation material can be installed in different ways. It is up to the insulation contractor to choose the best method for each application. For fire rated constructions, the installation must follow the official drawings according to the fire test. Drawings can be found on our website, [rti.rockwool.com](http://rti.rockwool.com)

A general description of the way the insulation work can be done is given below:

## Preparation



### **Welding of pins to the plate (bulkhead/deck)**

First the pins must be welded to the plate and stiffener. The distance between pins should not exceed 300 mm. For fire rated constructions, the position of pins must correspond to the official drawings.



### **Painting of the plate**

To avoid corrosion the plate can then be coated with anti-corrosion paint.

## Cutting



### **Using an electrical saw to cut large quantities of SeaRox products**

An electric saw is recommended when cutting large quantities of SeaRox insulation. This will ensure a good angular surface that is easy to tighten against adjacent slabs. 2-5 mm oversize is recommended. The pieces of insulation should be at least 150 x 150 mm.



### **Use a knife to cut SeaRox insulation**

SeaRox insulation can easily be cut with a sharp knife. When the slabs are cut 2-5 mm oversize (depending on density) the optimal tension and tightness can be obtained when fitting the wool. The pieces of insulation should be at least 150 x 150 mm.



### **Using scissors to cut wired mats**

Wired mats should be cut with large shears. 2-5 mm oversize is recommended. The pieces of insulation should be at least 150 x 150 mm.



### L-shaped stiffener - alternative 1



#### **Insulation of stiffeners**

Depending on the construction, starting with the insulation of the stiffeners is recommended. First by filling out the space, behind the stiffener, with SeaRox insulation. The insulation should fit the profile structure exactly. Then insulate around the stiffener with the required thickness of SeaRox insulation.



#### **Insulation between stiffeners**

Insulate the plate between stiffeners with SeaRox insulation. Joints must be tight and there must be no air gaps. For solutions with more than one layer of insulation, the joints should be staggered by at least 150 mm to ensure that joints are not aligned across both layers.

### L-shaped stiffener - alternative 2



#### **Insulation between stiffeners**

Depending on the construction, it may be easier to start with insulation of the plate. Joints must be tight and there must be no air gaps. For solutions with more than one layer of insulation, the joints should be staggered by at least 150 mm to ensure that joints are not aligned across both layers.



#### **Insulation of stiffeners**

Insulate with SeaRox insulation around the stiffener. Fill out the space behind the stiffener with SeaRox insulation, the insulation should fit the profile structure exactly.

### Bulb profile stiffener



#### Insulation of stiffeners

In most cases, a bulb profile stiffener is used. Typically, you start with insulation around the stiffener. No separate insulation behind the stiffener is needed but depending of the depth of the stiffener, a pin needs to be welded on the side of the stiffener to keep the insulation in place.



#### Insulation between stiffeners

Insulate the plate between stiffeners with SeaRox insulation. Be sure to make a safe and tight connection to the insulation around stiffeners to ensure no open joints.

### Fixing the insulation



### Hybrid solutions (fire board and fire mat)

For our lightweight range of A-rated steel constructions based of the SeaRox FB 6000 and FM 6000 ranges, we offer alternative solutions for installation focusing on improved workability and faster installation. Alternative working procedures may be used, depending on available space and the construction.

#### Hybrid solutions - alternative 1



##### **Insulation between stiffeners**

Insulate the plate between stiffeners with SeaRox insulation. Joints must be tight with no air gap.



##### **Insulation of stiffeners**

Cut the insulation mat to the right size and insulate with a strip on the stiffeners. Stiffeners insulation at least 150 mm on either side.

#### Hybrid solutions - alternative 2



##### **Insulation of stiffeners**

Cut the insulation mat to the right size and insulate around the stiffener.

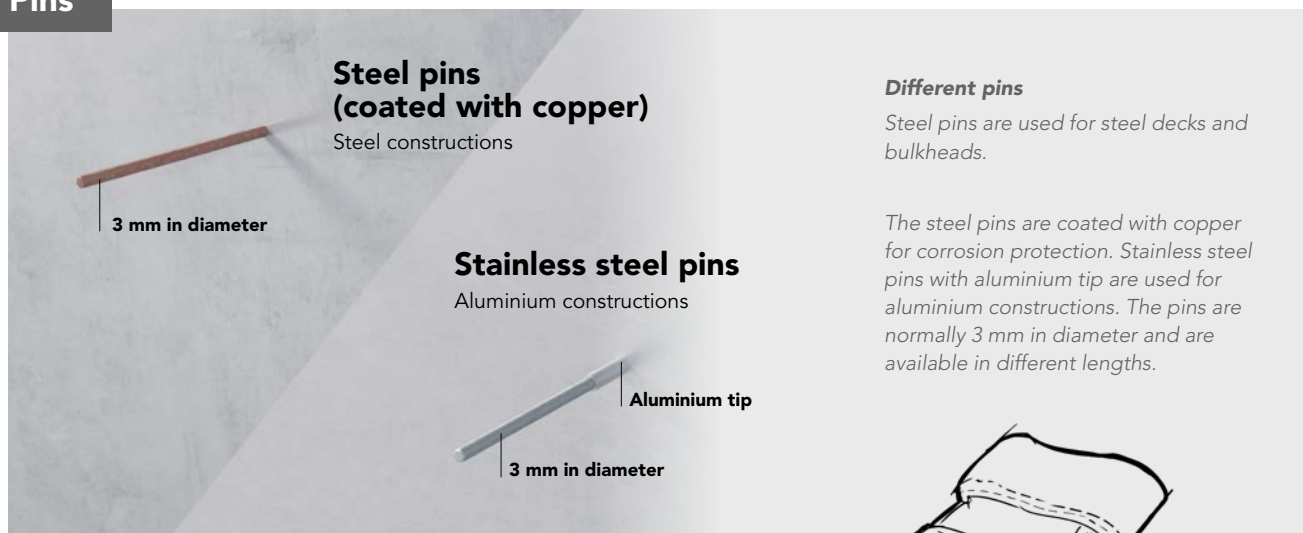


##### **Insulation between stiffeners**

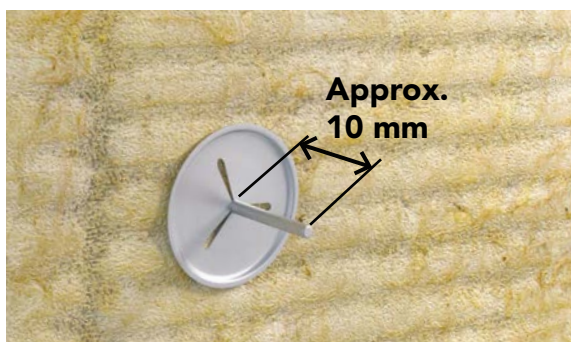
Insulate the distance between stiffeners - already insulated - with SeaRox insulation. Joints must be tight with no air gap.



## Pins

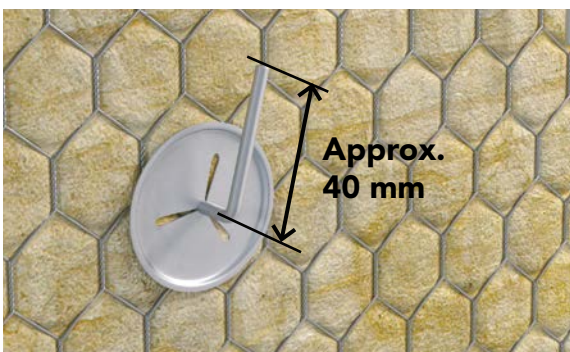


## Securing the product



### Securing the product

When installing the insulation, all pieces must fit firmly with at least one pin approx. 10 mm longer than the nominal thickness of the insulation. On A-constructions the material has to be fastened with spring washers without compressing the insulation.



### Blast overpressure

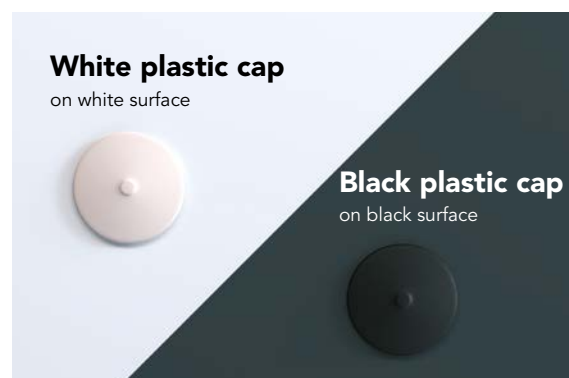
For reinforcement of A- and H-class constructions to resist a blast overpressure, the insulation can be reinforced with steel mesh (galvanised or stainless). The mesh can be applied separately or factory applied on the insulation (wired mats). Optimum blast resistance is achieved by the use of pins approx. 40 mm longer than the nominal thickness of the insulation, washers should have a diameter of 38 mm, and the pins should be bent in different directions. The joints of the mesh should be fixed by twisting or stitched together with a steel wire (same quality as the mesh).

## Washers



### 1. Washers

The spring washers used to slide over the pins for securing the insulation should be 38 mm in diameter and made of corrosion-protected material.



### 2. Covering the steel washers

The washer can be fit with a plastic cap to cover the steel tip and to create an attractive surface.



## Vapour barrier

In rooms where vapour will enter the insulation due to temperature or pressure differences, a vapour barrier is often demanded. When water vapour moves from the hot room towards colder surfaces, it may condense in the wool or on the steel surface. The water increases the weight of insulation and may cause corrosion. Any oil vapour will accumulate in the wool and could compromise the fire properties of the wool.

**There are several options for closing the surface of SeaRox products, one of which is reinforced aluminium foil:**

- All joints must be sealed with a tape width of 75-100 mm to ensure an airtight surface.
- Make sure that there is no grease, oil or dirt on the surface before the tape is applied. This will cause the tape to come loose.
- Make sure all holes in the surface are closed.
- The surface material must have a low flame spread approval if it is used for marine applications.



### Using aluminium tape to seal the joint between two slabs

All joints must be sealed with a tape width of 75-100 mm to ensure an airtight surface. Make sure that there is no grease on the surface before the tape is applied. Pins and washers should be taped.

## Storage and stacking

**In order to secure the right conditions for storage of ROCKWOOL marine and offshore products a specific set of conditions has been prepared. For example, products:**

- Must at all times be stored indoors in a dry place in closed warehouse facilities.
- Must not be stacked in more than two layers when delivered on pallets.
- Must only be stored on the fat side when delivered in packages and must not be stacked at heights of more than 3 m.
- Must be protected from mechanical exposure; do not sit or step on the material.
- Must be transported in closed compartments, such as trailers, containers and other cargo holds, in order to avoid exposure to weather, condensation or other natural phenomena.



### Storage of ROCKWOOL SeaRox insulation

The products must at all times be stored indoors in a dry place in closed warehouse facilities.



### Stacking of ROCKWOOL SeaRox products

The products must not be stacked at heights of more than 3 m.



### Do not sit on the ROCKWOOL SeaRox material

The products must at all times during storage remain untouched and must not be affected by any kind of treading, sitting or any other similar kind of exposure.

# Calculation of materials

Here we give rough guidance to estimate how much material you will need.  
Check your drawings for more detailed calculations.

## Insulation

1

Based on a plate of  $X \text{ m}^2$ :  
The number of slabs for stiffeners can roughly be estimated at  $X$  times 0.7.

**Example:**

*100 m<sup>2</sup> of plate needs to be insulated.  
Calculation of material for stiffener:*

$$100 \text{ m}^2 \times 0.7 = 70 \text{ m}^2$$

2

Based on a total amount of insulation for plate + stiffeners:

- The plate equals 60%
- The stiffeners equal 40%

## Pins and washers

1

The number of pins and washers can roughly be estimated as follows:  
Plate in  $\text{m}^2$  times min. 12.  
Stiffener in  $\text{m}^2$  times min. 10.

**Example:**

*100 m<sup>2</sup> insulation of plate requires  
 $100 \text{ m}^2 \times 12 \text{ pins/m}^2 = 1200 \text{ pins}$   
100 m<sup>2</sup> insulation of stiffeners requires  
 $100 \text{ m}^2 \times 10 \text{ pins/m}^2 = 1000 \text{ pins}$*

2

Alternatively, the number of pins and washers can roughly be estimated as follows: the total area of plate in  $\text{m}^2$  times min. 18.

**Example:**

*A total quantity of 100 m<sup>2</sup> plate needs to be insulated; also taking the insulation of stiffeners into consideration. Estimated need of pins and washers:*

$$100 \text{ m}^2 \times 18 \text{ pins/m}^2 = 1800 \text{ pins}$$

## Tape

1

The amount of tape for joints can roughly be estimated by multiplying the insulated area in  $\text{m}^2$  by 4 stated in running metres.

**Example:**

*Tape for 100 m<sup>2</sup> of insulation;  
 $100 \text{ m}^2 \times 4 \text{ m/m}^2 = 400 \text{ metres}$*

## Waste

1

As guidance, the following amount of waste has to be included:

- Insulation area < 100 m<sup>2</sup> 10% waste
- Insulation area > 100 m<sup>2</sup> 5% waste

**In general, the customer is always responsible for calculations**



## Choosing the right product

**To find the correct product it is necessary to know the application:**

- Fire insulation
- Sound insulation
- Thermal insulation
- Insulation of technical installations
- Floating floor insulation
- Panels
- Insulation of sub-sea pipelines
- Combinations, such as fire and sound insulation

**When the application is known, the requirements for product characteristics need to be evaluated:**

- Fire properties
- Sound properties
- Thickness
- Thermal conductivity
- Mechanical strength
- Water repellency

All ROCKWOOL SeaRox products have good fire properties, but when using the products on ships or offshore rigs it is necessary to choose the right product with the required fire rating.

To secure the highest safety level on-board also remember to check whether the product and construction are tested according to the latest standard fire test procedure, IMO 2010 FTP Code.

In some applications the weight could be of importance. In such cases the lighter products can be chosen, but it is not always the lightest solution that gives the best result. All our main products and constructions have been tested for acoustic properties and it is recommended to check the actual values to find the optimal solution for the specific situation.

For marine and offshore applications, choosing the product with the best water repellency properties is also recommended. All ROCKWOOL SeaRox products have the lowest water absorption, which ensures the best product performance.

Evaluating the various solutions with regard to the working and installation method is also recommended.

**Depending on the experience, the labour cost and the prioritisation it might be relevant to include parameters, such as:**

- Ease of handling
- Amount of cutting
- Speed of installation
- Labour intensity

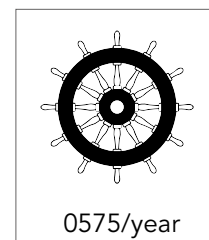
ROCKWOOL Technical Insulation has a large number of certificates for the different products and applications from classification companies based on fire tests made at IMO-approved fire institutes.

When choosing a product, it is necessary to choose a product that is accepted by the classification company that ultimately has to approve the application/newbuild. Some customers prefer to work with constructions based on slabs, securing easy handling of small size and fixed products, others prefer to work with constructions based on mats. For some customers, it is important to have the best and safest solutions, typically based on a two-layer solution while other customers may focus on the easy and fast installation of a one-layer system.

**Finally, it is important to focus on the right documentation such as:**

- Type approvals
- Type certificates

ROCKWOOL SeaRox products will always carry the wheel mark, confirming that the materials are MED type approved for installation on vessels registered in an EEA country or the USA (with mutual recognition with USCG).



It is important to make sure that the products and constructions have the right approval needed in the specific project, such as construction approval, non-combustible approval and low flame spread approval. Remember to check whether the certificate is valid when the insulation plan is approved by the classification societies and, for A-class constructions, that the certificate is valid at the time of installation.

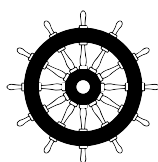
# Regulations for fire insulation according to SOLAS

The requirements for materials and constructions to meet specified standards of safety are normally prescribed by international or national laws related to shipping and offshore installations.

In addition to these regulations, classification societies such as DNV and LR (Lloyd's Register) may have additional requirements.

## Approvals and certification

- Suppliers of materials and constructions to the marine and offshore industry must prove that their products meet at least the statutory requirements.
- The Marine Equipment Directive "MED directive 2014/90/EU" replaced the MED directive 96/98/EC as of 18 September 2016 and all previous approvals from the maritime authorities within EEA countries. All products supplied to marine vessels carrying EEA flag are subject to the MED directive.
- MED-certificates are issued by notified bodies accredited by an EEA country. Approved products bear the mark of conformity.
- Classification societies issue type approval certificates stating the permission to use specific materials and constructions together with any relevant restrictions.
- If there are special circumstances or requirements for special details, it may be required to obtain statements from other authorities.
- Via an agreement between EU and USA, MED and USCG (US Coast Guard) certificates are mutually recognized.



SOLAS, Chapter II-2, Regulation 5.3.1:

### Use of non-combustible materials

*"Insulating materials shall be non-combustible, except in cargo spaces, mail rooms, baggage rooms and refrigerated compartments of service spaces. Vapour barriers and adhesives used in conjunction with insulation, as well as the insulation of pipe fittings for cold service systems, need not be of non-combustible materials, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame-spread characteristics."*

## Approval requirements

- To satisfy the national authorities and classification societies, materials and constructions must be proven to comply with the national and international requirements. Tests have to be done at internationally recognised test laboratories.
- The tests have to be performed so that the materials or products are exposed to a fire generated under controlled conditions that simulate as closely as possible a worst case scenario.

## Test requirements

- There are several national and international requirements regarding the use of materials on ships and offshore installations. These classifications are required to prove combustibility characteristics and include ignition properties, heat release and development of toxic gases and smoke.
- To prove that materials meet the required fire technical classification, tests are carried out at recognised test institutions according to standardised test methods.

## Material test methods

Testing of material's fire resistance is done according to the latest FTP code for non-combustibility and where a facing is applied for low flame spread.

It is important to note that materials which meet the requirements for non-combustibility do not have to be tested for other fire technical properties.

All our A- and H-constructions are tested according to the FTP code. The FTP code also describes the thickness of the test specimen. The decision about the thickness of the structural part is the responsibility of the ship designer and will ultimately be approved by the responsible class society.

## Construction test methods

Tests of a construction's fire resistance (decks, bulkheads, structural steel, penetrations etc.) are carried out in a standardised test furnace, where the construction specimen is exposed to a fire according to a standardised time/temperature curve.

## IMO 2010 FTP code

New fire test procedures within the marine sector, IMO 2010 FTP Code came into effect on 1 July 2012. The test procedures have been revised in order to maintain the highest practical level of safety including the harmonisation of certified test institutes to the same level. Most of the ROCKWOOL A-class solutions have now been tested and certified to part 3 of the new IMO 2010 FTP code.

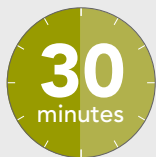




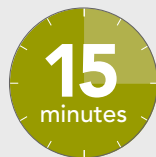
### Notified body

ROCKWOOL Technical Insulation is certified according to the MED directive. As notified body we have chosen DNV, which also guarantees our quality by running audits. Further reference is made to the ROCKWOOL MED-D certificates.

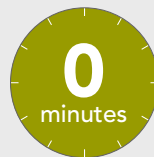
## Fire classifications for divisions



**Class B-30**



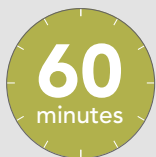
**Class B-15**



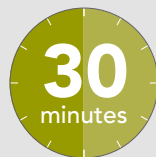
**Class B-0**

### Class B fire divisions

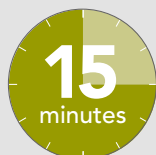
- Class B fire divisions must be of non-combustible materials and must prevent the propagation of flames for at least 30 minutes during a standard fire test.
- The divisions must be insulated so that the average temperature on the unexposed side of the division does not exceed 140°C above the initial temperature.
- Furthermore, the temperature at any single point on the unexposed side must not exceed 225°C above the initial temperature within the time limits.



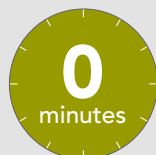
**Class A-60**



**Class A-30**



**Class A-15**



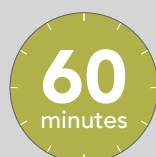
**Class A-0**

### Class A fire divisions

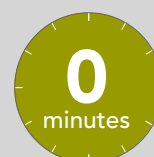
- Class A fire divisions must be of non-combustible materials and insulation materials must be fire tested at a recognised institution. They must be sufficiently braced and must prevent the propagation of flames and smoke for a minimum of one hour during a standard fire test.
- The divisions must be insulated so that the average temperature on the unexposed side of the division does not exceed 140°C above the initial temperature.
- Furthermore, the temperature at any single point on the unexposed side must not exceed 180°C above the initial temperature within the time limits.
- For aluminium constructions, in addition to the normal A-class fire requirements the temperature of the core aluminium structure is not allowed to increase by more than 200°C during a 1 hour fire testing as per the IMO 2010 FTP code, this apply for A-0, A-15, A-30 and A-60.



**Class H-120**



**Class H-60**



**Class H-0**

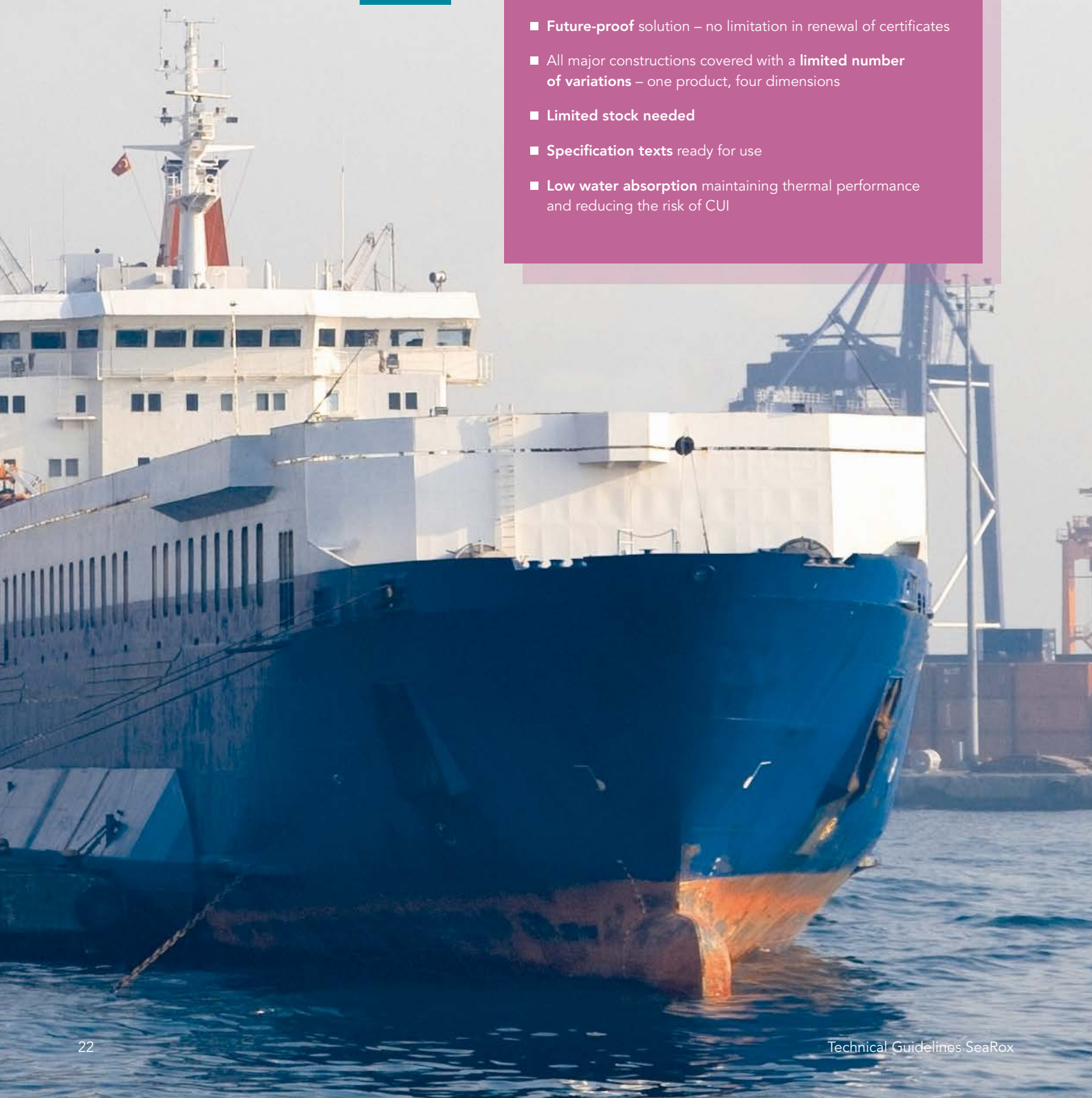
### Class H fire divisions

- Class H fire divisions must be of non-combustible materials and insulation materials must be fire tested at a recognized institution. They must be sufficiently braced and must prevent the propagation of flames and smoke for a minimum of two hours during a standard fire test for a hydrocarbon fire.
- The divisions must be insulated so that the average temperature on the unexposed side of the division does not exceed 140°C above the initial temperature.
- Furthermore, the temperature at any single point on the unexposed side must not exceed 180°C above the initial temperature within the time limits.



## Advantages NEW SeaRox SL 620 at a glance:

- Thin stone wool bulk solutions for steel bulkhead and deck fulfilling with highest level of safety
- Highest fire safety – IMO 2010 FTP Code part 3
- Improved acoustic performance – ISO 10140-2 and ISO 717-1
- Cost competitive bulk solutions
- Updated certificates from major classification bodies
- Future-proof solution – no limitation in renewal of certificates
- All major constructions covered with a **limited number of variations** – one product, four dimensions
- Limited stock needed
- Specification texts ready for use
- Low water absorption maintaining thermal performance and reducing the risk of CUI



# Optimized standard solutions

## NEW SeaRox SL 620 slab meets the need for better solutions

Having a thin slab with the best fire safety contributes to a safe environment for people in all temperature conditions onboard ships and offshore. The improved acoustic performance contributes to a comfortable environment for crew and passengers.

Thickness and simplicity can be important parameters for insulation selection, when it can be done without compromising performance. With that in mind we offer a superior set of standard solutions with thin insulation thicknesses, improved acoustic performance and the highest fire safety according to IMO 2010 FTP Code. All solutions are based on new, improved SeaRox SL 620.

The thin insulation thicknesses ensure better installation with higher operational efficiency.

This SeaRox SL 620 innovation delivers cost efficient A-class steel divisions.



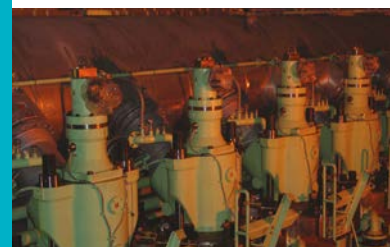
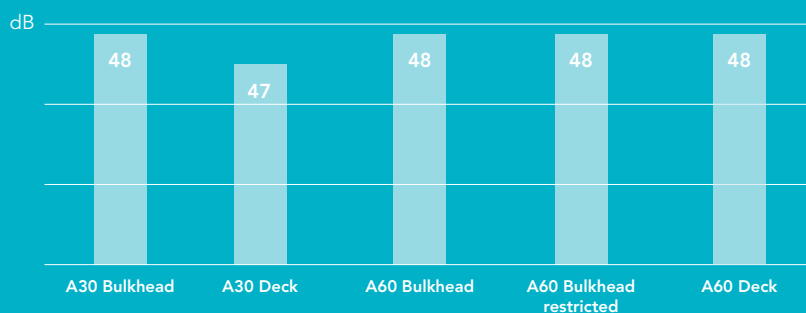
## Complete range A-class steel divisions

Most competitive bulk assortment worldwide

Construction		Product	Thickness	
			Plate	Stiffener
A15	Bulkhead	SeaRox SL 620	50	
A15	Deck	SeaRox SL 620	50	
A30	Bulkhead	SeaRox SL 620	40	25
A30	Deck	SeaRox SL 620	25	25
A60	Bulkhead	SeaRox SL 620	60	25
A60	Bulkhead restricted	SeaRox SL 620	40	25
A60	Deck	SeaRox SL 620	40	25

## High acoustic performance

Sound reduction performance on SeaRox SL 620 slab



Acoustic measurements are conducted according to ISO 10140-2 and ISO 717-1 on 6 mm steel plate.



# Lightweight fire-safe solutions

## New generation SeaRox

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



**SeaRox FB 6000 - Fire Board range**



**SeaRox FM 6000 - Fire Mat range**

The commitment to a sustainable approach has become an increasingly prominent item on the agenda of shipowners, shipbuilders, naval architects and marine engineers. This includes safety, environmental protection, efficient operation and resource conservation.

Energy-efficiency measures also address the reduction of carbon 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.

At ROCKWOOL Technical Insulation, we meet this challenge with a new range of high-performance lightweight stone wool solutions: the product ranges of SeaRox FB 6000 fire board and SeaRox FM 6000 fire mat.

These new generation SeaRox products combine the solid product performance in fire, thermal and acoustic insulation of ROCKWOOL stone wool at an exceptionally low weight. Lower weight means lower fuel consumption and thus also lower carbon emissions.

### Flexible properties

One of the characteristics of our new product range is the new look and feel compared to our traditional range of SeaRox fire protection products. They continue to be delivered in the practical dimensions of slabs and mats but due to the optimized production process and reduced density the materials are softer and more flexible.

## The SeaRox FB 6000 and FM 6000 range...

- new design possibilities...



### Greater flexibility to design the right insulation solution

The introduction of the SeaRox FM 6000 fire mats extends the range of lightweight insulation designs.



## A complete range for improved workability and faster installation

Following the success of our lightweight SeaRox FB 6000 range, we have introduced the SeaRox FM 6000 series of lightweight fire mats. This novel combination opens up new design possibilities.

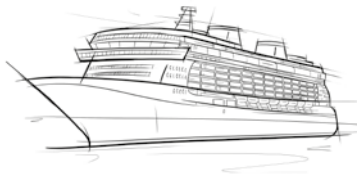
## Optimized pin design

We have developed a simple, uniform pin design for all products as part of our new optimized solutions. We have also reduced the number of pins on the steel plate by up to 20%, cutting the installation time. All our SeaRox fire mat solutions are tested and approved with no pin on stiffeners to ensure faster, safer installation.

## Solutions certified by major classification bodies

Our new ROCKWOOL Technical Insulation lightweight solutions are **MED-approved by DNV**, with additional certification by other major classification bodies. New certificates are issued for all new solutions, specifying the product and clearly describing the alternative design.

Our latest certificates are published at [rti.rockwool.com](http://rti.rockwool.com)



The new lightweight ROCKWOOL Technical Insulation solutions are tested according to the latest IMO 2010 FTP Code.

**NEW**  
lightweight constructions for aluminium structures

## The complete range of lightweight stone wool products...

The SeaRox FB 6000 range comprises exceptionally lightweight flexible stone wool fire boards. The SeaRox FM 6000 range consists of lightweight fire mats, delivered with reinforced aluminium foil on one side as standard. This range is specially designed to optimize the insulation speed of stiffeners in general and facilitate installation of deck constructions as one-layer solutions.

Today, the complete range of lightweight stone wool products for fire insulation of A-Class divisions consists of:

### SeaRox FM 6000 series:

- SeaRox FM 6030 ALU: 30 mm, 50 kg/m<sup>3</sup>
- SeaRox FM 6040 ALU: 35 and 50 mm, 60 kg/m<sup>3</sup>
- SeaRox FM 6050 ALU: 75mm, 70 kg/m<sup>3</sup>

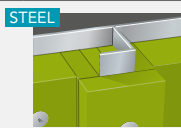
### SeaRox FB 6000 series:

- SeaRox FB 6020: 70 mm, 40 kg/m<sup>3</sup>
- SeaRox FB 6040: 35 and 70 mm, 60 kg/m<sup>3</sup>
- SeaRox FB 6050: 30 and 75 mm, 70 kg/m<sup>3</sup>

### Type 1. Standard design – SeaRox FB 6000 range

#### Advantages:

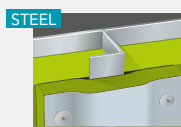
- Easy handling – standard slab dimensions
- Softer and more flexible slabs



### Type 2. Hybrid solution - SeaRox FB+FM 6000 ranges, alternative 1

#### Advantages:

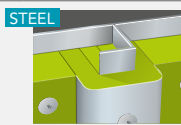
- Fast installation
- Suitable for narrow spaces
- Safer (no pin on stiffeners)
- Reduced cut-off waste



### Type 3. Hybrid solution - SeaRox FB+FM 6000 ranges, alternative 2

#### Advantages:

- Fast installation
- No open gaps
- Reduced cut-off waste



### Type 4. SeaRox FM 6000 ALU series solutions

#### Advantages:

- Fast installation
- Reduced cut-off waste
- One-layer solution possible

Note: Only for A30 and A60 Deck application



### Type 5. No insulation on stiffeners

#### Advantages:

- Fast installation (no insulation on stiffeners)
- Thin solution (no insulation on stiffeners)

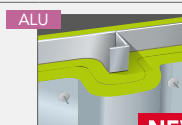
Note: Only for A15 application



### Type 6. SeaRox FM 6000 ALU range in one or two layers

#### Advantages:

- Fast installation
- Just one product in one size



**NEW**

**NEW**  
lightweight A-60 solutions for 4 mm aluminium bulkhead and deck



# Symbol guide

ROCKWOOL's seven strengths of stone and its versatile properties that lie at the heart of each ROCKWOOL product are closely connected with specific features and benefits of our SeaRox product range. By creating clear symbols for all fire rated constructions we are able to explain the advantages for each solution.



## Fire safe solution

Our product solutions are tested according to IMO 2010 FTP Code to **ensure highest fire safety.**



## Optimal sound properties

The acoustic capabilities of our products **secure excellent noise reduction and better comfort.**



## Low weight solution

Our SeaRox FB & FM 6000 lightweight range will help to **reduce energy consumption and emissions.**



## Fast installation

Our products are easy to handle and therefore fast to install **cutting labour time and reducing the total cost of installation.**



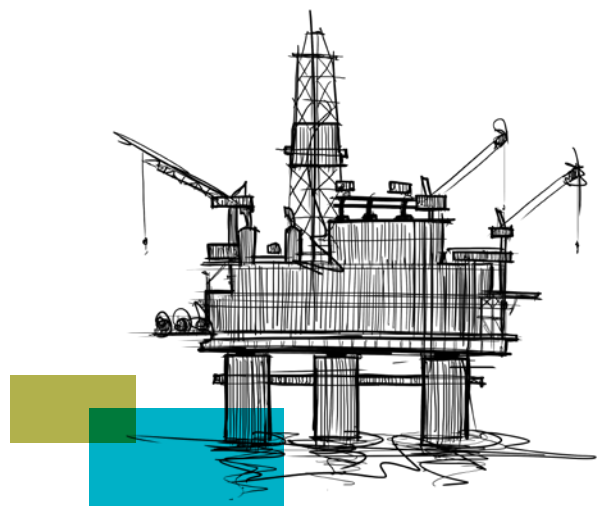
## Lowest water absorption

Our products feature excellent water repellent characteristics, to lower the risk of water penetration. All SeaRox products have very low water absorption as standard in order to **maintain optimal insulation performance.**



## Thin stone wool solution

Our assortment contains thin products enabling you to **maximize the available space.**





# Index of A-constructions Steel Bulkhead



LIGHTWEIGHT		Page
A-15	SeaRox FB 6040	28
A-30	SeaRox FB 6020/SeaRox FB 6050	29
A-30	SeaRox FB 6020/SeaRox FM 6030 ALU	30
A-60	SeaRox FB 6040/SeaRox FB 6050	31
A-60	SeaRox FB 6040/SeaRox FM 6040 ALU	32
A-60 restr.	SeaRox FB 6020/SeaRox FB 6050	33
A-60 restr.	SeaRox FB 6020/SeaRox FM 6040 ALU	34

STANDARD		Page
A-15	SeaRox SL 620	35
A-30	SeaRox SL 620	36
A-60	SeaRox SL 620	37
A-60 restricted	SeaRox SL 620	38
A-60 corrugated - Type 1	SeaRox SL 620	39
A-60 corrugated - Type 2	SeaRox SL 620	40

NON-STANDARD		Page
A-60	SeaRox WM 620	41
A-60	SeaRox WM 640	42
A-60	SeaRox SL 640	43
A-60 restricted	SeaRox SL 640	44

# A-15 Steel Bulkhead



	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6040 or SeaRox FM 6040 ALU	35 mm	60 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>
<b>Stiffener</b>	No insulation			

## Construction notes:

- Plate between stiffeners insulated with one layer of 35 mm SeaRox FB 6040 or FM 6040 ALU.
- No insulation on stiffeners.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

## Application notes:

- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

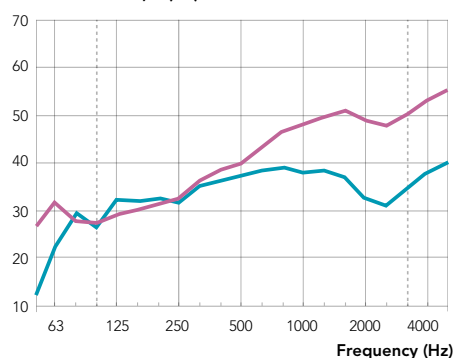
## Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

## Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	26.6
63	31.2
80	27.9
100	27.5
125	29.1
160	29.9
200	31.4
250	33.0
315	36.1
400	38.5
500	39.8
630	43.1
800	46.4
1000	47.9
1250	50.0
1600	51.1
2000	48.7
2500	47.4
3150	50.6
4000	53.4
5000	55.1

Sound Insulation, R (dB)

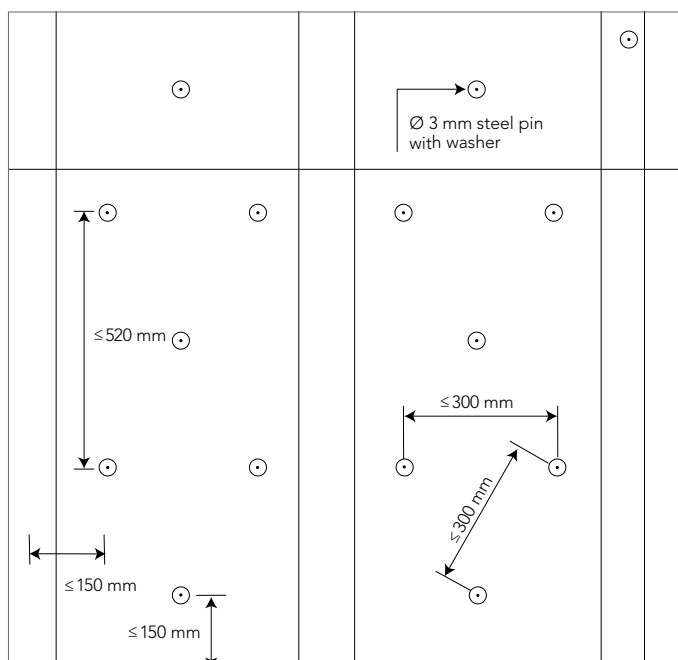
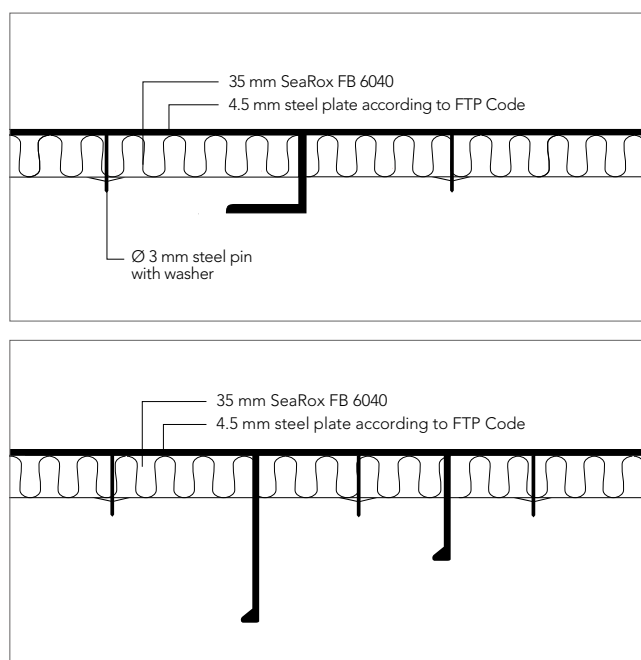


■ Test set-up: Plate: SeaRox FB 6040, 35 mm

■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 45 (-2; -6) \text{ dB}$$

## Construction details



# A-30 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6020	70 mm	40 kg/m <sup>3</sup>	2.8 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FB 6050	30 mm	70 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>

## Construction notes:

- Stiffeners insulated with min. 30 mm SeaRox FB 6050.
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6020.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Insulation can be placed on both sides of the steel plate.
- Alternative pin and stiffener design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

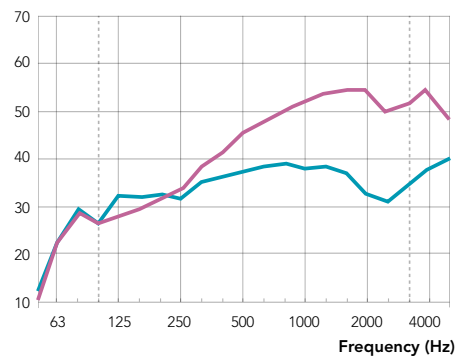
## Advantages:

- FTP Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Lowest water absorption - optimal insulation performance

## Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	10.5
63	22.1
80	28.4
100	26.4
125	27.8
160	29.2
200	31.5
250	33.8
315	38.2
400	41.2
500	45.7
630	47.7
800	50.2
1000	52.3
1250	53.8
1600	54.7
2000	54.4
2500	49.8
3150	51.5
4000	54.4
5000	48.3

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FB 6020, 70 mm  
Stiffener: SeaRox FB 6050, 30 mm

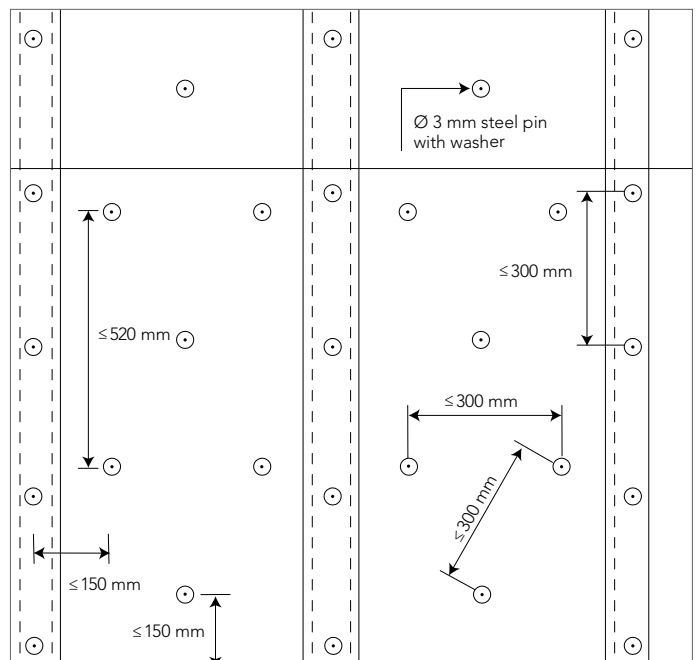
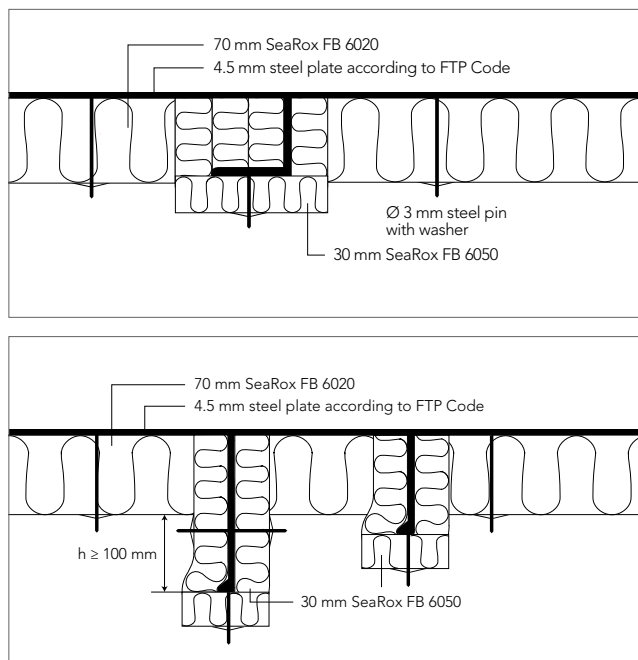
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -6) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FB 6020, 70 mm,  $\alpha_w = 0.95$

## Construction details





# A-30 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6020	70 mm	40 kg/m <sup>3</sup>	2.8 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6030 ALU	30 mm	50 kg/m <sup>3</sup>	1.5 kg/m <sup>2</sup>

## Construction notes:

- Stiffeners insulated with min. 30 mm SeaRox FM 6030 ALU.
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6020.
- or**
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6020.
- Stiffener insulated min. 150 mm on either side with min. 30 mm SeaRox FM 6030 ALU.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of min. Ø 30-38 mm.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth (SeaRox FB 6020)

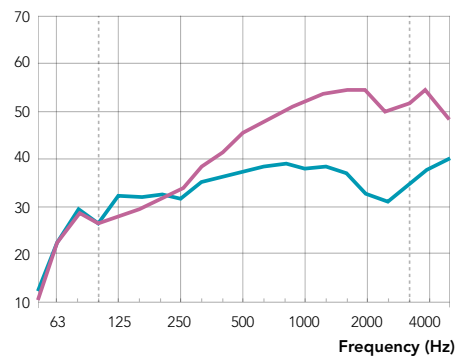
## Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance

## Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	10.5
63	22.1
80	28.4
100	26.4
125	27.8
160	29.2
200	31.5
250	33.8
315	38.2
400	41.2
500	45.7
630	47.7
800	50.2
1000	52.3
1250	53.8
1600	54.7
2000	54.4
2500	49.8
3150	51.5
4000	54.4
5000	48.3

Sound Insulation, R (dB)



Test set-up: Plate: SeaRox FB 6020, 70 mm  
Stiffener: SeaRox FB 6050, 30 mm

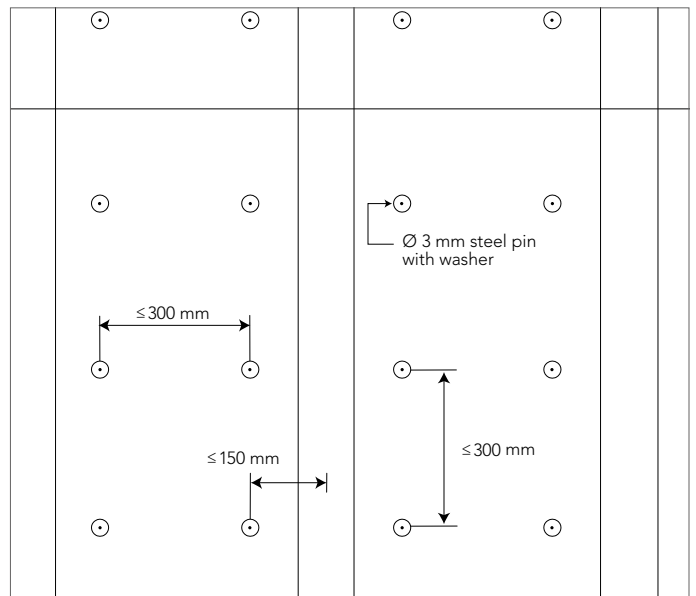
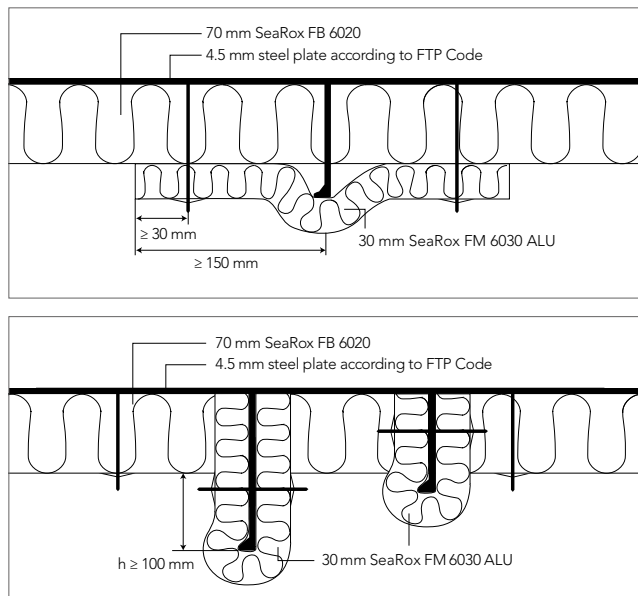
Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -6) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FB 6020, 70 mm,  $\alpha_w = 0.95$

## Construction details



## A-60 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6040	70 mm	60 kg/m <sup>3</sup>	4.2 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FB 6050	30 mm	70 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with min. 30 mm SeaRox FB 6050.
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6040.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.





### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Insulation can be placed on both sides of the steel plate.
- Alternative pin and stiffener design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

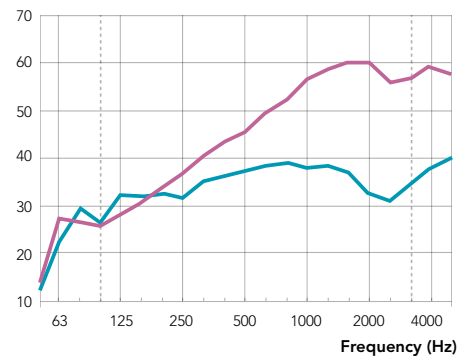
### Advantages:

-  Ensures highest fire safety on board
-  Secures excellent noise reduction and better comfort
-  Low weight to reduce energy consumption and emissions
-  Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	13.4
63	27.2
80	26.6
100	26.0
125	28.2
160	31.2
200	33.8
250	37.2
315	40.4
400	43.3
500	45.8
630	49.8
800	52.6
1000	56.6
1250	59.0
1600	59.9
2000	60.1
2500	55.9
3150	57.0
4000	59.7
5000	58.1

#### Sound Insulation, R (dB)



Test set-up: Plate: SeaRox FB 6040, 70 mm  
Stiffener: SeaRox FB 6050, 30 mm

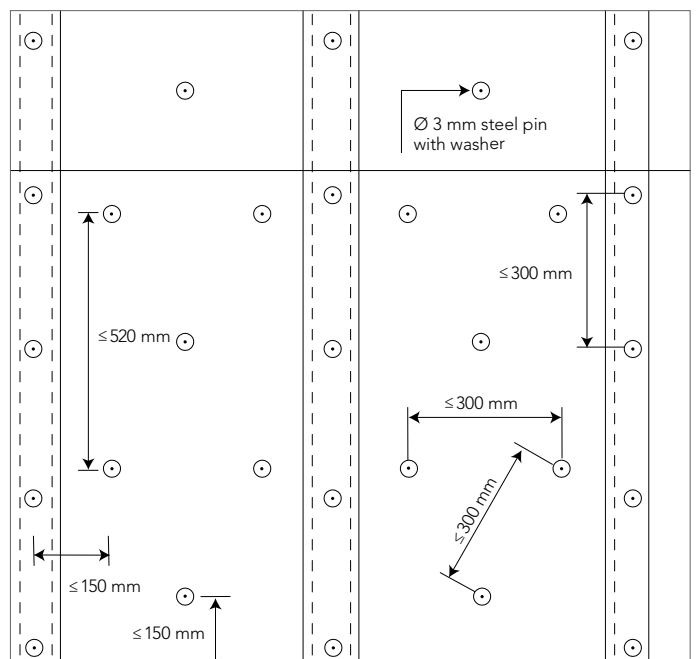
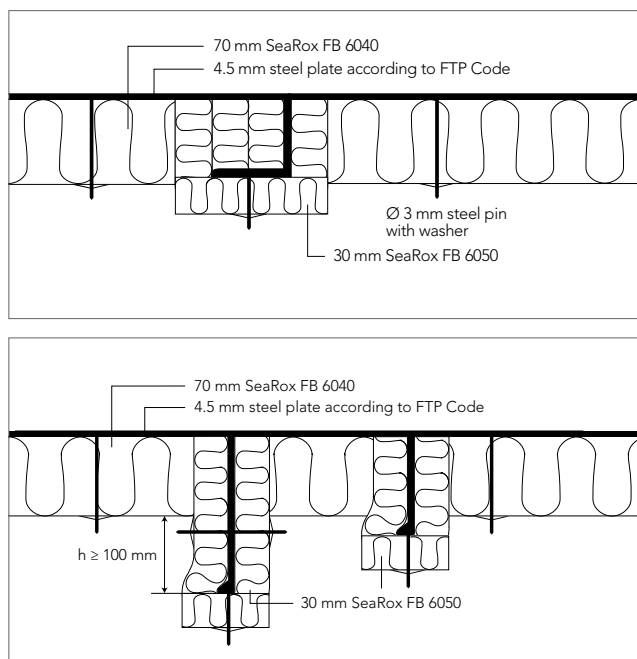
Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-2; -7) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox FB 6040, 70 mm,  $\alpha_w = 0.95$

### Construction details



# A-60 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6040	70 mm	60 kg/m <sup>3</sup>	4.2 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6040 ALU	35 mm	60 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>

## Construction notes:

- Stiffeners insulated with min. 35 mm SeaRox FM 6040 ALU.
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6040.
- or**
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6040.
- Stiffener insulated min. 150 mm on either side with min. 35 mm SeaRox FM 6040 ALU.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of min. Ø 30-38 mm.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil (SeaRox FM 6040 ALU: Reinforced Aluminium foil is standard)
- Glass cloth (SeaRox FB 6040)

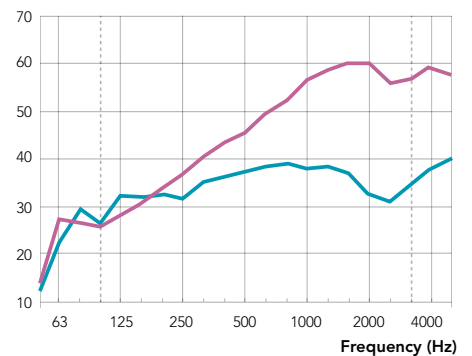
## Advantages:

- FTP Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance

## Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	13.4
63	27.2
80	26.6
100	26.0
125	28.2
160	31.2
200	33.8
250	37.2
315	40.4
400	43.3
500	45.8
630	49.8
800	52.6
1000	56.6
1250	59.0
1600	59.9
2000	60.1
2500	55.9
3150	57.0
4000	59.7
5000	58.1

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FB 6040, 70 mm  
Stiffener: SeaRox FM 6050, 30 mm

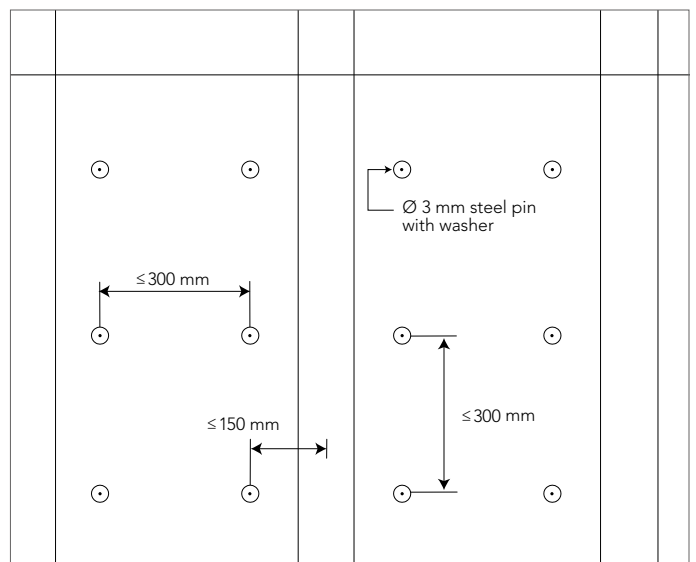
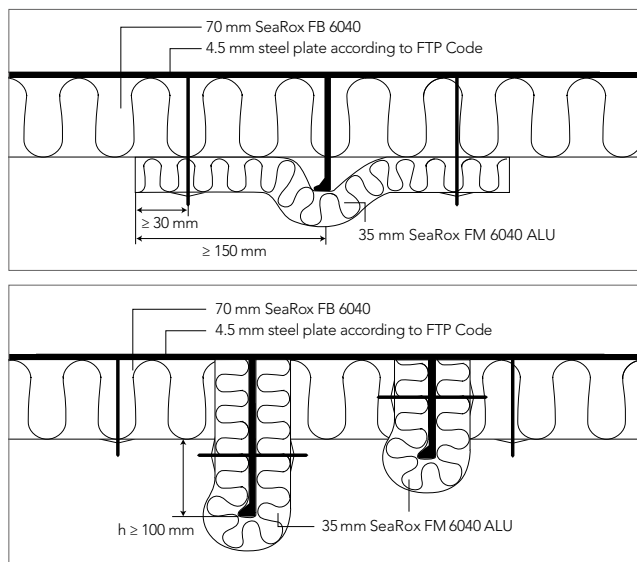
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-2; -7) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FB 6040, 70 mm,  $\alpha_w = 0.95$

## Construction details







## A-60 Steel Bulkhead restricted

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6020	70 mm	40 kg/m <sup>3</sup>	2.8 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FB 6050	30 mm	70 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with min. 30 mm SeaRox FB 6050.
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6020.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

### Application notes:

- Restricted application (fire against insulated side).
- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

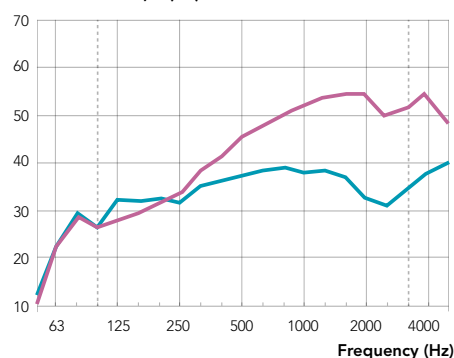
### Advantages:

- FTP Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	10.5
63	22.1
80	28.4
100	26.4
125	27.8
160	29.2
200	31.5
250	33.8
315	38.2
400	41.2
500	45.7
630	47.7
800	50.2
1000	52.3
1250	53.8
1600	54.7
2000	54.4
2500	49.8
3150	51.5
4000	54.4
5000	48.3

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FB 6020, 70 mm  
Stiffener: SeaRox FB 6050, 30 mm

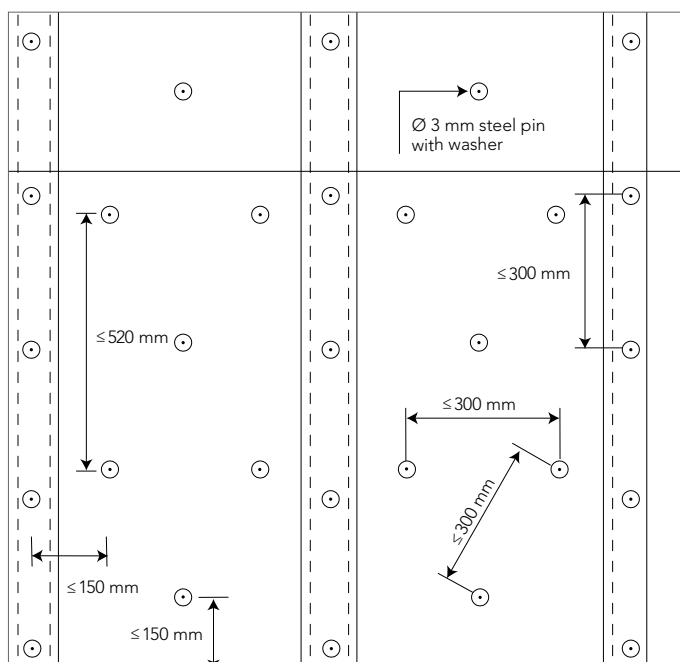
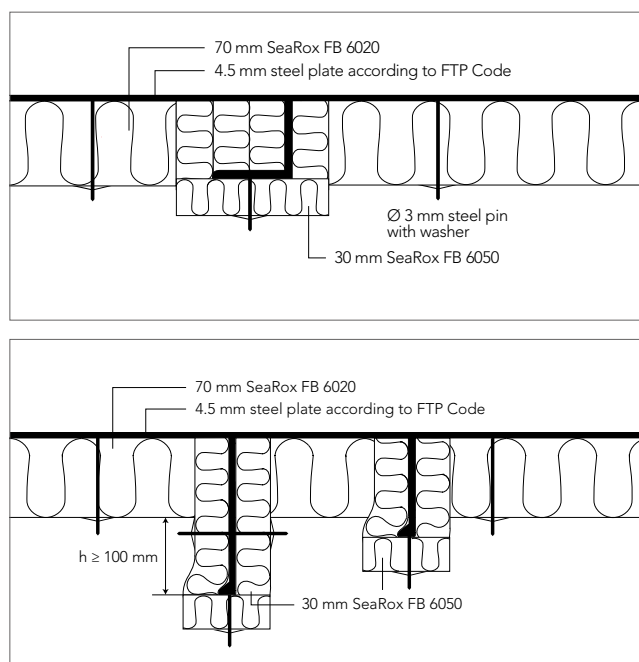
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -6) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox FB 6020, 70 mm,  $\alpha_w = 0.95$

### Construction details



# A-60 Steel Bulkhead restricted

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6020	70 mm	40 kg/m <sup>3</sup>	2.8 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6040 ALU	35 mm	60 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>

## Construction notes:

- Stiffeners insulated with min. 35 mm SeaRox FM 6040 ALU.
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6020.
- or**
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6020.
- Stiffener insulated min. 150 mm on either side with min. 35 mm SeaRox FM 6040 ALU.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of min. Ø 30-38 mm.






## Application notes:

- Restricted application (fire against insulated side).
- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth (SeaRox FB 6040)

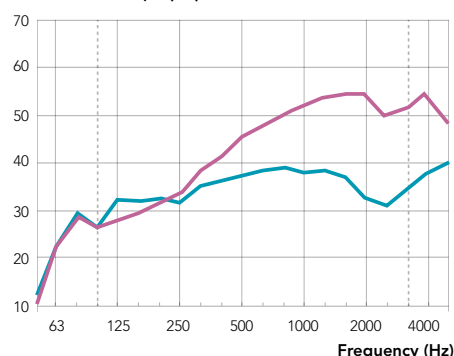
## Advantages:

-  Ensures highest fire safety on board
-  Secures excellent noise reduction and better comfort
-  Low weight to reduce energy consumption and emissions
-  Cuts labour time and reduces the total cost of installation
-  Lowest water absorption - optimal insulation performance

## Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	10.5
63	22.1
80	28.4
100	26.4
125	27.8
160	29.2
200	31.5
250	33.8
315	38.2
400	41.2
500	45.7
630	47.7
800	50.2
1000	52.3
1250	53.8
1600	54.7
2000	54.4
2500	49.8
3150	51.5
4000	54.4
5000	48.3

Sound Insulation, R (dB)



Test set-up: Plate: SeaRox FB 6020, 70 mm  
Stiffener: SeaRox FB 6050, 30 mm

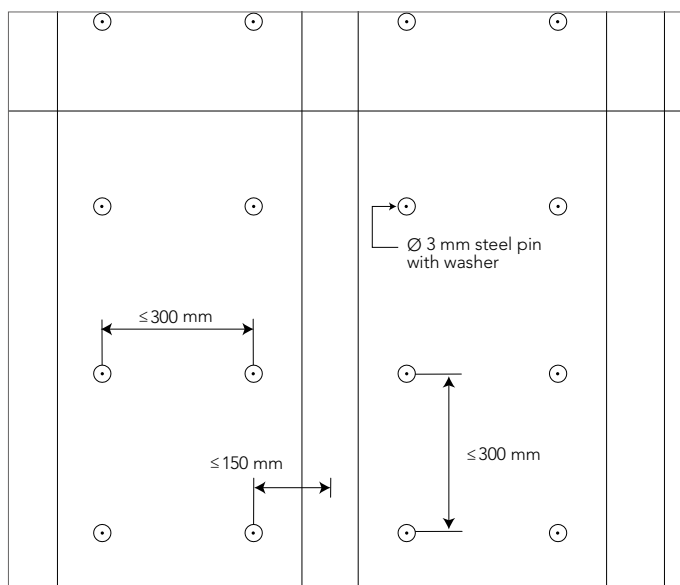
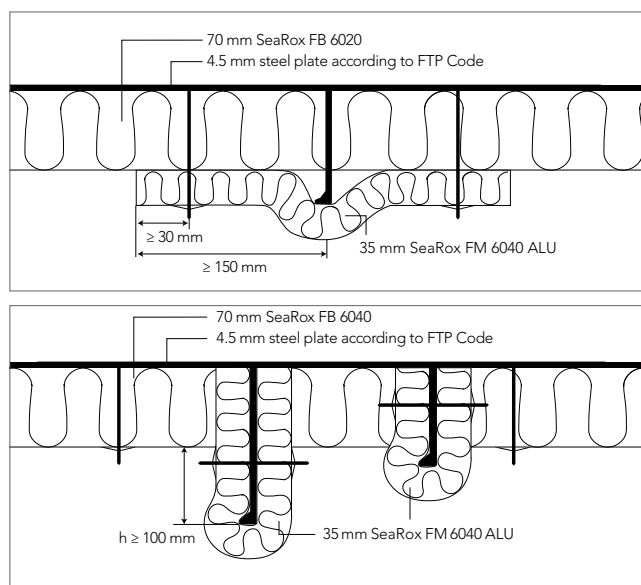
Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -6) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FB 6020, 70 mm,  $\alpha_w = 0.95$

## Construction details



## A-15 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	50 mm	100 kg/m <sup>3</sup>	5.0 kg/m <sup>2</sup>
<b>Stiffener</b>	No insulation			

### Construction notes:

- Steel plate between stiffeners insulated with one layer min. 50 mm SeaRox SL 620.
- No insulation around stiffeners.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Insulation can be placed on either side of the steel plate.
- Alternative pin design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

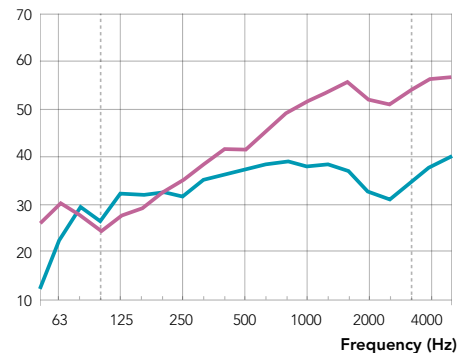
### Advantages:

- FTP Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

### Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	25.9
63	30.2
80	27.6
100	24.4
125	27.6
160	29.1
200	32.6
250	35.1
315	38.4
400	41.6
500	41.4
630	45.1
800	49.1
1000	51.4
1250	53.6
1600	55.7
2000	51.9
2500	50.9
3150	53.7
4000	56.3
5000	56.7

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 50 mm

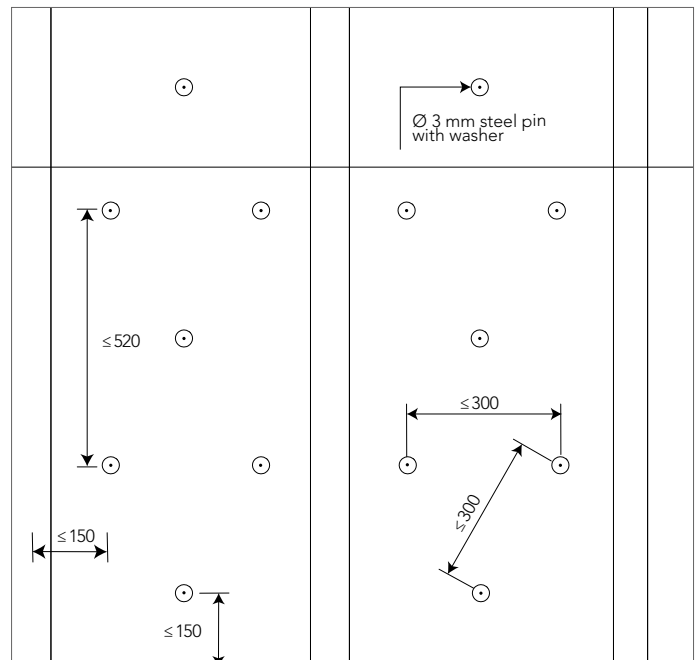
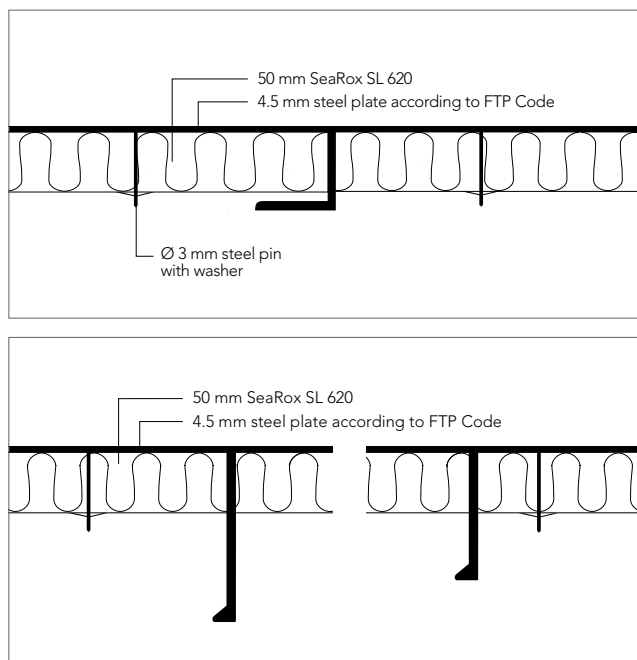
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -7) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox SL 620, 50 mm,  $\alpha_w = 0.85$

### Construction details





## A-30 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	40 mm	100 kg/m <sup>3</sup>	4.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 620	25 mm	100 kg/m <sup>3</sup>	2.5 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with min. 25 mm SeaRox SL 620.
- Plate between stiffeners insulated with min. 40 mm SeaRox SL 620.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Insulation can be placed on either side of the steel plate.
- Alternative pin and stiffener design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

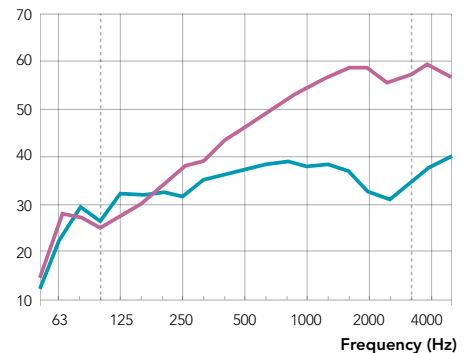
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	14.5
63	27.7
80	27.2
100	25.5
125	27.7
160	30.0
200	34.2
250	38.0
315	39.2
400	43.1
500	46.1
630	48.8
800	51.9
1000	54.3
1250	56.4
1600	58.3
2000	58.5
2500	55.6
3150	56.8
4000	59.0
5000	57.1

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 40 mm  
Stiffener: SeaRox SL 620, 25 mm

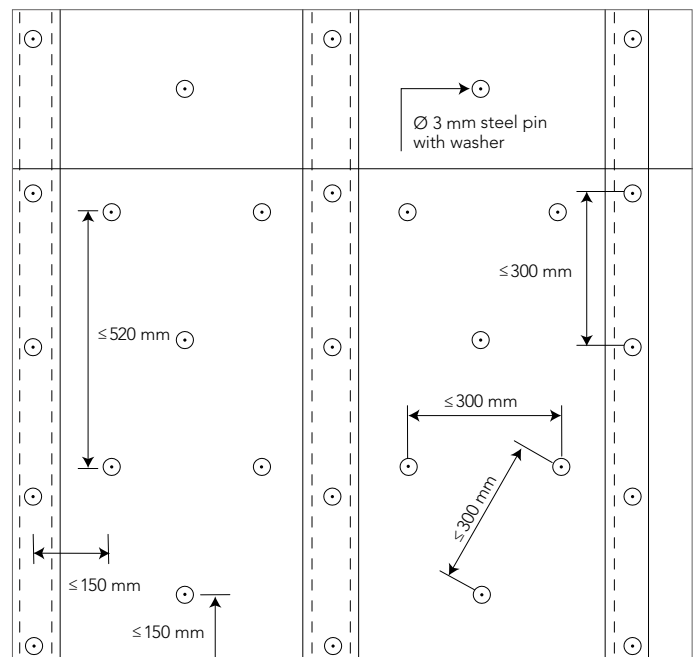
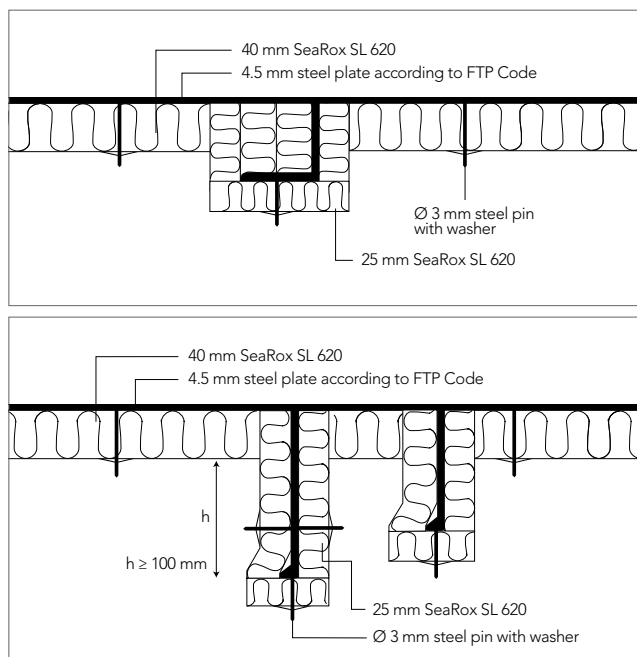
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-2; -7) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox SL 620, 40 mm,  $\alpha_w = 0.80$

### Construction details



## A-60 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	60 mm	100 kg/m <sup>3</sup>	6.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 620	25 mm	100 kg/m <sup>3</sup>	2.5 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with min. 25 mm SeaRox SL 620.
- Plate between stiffeners insulated with min. 60 mm SeaRox SL 620.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Insulation can be placed on either side of the steel plate.
- Alternative pin and stiffener design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

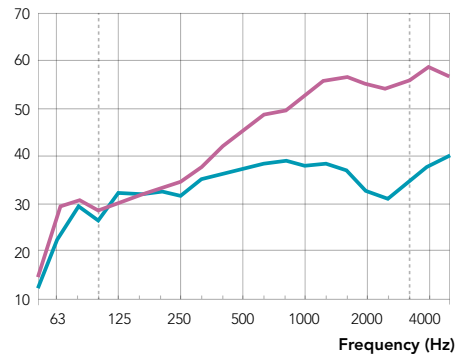
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	14.3
63	29.1
80	30.8
100	28.2
125	30.4
160	31.4
200	33.0
250	34.7
315	38.3
400	42.3
500	45.0
630	48.9
800	49.7
1000	52.7
1250	56.3
1600	57.1
2000	55.3
2500	54.3
3150	55.3
4000	59.0
5000	57.2

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 60 mm  
Stiffener: SeaRox SL 620, 25 mm

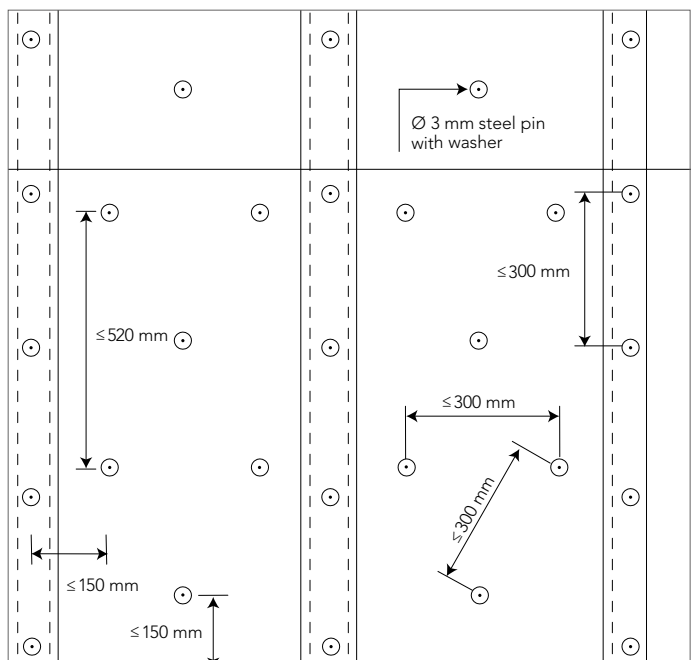
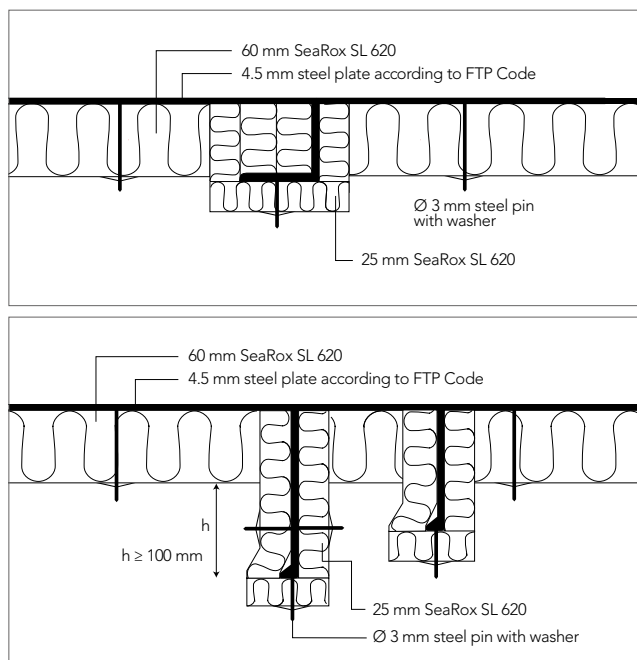
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-2; -7) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox SL 620, 60 mm,  $\alpha_w = 0.90$

### Construction details





## A-60 Steel Bulkhead restricted

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	40 mm	100 kg/m <sup>3</sup>	4.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 620	25 mm	100 kg/m <sup>3</sup>	2.5 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with min. 25 mm SeaRox SL 620.
- Plate between stiffeners insulated with min. 40 mm SeaRox SL 620.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

### Application notes:

- Restricted application (fire against insulated side).
- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Insulation can be placed on either side of the steel plate.
- Alternative pin and stiffener design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

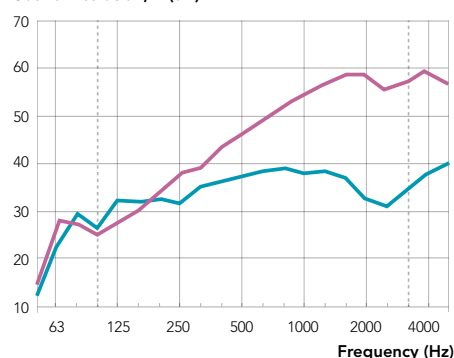
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	14.5
63	27.7
80	27.2
100	25.5
125	27.7
160	30.0
200	34.2
250	38.0
315	39.2
400	43.1
500	46.1
630	48.8
800	51.9
1000	54.3
1250	56.4
1600	58.3
2000	58.5
2500	55.6
3150	56.8
4000	59.0
5000	57.1

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 40 mm  
Stiffener: SeaRox SL 620, 25 mm

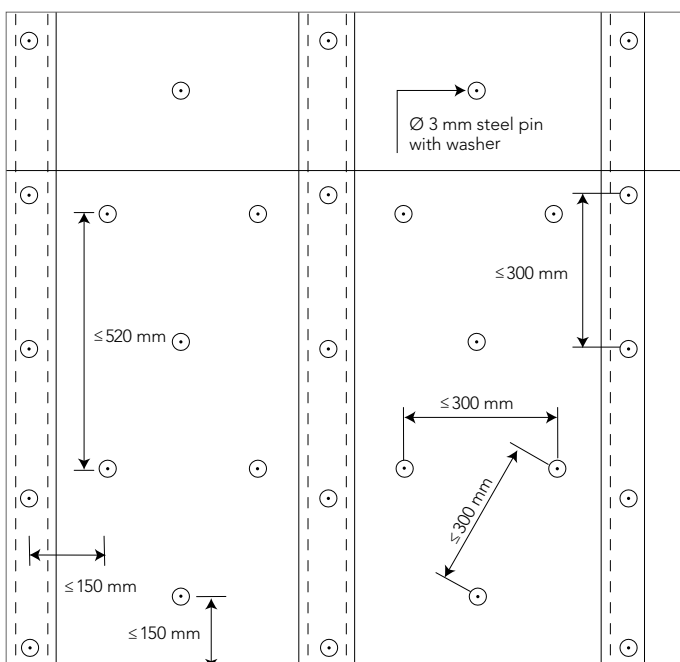
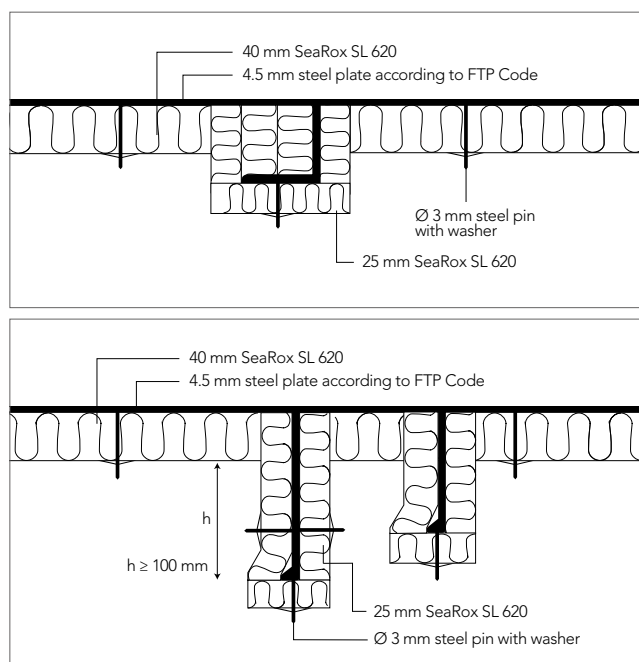
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-2; -7) \text{ dB}$$

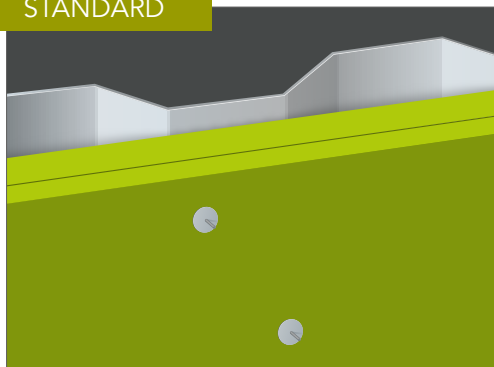
### Sound absorption:

Weighted sound absorption: SeaRox SL 620, 40 mm,  $\alpha_w = 0.80$

### Construction details







## A-60 Steel Bulkhead corrugated - Type 1

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	50+30 mm	100 kg/m <sup>3</sup>	8.0 kg/m <sup>2</sup>

### Construction notes:

- 2 mm corrugated steel plate insulated with 50 mm and 30 mm SeaRox SL 620.
- Dimension of corrugation: 100 mm x 67.5 mm x 65 mm, pitch 335 mm.
- Insulation fixed with two rows of pins on top of corrugation.
- No insulation of void.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Joints must be staggered, 150 mm overlap is recommended.

### Advantages:



Ensures highest fire safety on board

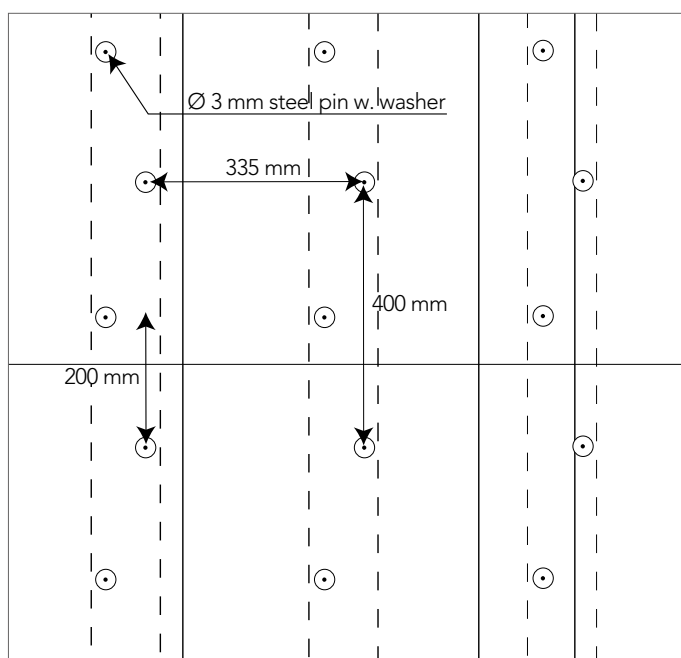
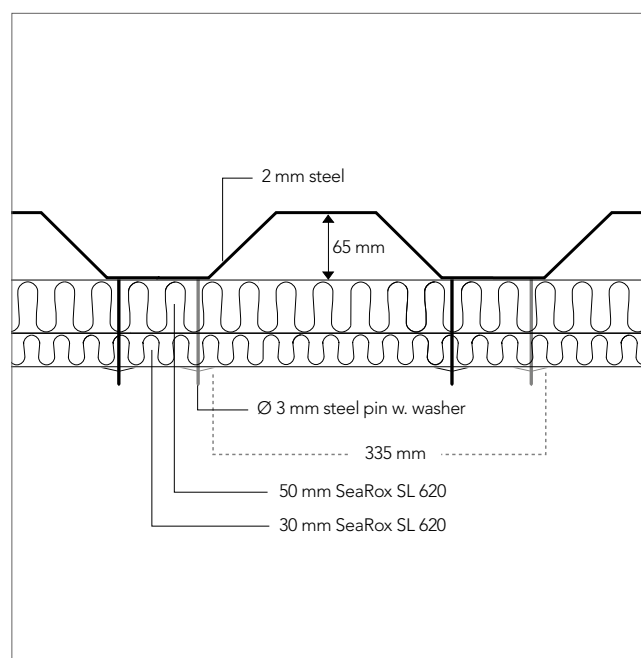


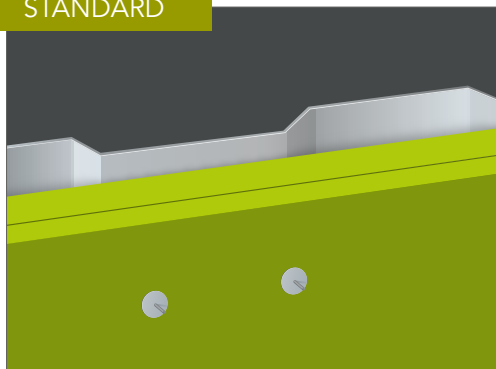
Secures excellent noise reduction and better comfort



Lowest water absorption - optimal insulation performance

### Construction details





## A-60 Steel Bulkhead corrugated - Type 2

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	50+30 mm	100 kg/m <sup>3</sup>	8.0 kg/m <sup>2</sup>

### Construction notes:

- 4 mm corrugated steel plate insulated with 50 mm and 30 mm SeaRox SL 620.
- Dimension of corrugation: 260 mm x 35 mm x 25 mm, pitch 570 mm.
- Insulation fixed with two rows of pins on top of corrugation.
- No insulation of void.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Joints must be staggered, 150 mm overlap is recommended.

### Advantages:



Ensures highest fire safety on board

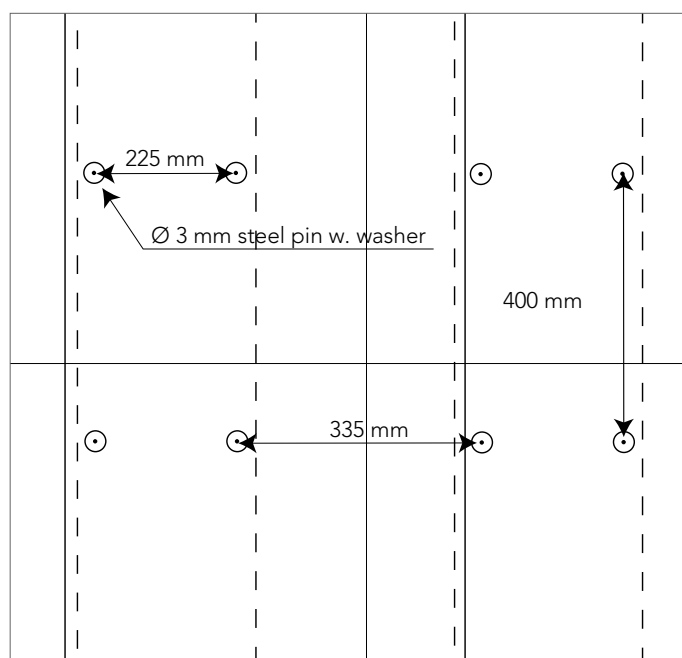
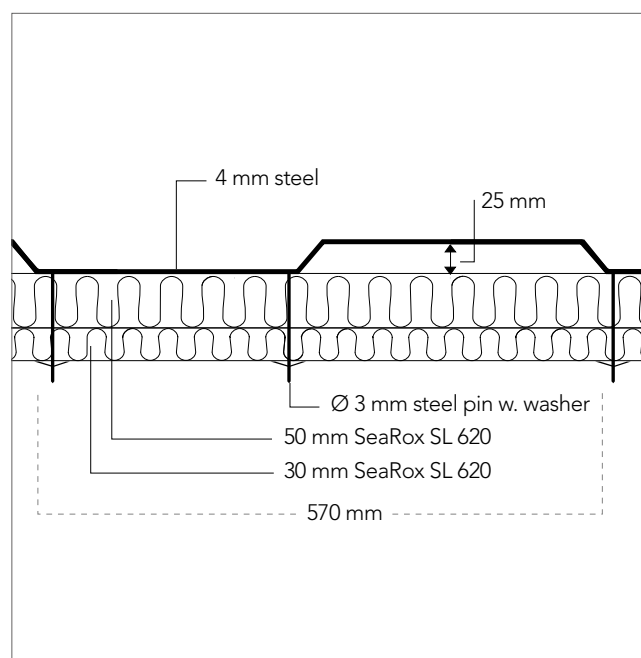


Secures excellent noise reduction and better comfort



Lowest water absorption - optimal insulation performance

### Construction details



## A-60 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox WM 620	2 x 45 mm	90 kg/m <sup>3</sup>	8.1 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox WM 620	45 mm	90 kg/m <sup>3</sup>	4.1 kg/m <sup>2</sup>

### Construction notes:

- Plate between stiffeners insulated with one layer of 45 mm SeaRox WM 620.
- Stiffeners and plate insulated in the same process with 45 mm SeaRox WM 620.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Insulation can be placed on either side of the steel plate.
- Wire mesh must be twisted together at joints.

### Optional surface (on request):

- Reinforced aluminium foil

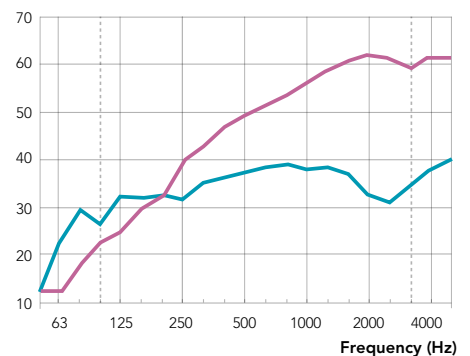
### Advantages:

- 🎵 Secures excellent noise reduction and better comfort
- 🚰 Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	12.7
63	12.7
80	18.6
100	23.6
125	25.1
160	30.3
200	32.9
250	39.9
315	43.2
400	46.9
500	49.6
630	51.5
800	53.3
1000	56.0
1250	59.1
1600	60.7
2000	61.9
2500	61.5
3150	59.5
4000	61.7
5000	61.2

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox WM 90, 2 x 45 mm  
Stiffener: SeaRox WM 90, 45 mm

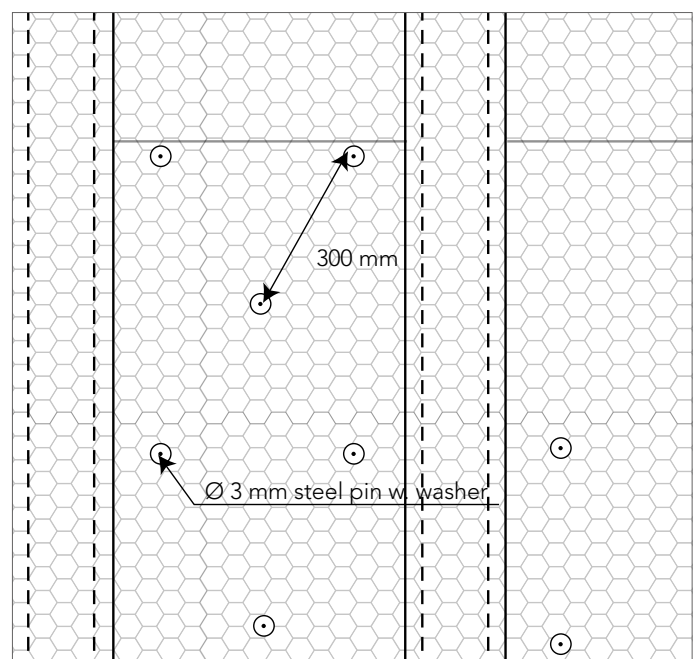
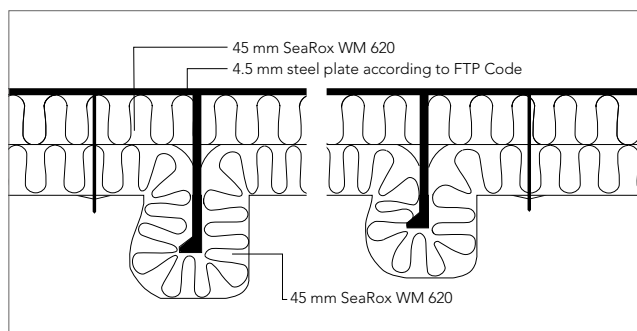
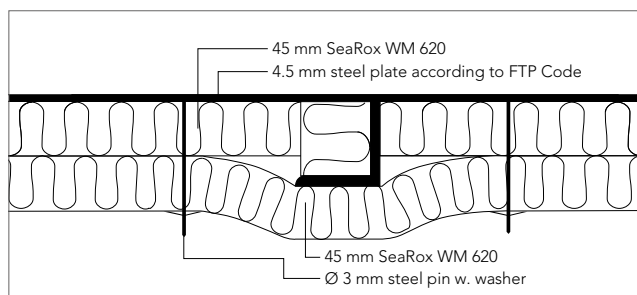
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 7 mm  
(without insulation)

$$R_w(C;C_{tr}) = 49 (-3; -9) \text{ dB}$$

### Sound absorption:

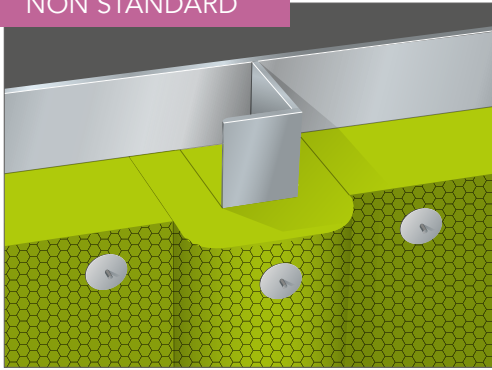
Weighted sound absorption: **SeaRox WM 620, 2 x 45 mm**,  $\alpha_w = 0.95$

### Construction details





## A-60 Steel Bulkhead



	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox WM 640	75 mm	105 kg/m <sup>3</sup>	7.9 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox WM 640	30 mm	105 kg/m <sup>3</sup>	3.2 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with 30 mm SeaRox WM 640.
- Plate between stiffeners insulated with one layer of 75 mm SeaRox WM 640.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Insulation secured with washers of Ø 38 mm.

### Application notes:

- All connections must be tight.
- Gap under the stiffener must be filled out completely.
- The pins should exceed the insulation by approx. 10 mm.
- Wire mesh must be twisted together at joints.
- Insulation can be placed on either side of the steel plate.

### Optional surface (on request):

- Reinforced aluminium foil

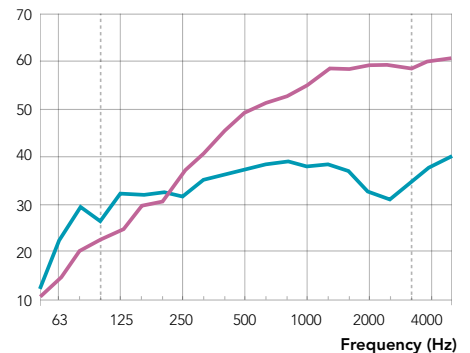
### Advantages:

- 🎵 Secures excellent noise reduction and better comfort
- 🛡️ Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	10.2
63	15.2
80	20.6
100	23.0
125	24.9
160	30.0
200	30.7
250	37.7
315	41.5
400	45.9
500	49.3
630	51.4
800	52.8
1000	55.2
1250	58.5
1600	58.6
2000	59.4
2500	59.4
3150	58.3
4000	60.5
5000	60.9

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox WM 105, 75 mm  
Stiffener: SeaRox WM 105, 30 mm

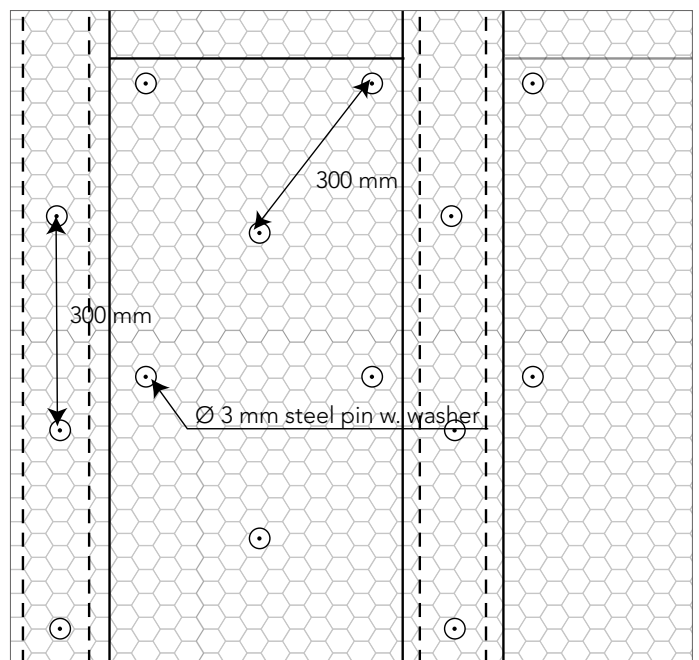
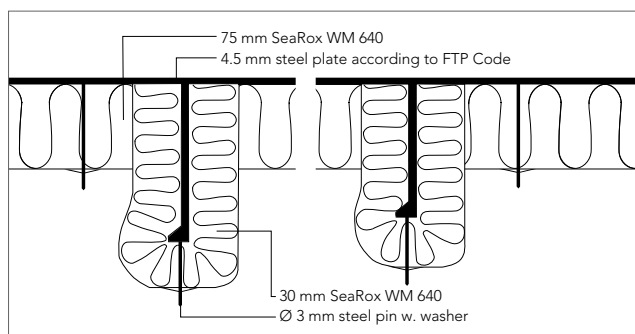
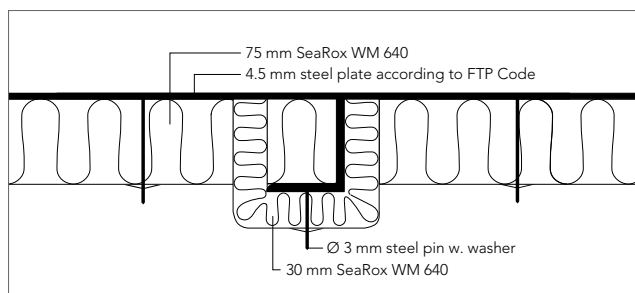
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 7 mm  
(without insulation)

$$R_w(C;C_{tr}) = 47 (-2; -8) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox WM 640, 75 mm,  $\alpha_w = 0.90$

### Construction details



## A-60 Steel Bulkhead

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 640	2 x 30 mm	130 kg/m <sup>3</sup>	7.8 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 640	30 mm	130 kg/m <sup>3</sup>	3.9 kg/m <sup>2</sup>

### Construction notes:

- Plate between stiffeners insulated with two layers of 30 mm SeaRox SL 640.
- Stiffeners insulated with 30 mm SeaRox SL 640.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Insulation secured with washers of Ø 38 mm.

### Application notes:

- All connections must be tight.
- Gap under the stiffener must be filled out completely.
- The pins should exceed the insulation by approx. 10 mm.
- Insulation must be placed on fire-exposed side of the steel plate.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

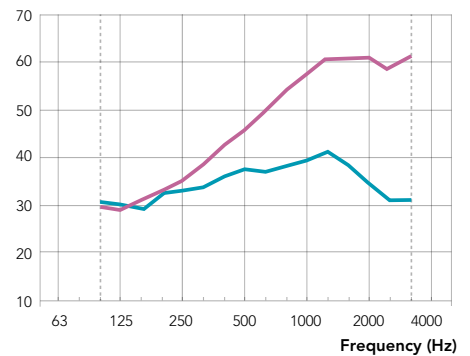
### Advantages:

- 🎵 **Secures excellent noise reduction and better comfort**
- 🔧 **Lowest water absorption - optimal insulation performance**

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
100	29.9
125	28.8
160	31.7
200	34.2
250	35.8
315	39.2
400	43.2
500	46.3
630	49.5
800	54.3
1000	57.4
1250	60.1
1600	60.3
2000	60.4
2500	58.9
3150	61.0

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 640, 2 x 30 mm  
Stiffener: SeaRox SL 640, 30 mm

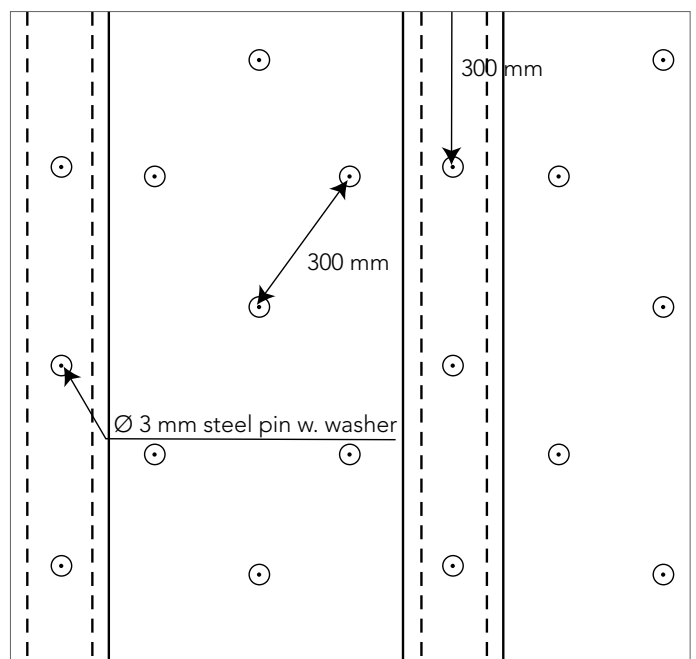
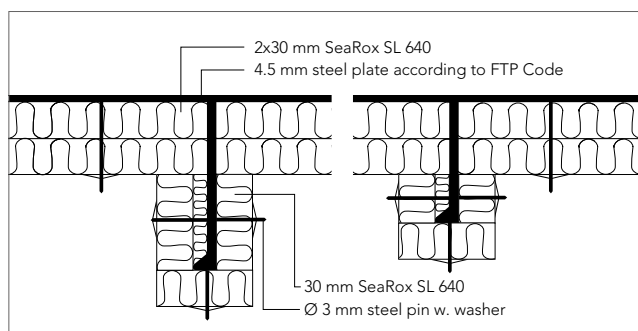
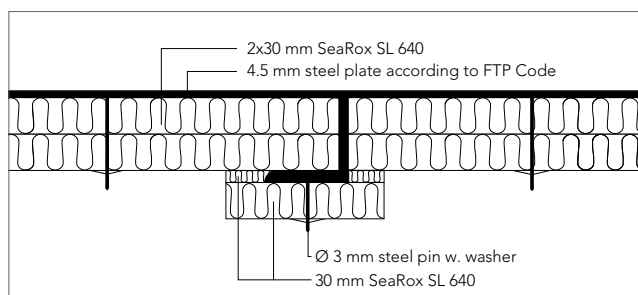
■ Steel Bulkhead 1500/ 1500/ 5 mm  
L-profile: 60/ 30/ 5 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-1; -2) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: **SeaRox SL 640, 2x30 mm**,  $\alpha_w = 0.90$

### Construction details



## A-60 Steel Bulkhead restricted

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 640	40 mm	130 kg/m <sup>3</sup>	5.2 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 640	40 mm	130 kg/m <sup>3</sup>	5.2 kg/m <sup>2</sup>

### Construction notes:

- Plate between stiffeners insulated with one layer of 40 mm SeaRox SL 640.
- Stiffeners insulated with 40 mm SeaRox SL 640.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Insulation secured with washers of Ø 38 mm.

### Application notes:

- Restricted application (fire against insulated side).
- All connections must be tight.
- Gap under the stiffener must be filled out completely.
- The pins should exceed the insulation by approx. 10 mm.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

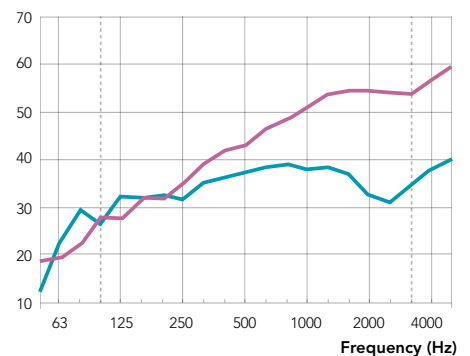
### Advantages:

- 🎵 **Secures excellent noise reduction and better comfort**
- 🔧 **Lowest water absorption - optimal insulation performance**

### Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	18.7
63	19.7
80	22.5
100	28.1
125	27.5
160	31.8
200	32.1
250	35.2
315	39.8
400	41.9
500	43.0
630	46.4
800	48.4
1000	51.2
1250	53.7
1600	54.5
2000	54.4
2500	54.1
3150	53.7
4000	56.7
5000	59.3

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 640, 40 mm  
Stiffener: SeaRox SL 640, 40 mm

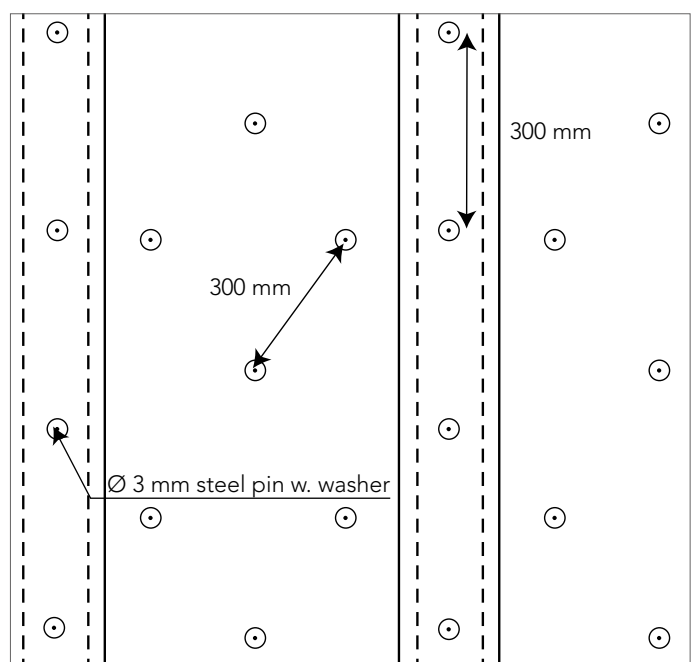
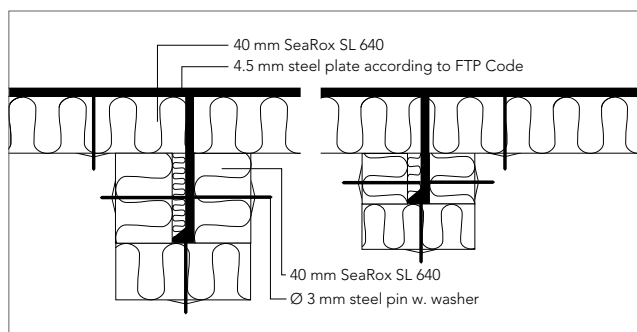
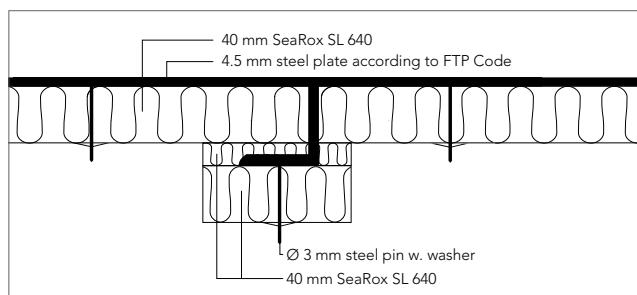
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1880 / 140 / 7 mm  
(without insulation)

$$R_w(C;C_{tr}) = 47 (-2; -6) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: **SeaRox SL 640, 40 mm**,  $\alpha_w = 0.80$

### Construction details





# Index of **A-constructions Steel Deck**



LIGHTWEIGHT		Page
A-15	SeaRox FB 6020	46
A-15	SeaRox FB 6040	47
A-30	SeaRox FB 6050	48
A-30	SeaRox FM 6030 ALU	49
A-30	SeaRox FB 6050/SeaRox FM 6030 ALU	50
A-60	SeaRox FB 6020/SeaRox FB 6050	51
A-60	SeaRox FM 6040 ALU	52
A-60	SeaRox FB 6020/SeaRox FM 6040 ALU	53

STANDARD		Page
A-15	SeaRox SL 620	54
A-30	SeaRox SL 620	55
A-60	SeaRox SL 620	56

NON-STANDARD		Page
A-60	SeaRox WM 620	57
A-60	SeaRox SL 640	58

# A-15 Steel Deck



	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6020	70 mm	40 kg/m <sup>3</sup>	2.8 kg/m <sup>2</sup>
<b>Stiffener</b>	No insulation			

## Construction notes:

- Plate between stiffeners insulated with one layer of min. 70 mm SeaRox FB 6020.
- No insulation on stiffeners.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

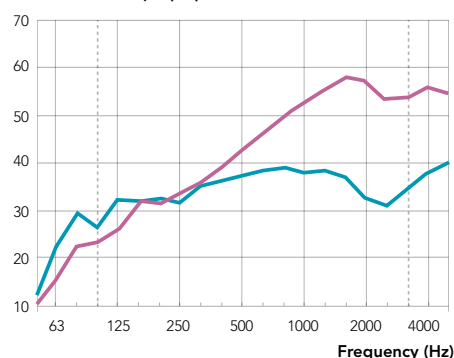
## Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance

## Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	9.8
63	15.8
80	22.7
100	23.4
125	26.7
160	32.1
200	31.2
250	33.9
315	36.1
400	39.0
500	43.2
630	46.5
800	49.7
1000	52.7
1250	55.9
1600	58.1
2000	56.9
2500	53.2
3150	53.5
4000	55.7
5000	54.8

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FB 6020, 70 mm

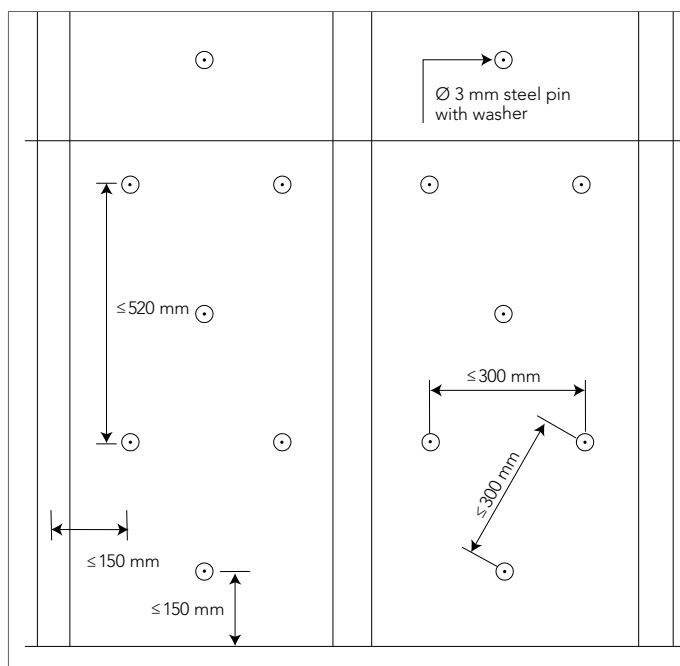
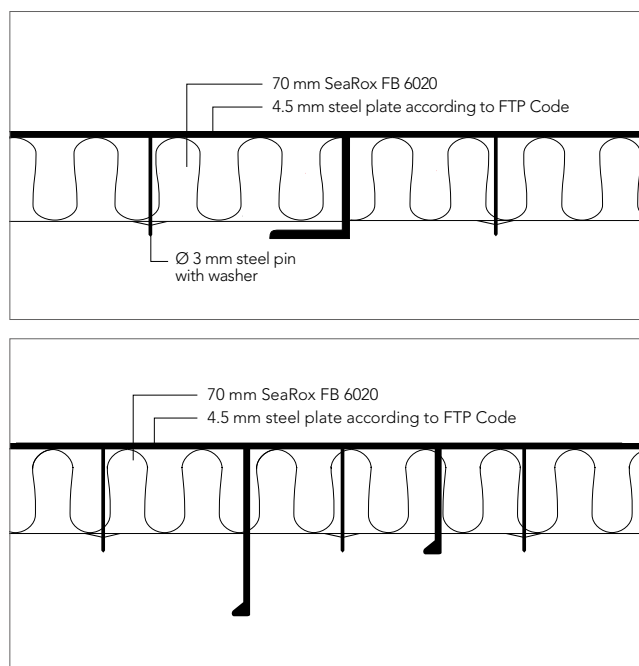
■ Steel Bulkhead 1500 / 1880 / 5 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 45 (-1; -6) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FB 6020, 70 mm,  $\alpha_w = 0.95$

## Construction details



# A-15 Steel Deck



	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6040 or SeaRox FM 6040 ALU	35 mm	60 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>
<b>Stiffener</b>	No insulation			

## Construction notes:

- Plate between stiffeners insulated with one layer of min. 35 mm SeaRox FB 6040 or FM 6040 ALU.
- No insulation on stiffeners.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

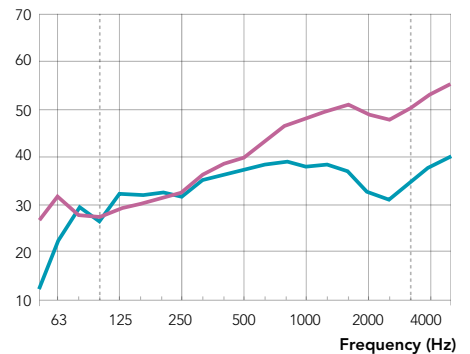
## Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

## Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	26.6
63	31.2
80	27.9
100	27.5
125	29.1
160	29.9
200	31.4
250	33.0
315	36.1
400	38.5
500	39.8
630	43.1
800	46.4
1000	47.9
1250	50.0
1600	51.1
2000	48.7
2500	47.4
3150	50.6
4000	53.4
5000	55.1

Sound Insulation, R (dB)

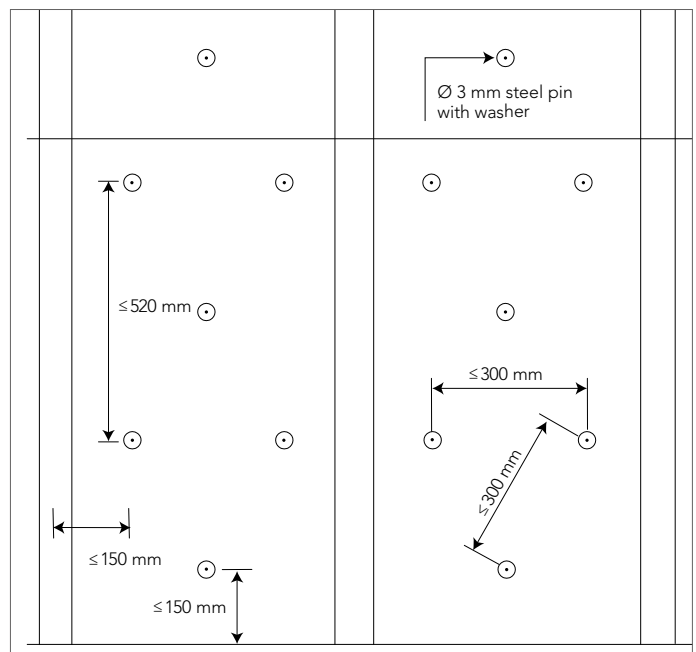
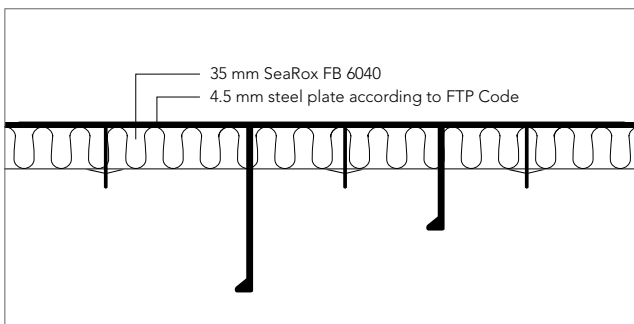
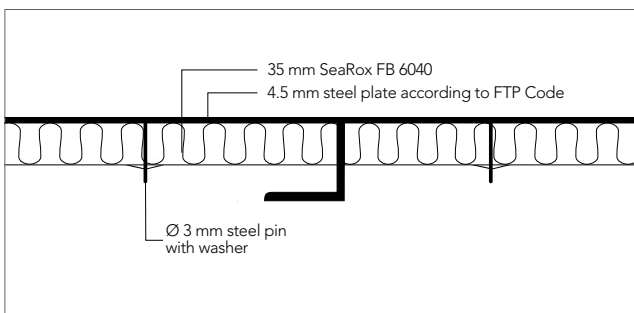


■ Test set-up: Plate: SeaRox FB 6040, 35 mm

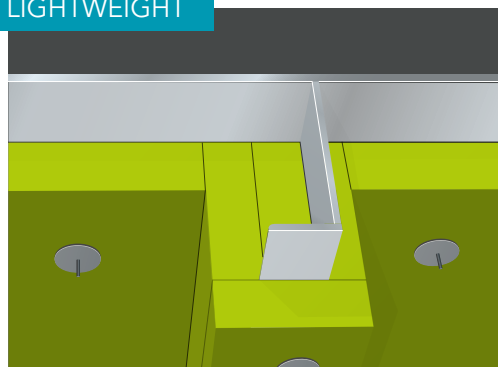
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 45 (-2; -6) \text{ dB}$$

## Construction details



# A-30 Steel Deck



	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6050	30 mm	70 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FB 6050	30 mm	70 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>

## Construction notes:

- Stiffeners insulated with min. 30 mm SeaRox FB 6050.
- Steel plate between stiffeners insulated with min. 30 mm SeaRox FB 6050.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of min. Ø 30-38 mm.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

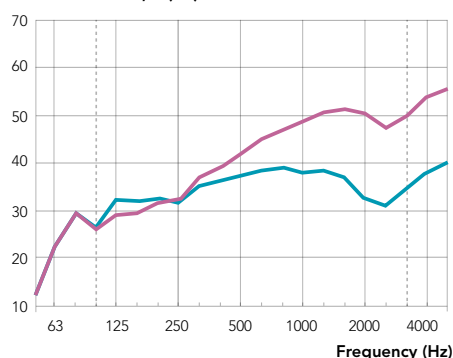
## Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Lowest water absorption - optimal insulation performance

## Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	10.9
63	22.2
80	29.3
100	26.1
125	29.3
160	29.7
200	31.5
250	32.4
315	36.8
400	39.2
500	42.0
630	45.0
800	46.9
1000	48.9
1250	50.5
1600	51.6
2000	50.5
2500	47.4
3150	49.8
4000	54.0
5000	55.6

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FB 6050, 30 mm  
Stiffener: SeaRox FB 6050, 30 mm

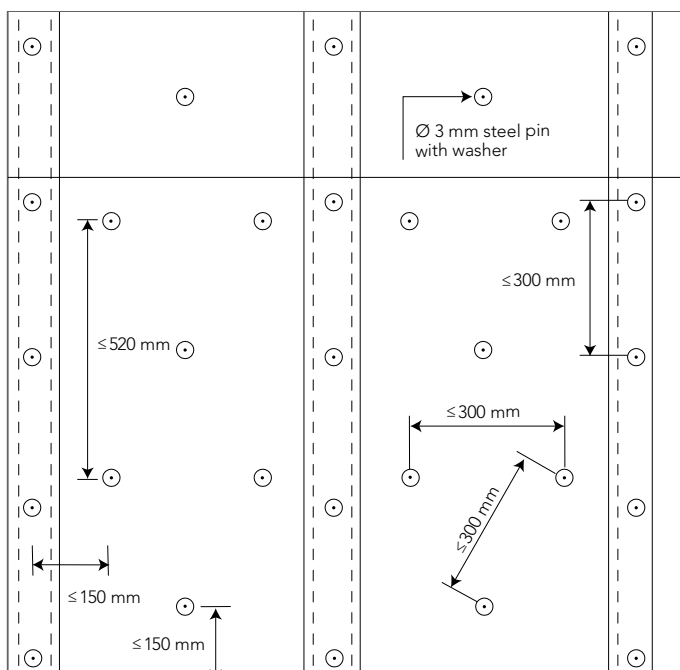
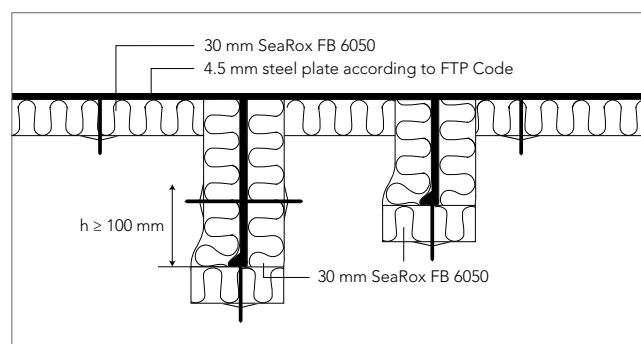
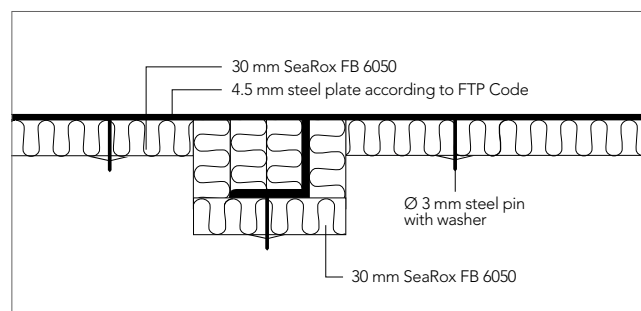
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 45 (-2; -6) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FB 6050, 30 mm,  $\alpha_w = 0.55$

## Construction details





# A-30 Steel Deck



	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FM 6030 ALU	30 mm	50 kg/m <sup>3</sup>	1.5 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6030 ALU	30 mm	50 kg/m <sup>3</sup>	1.5 kg/m <sup>2</sup>

## Construction notes:

- Plate and stiffeners insulated with one layer of min. 30 mm SeaRox FM 6030 ALU.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of Ø 30-38 mm.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

## Surface (as standard):

- Reinforced aluminium foil

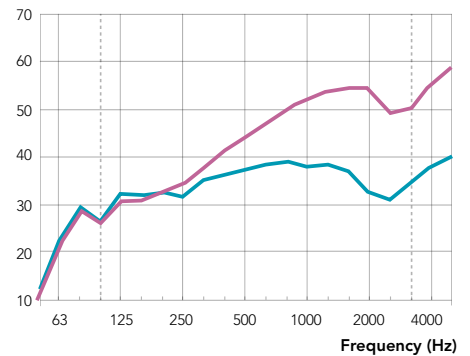
## Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Lowest water absorption - optimal insulation performance

## Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	9.8
63	20.4
80	29.3
100	26.3
125	30.8
160	30.6
200	32.0
250	34.7
315	37.8
400	40.9
500	43.7
630	47.2
800	50.0
1000	52.6
1250	53.7
1600	54.6
2000	53.9
2500	49.4
3150	50.4
4000	55.4
5000	58.3

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FM 6030 ALU, 30 mm  
Stiffener: SeaRox FM 6030 ALU, 30 mm

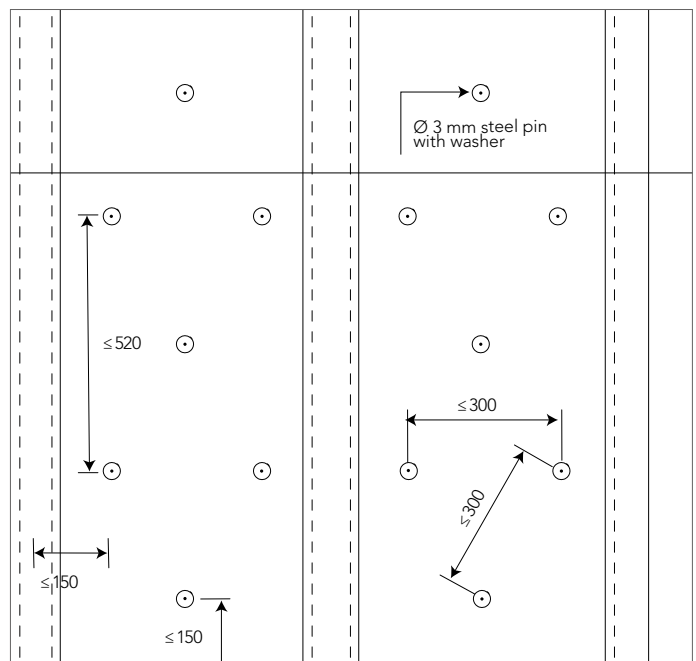
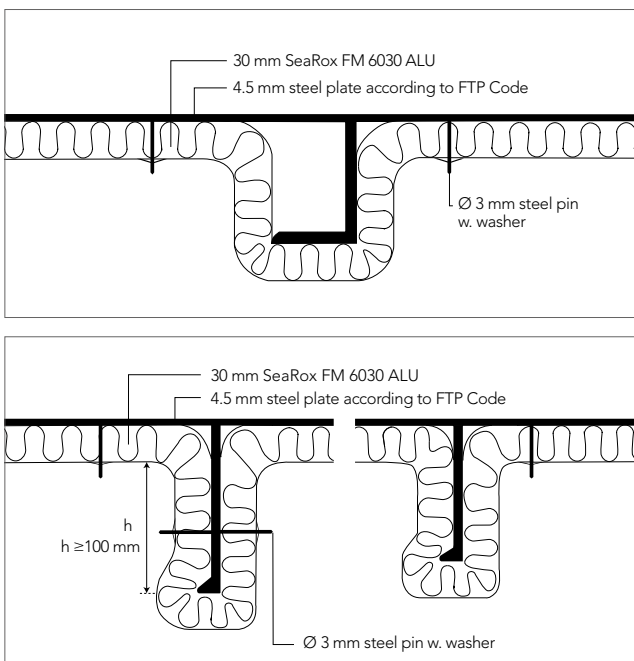
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

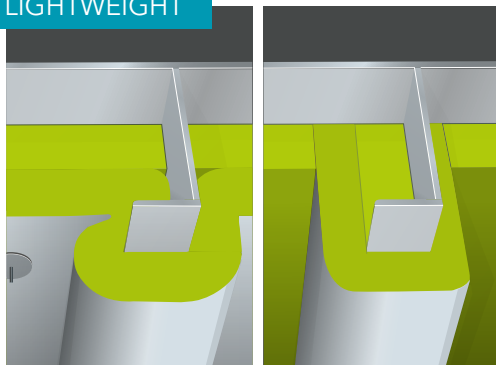
$$R_w(C;C_{tr}) = 46 (-1; -6) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FM 6030 ALU,  $\alpha_w = 0.60$

## Construction details





## A-30 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6050	30 mm	70 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6030 ALU	30 mm	50 kg/m <sup>3</sup>	1.5 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with min. 30 mm SeaRox FM 6030 ALU.
- Steel plate between stiffeners insulated with min. 30 mm SeaRox FB 6050.
- or
- Steel plate between stiffeners insulated with min. 30 mm SeaRox FB 6050.
- Stiffener insulated min. 150 mm on either side with min. 30 mm SeaRox FM 6030 ALU.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of min. Ø 30-38 mm.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth (SeaRox FB 6050)

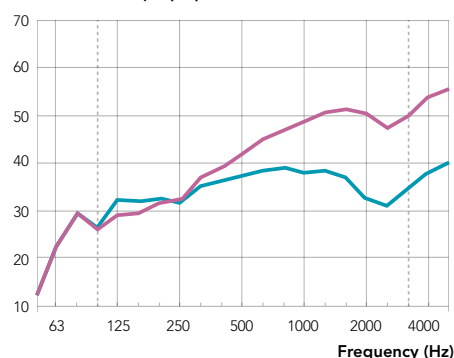
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	10.9
63	22.2
80	29.3
100	26.1
125	29.3
160	29.7
200	31.5
250	32.4
315	36.8
400	39.2
500	42.0
630	45.0
800	46.9
1000	48.9
1250	50.5
1600	51.6
2000	50.5
2500	47.4
3150	49.8
4000	54.0
5000	55.6

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FB 6050, 30 mm  
Stiffener: SeaRox FB 6050, 30 mm

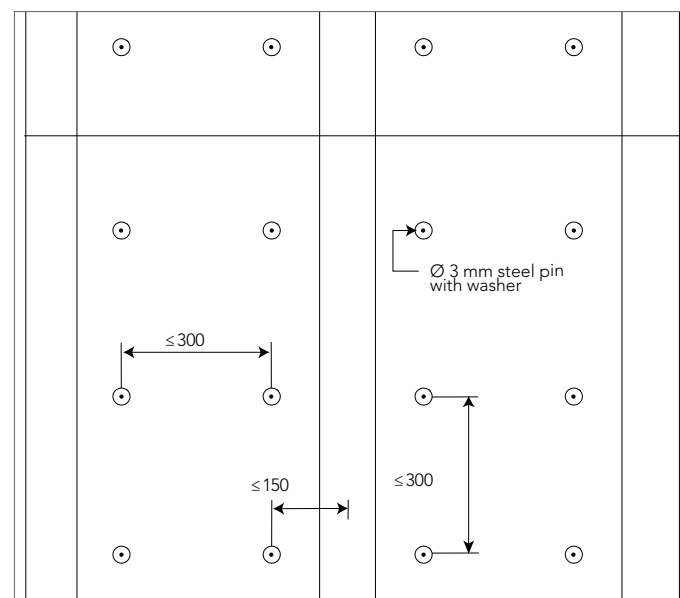
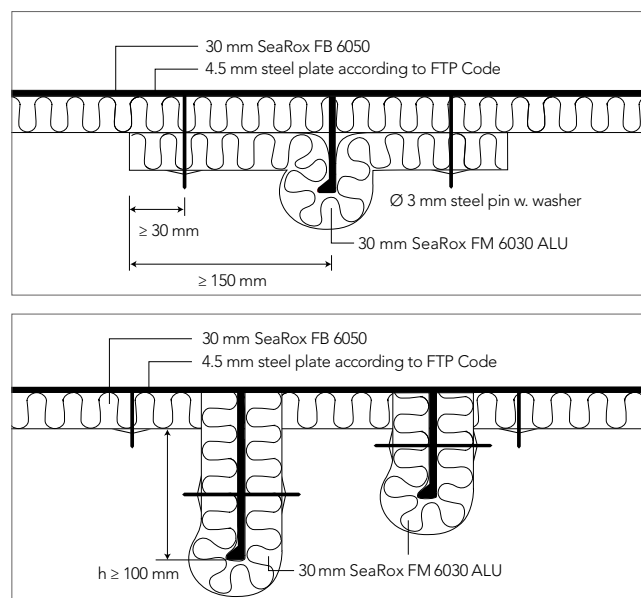
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 45 (-2; -6) \text{ dB}$$

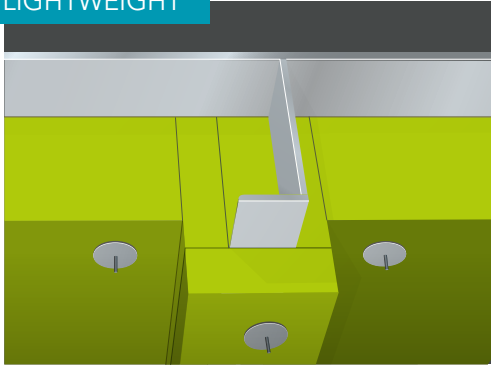
### Sound absorption:

Weighted sound absorption: SeaRox FB 6050, 30 mm,  $\alpha_w = 0.55$

### Construction details



# A-60 Steel Deck



	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6020	70 mm	40 kg/m <sup>3</sup>	2.8 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FB 6050	30 mm	70 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>

## Construction notes:

- Stiffeners insulated with min. 30 mm SeaRox FB 6050.
- Plate between stiffeners insulated with one layer of min. 70 mm SeaRox FB 6020.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of Ø 30-38 mm.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

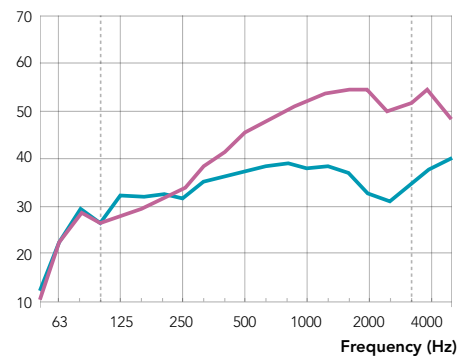
## Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Lowest water absorption - optimal insulation performance

## Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	10.5
63	22.1
80	28.4
100	26.4
125	27.8
160	29.2
200	31.5
250	33.8
315	38.2
400	41.2
500	45.7
630	47.7
800	50.2
1000	52.3
1250	53.8
1600	54.7
2000	54.4
2500	49.8
3150	51.5
4000	54.4
5000	48.3

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FB 6020, 70 mm  
Stiffener: SeaRox FB 6050, 30 mm

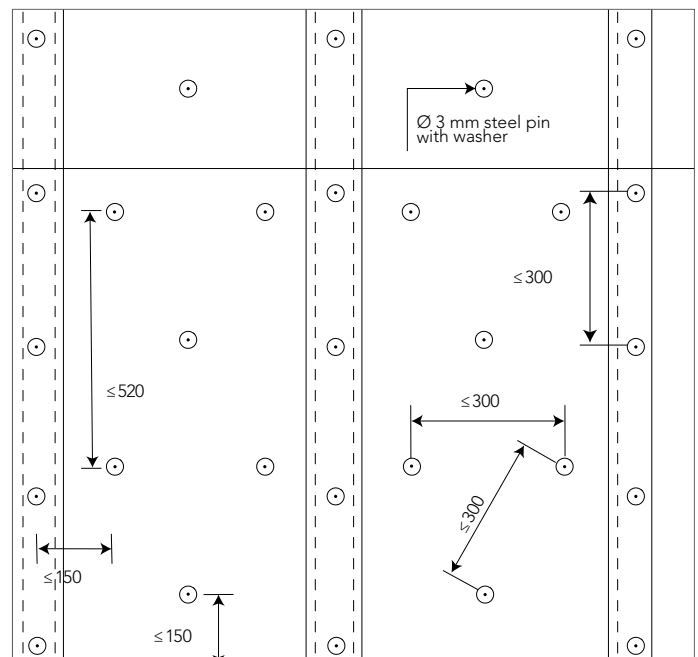
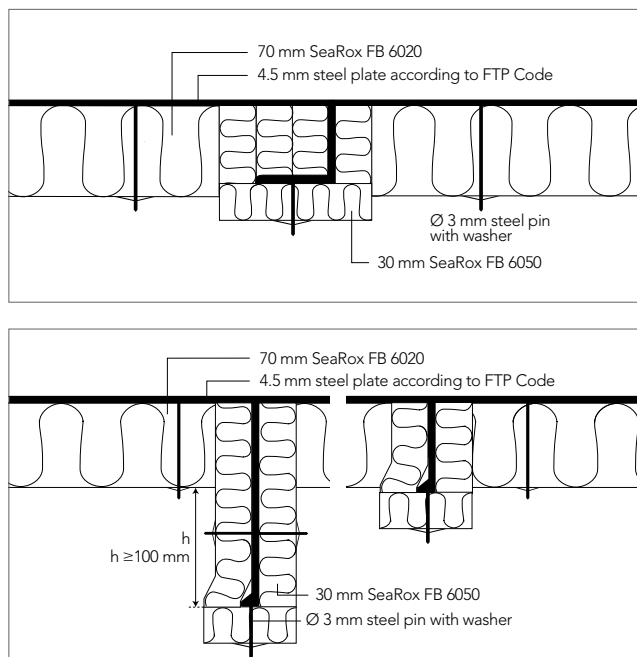
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -6) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FB 6020, 70 mm,  $\alpha_w = 0.95$

## Construction details





## A-60 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FM 6040 ALU	50 mm	60 kg/m <sup>3</sup>	3.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6040 ALU	50 mm	60 kg/m <sup>3</sup>	3.0 kg/m <sup>2</sup>

### Construction notes:

- Plate and stiffeners insulated with one layer of min. 50 mm SeaRox FM 6040 ALU.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of Ø 30-38 mm.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.

### Surface (as standard):

- Reinforced aluminium foil

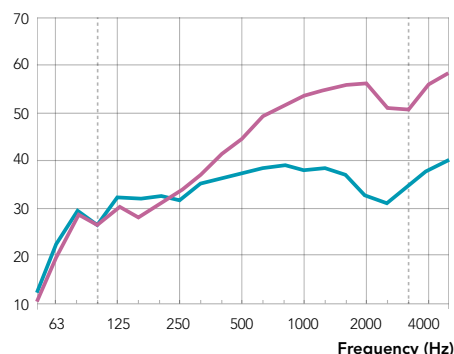
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	11.4
63	20.1
80	29.3
100	26.6
125	30.5
160	28.5
200	31.0
250	34.3
315	37.5
400	41.6
500	45.0
630	49.2
800	51.4
1000	53.8
1250	54.9
1600	55.8
2000	56.2
2500	51.1
3150	51.3
4000	56.1
5000	58.7

Sound Insulation, R (dB)

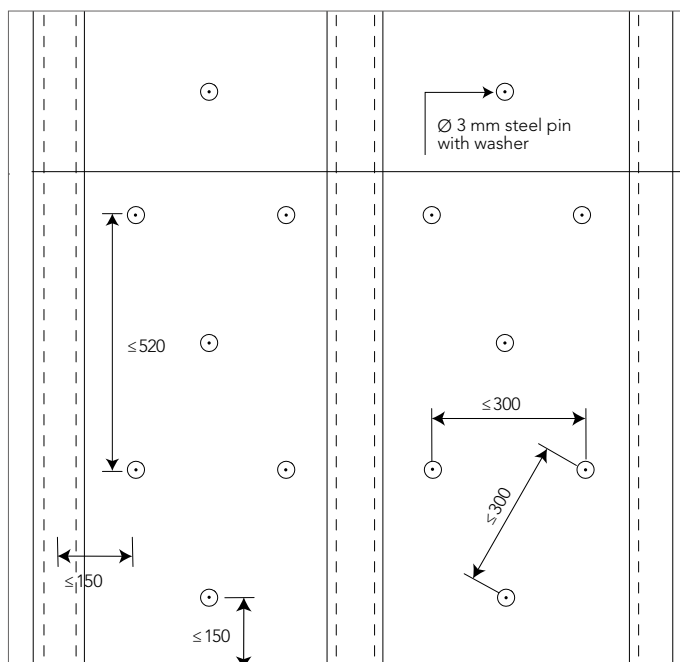
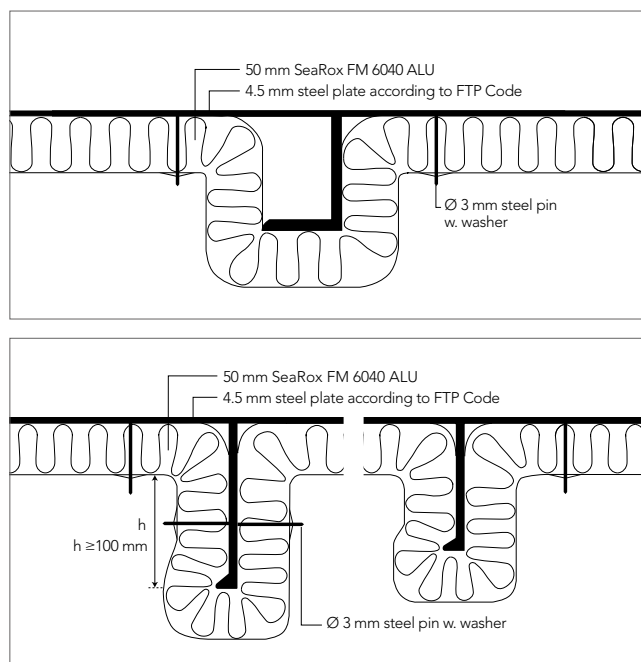


■ Test set-up: Plate: SeaRox FM 6040 ALU, 50 mm  
Stiffener: SeaRox FM 6040 ALU, 50 mm

■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

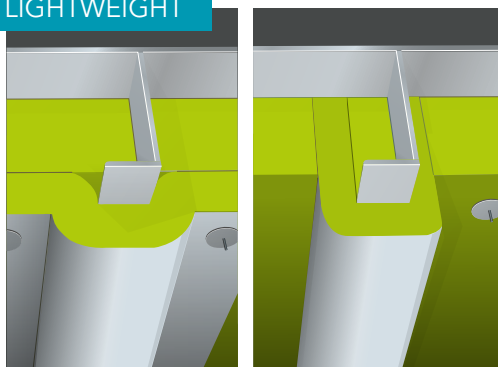
$$R_w(C;C_{tr}) = 47 (-2; -7) \text{ dB}$$

### Construction details





# A-60 Steel Deck



	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FB 6020	70 mm	40 kg/m <sup>3</sup>	2.8 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6040 ALU	35 mm	60 kg/m <sup>3</sup>	2.1 kg/m <sup>2</sup>

## Construction notes:

- Stiffeners insulated with min. 35 mm Searox FM 6040 ALU.
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6020.
- or
- Steel plate between stiffeners insulated with min. 70 mm SeaRox FB 6020.
- Stiffener insulated with min. 150 mm on either side with min. 35 mm SeaRox FM 6040 ALU.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of min. Ø 30-38 mm.

## Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

## Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth (SeaRox FB 6020)

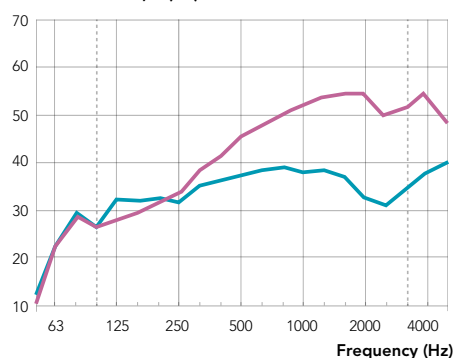
## Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance

## Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	10.5
63	22.1
80	28.4
100	26.4
125	27.8
160	29.2
200	31.5
250	33.8
315	38.2
400	41.2
500	45.7
630	47.7
800	50.2
1000	52.3
1250	53.8
1600	54.7
2000	54.4
2500	49.8
3150	51.5
4000	54.4
5000	48.3

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox FB 6020, 70 mm  
Stiffener: SeaRox FB 6050, 30 mm

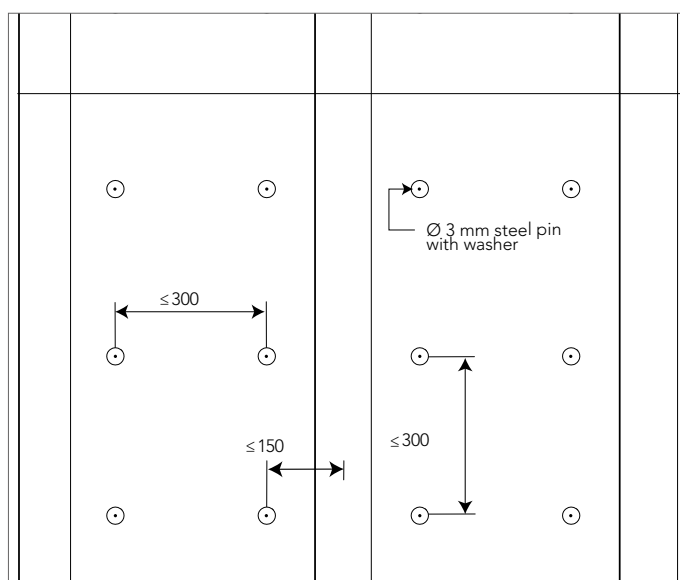
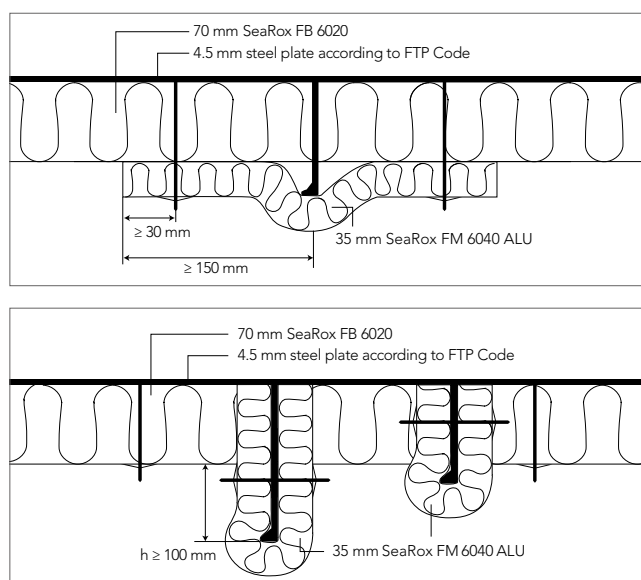
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -6) \text{ dB}$$

## Sound absorption:

Weighted sound absorption: SeaRox FB 6020, 70 mm,  $\alpha_w = 0.95$

## Construction details



## A-15 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	50 mm	100 kg/m <sup>3</sup>	5.0 kg/m <sup>2</sup>
<b>Stiffener</b>	No insulation			

### Construction notes:

- Plate between stiffeners insulated with one layer of min. 50 mm SeaRox SL 620.
- No insulation on stiffeners.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with washers of Ø 30-38 mm.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

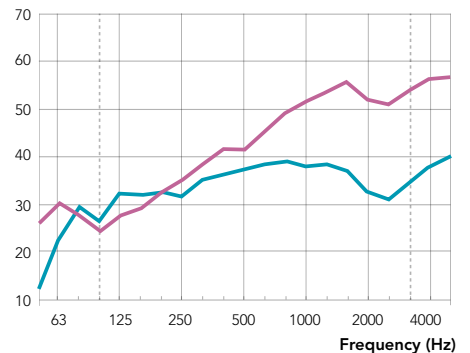
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

### Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	25.9
63	30.2
80	27.6
100	24.4
125	27.6
160	29.1
200	32.6
250	35.1
315	38.4
400	41.6
500	41.4
630	45.1
800	49.1
1000	51.4
1250	53.6
1600	55.7
2000	51.9
2500	50.9
3150	53.7
4000	56.3
5000	56.7

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 50 mm

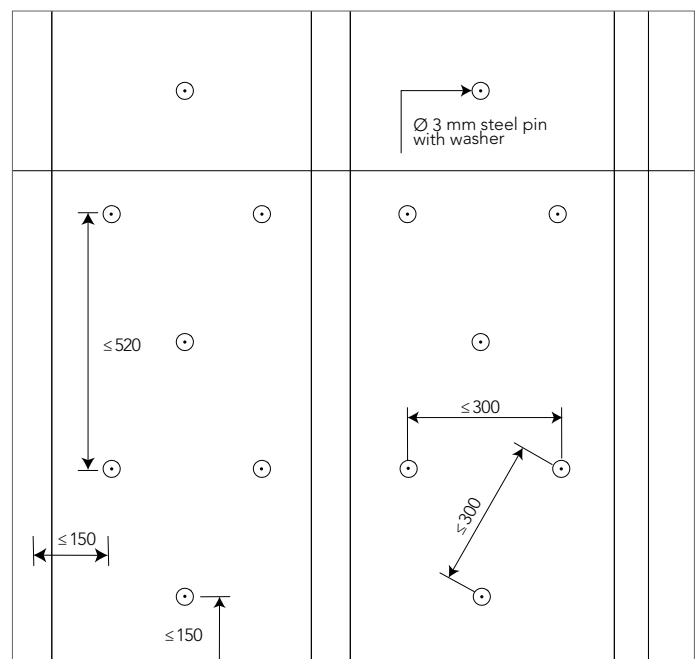
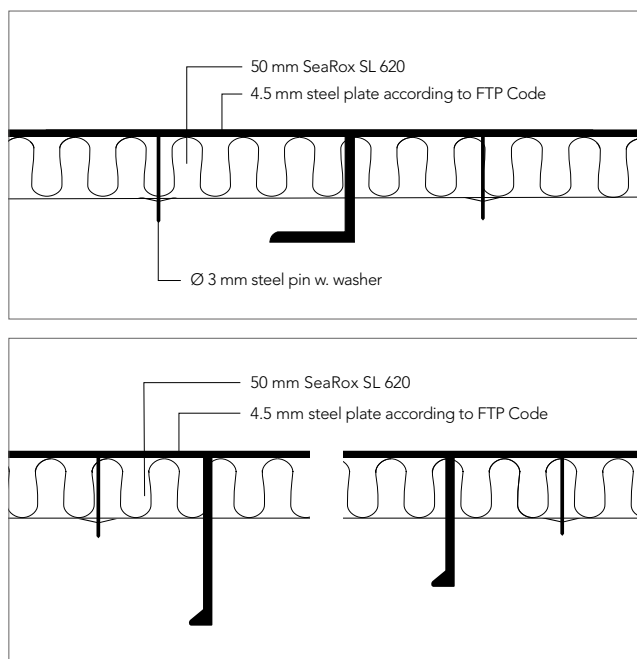
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -7) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: **SeaRox SL 620, 50 mm**,  $\alpha_w = 0.85$

### Construction details



## A-30 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	25 mm	100 kg/m <sup>3</sup>	2.5 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 620	25 mm	100 kg/m <sup>3</sup>	2.5 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with min. 25 mm SeaRox SL 620.
- Plate between stiffeners insulated with min. 25 mm SeaRox SL 620.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

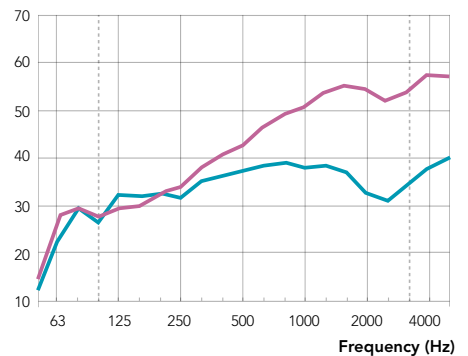
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	14.3
63	27.8
80	29.9
100	27.4
125	29.8
160	30.1
200	32.4
250	34.1
315	38.2
400	40.8
500	42.6
630	46.7
800	49.3
1000	50.9
1250	54.0
1600	55.2
2000	54.7
2500	52.3
3150	53.8
4000	57.7
5000	57.2

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 25 mm  
Stiffener: SeaRox SL 620, 25 mm

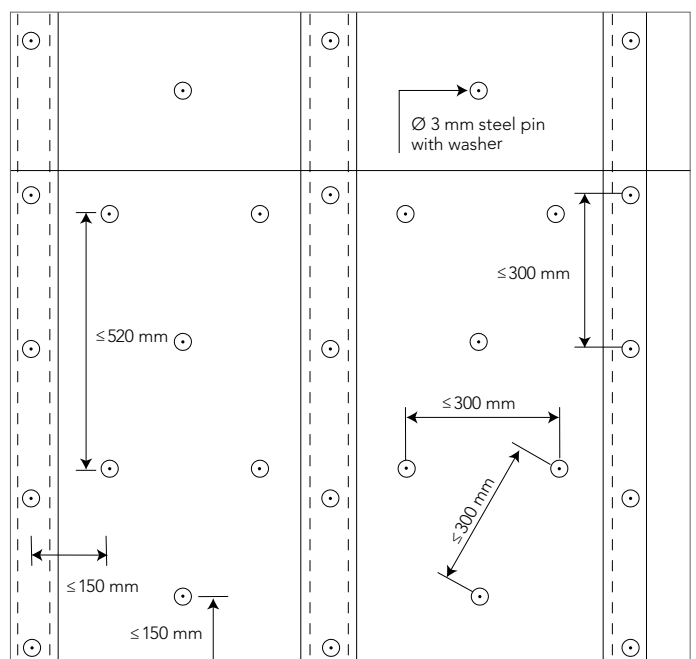
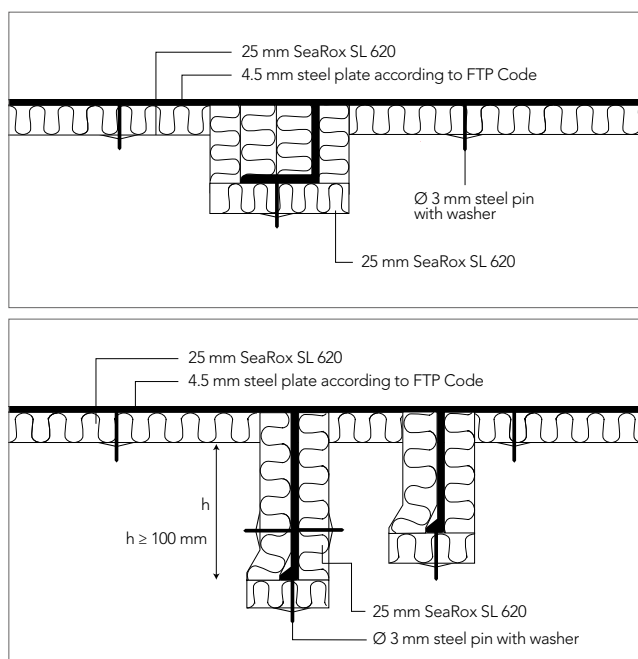
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 47 (-2; -7) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox SL 620, 30 mm,  $\alpha_w = 0.60$

### Construction details



## A-60 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	40 mm	100 kg/m <sup>3</sup>	4.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 620	25 mm	100 kg/m <sup>3</sup>	2.5 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with min. 25 mm SeaRox SL 620.
- Plate between stiffeners insulated with min. 40 mm SeaRox SL 620.
- Ø 3 mm pins fixed with max. 300 mm distance.
- Insulation secured with Ø 30-38 mm spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Alternative pin and stiffener design acc. to certificates.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

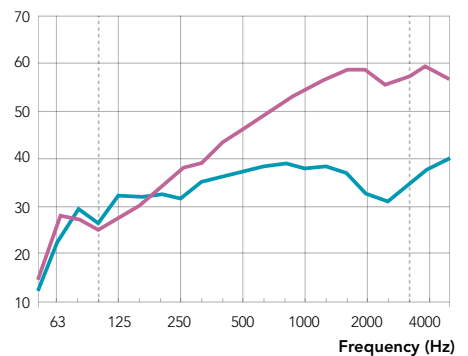
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance
- Thin solution to maximize available space

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	14.5
63	27.7
80	27.2
100	25.5
125	27.7
160	30.0
200	34.2
250	38.0
315	39.2
400	43.1
500	46.1
630	48.8
800	51.9
1000	54.3
1250	56.4
1600	58.3
2000	58.5
2500	55.6
3150	56.8
4000	59.0
5000	57.1

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 40 mm  
Stiffener: SeaRox SL 620, 25 mm

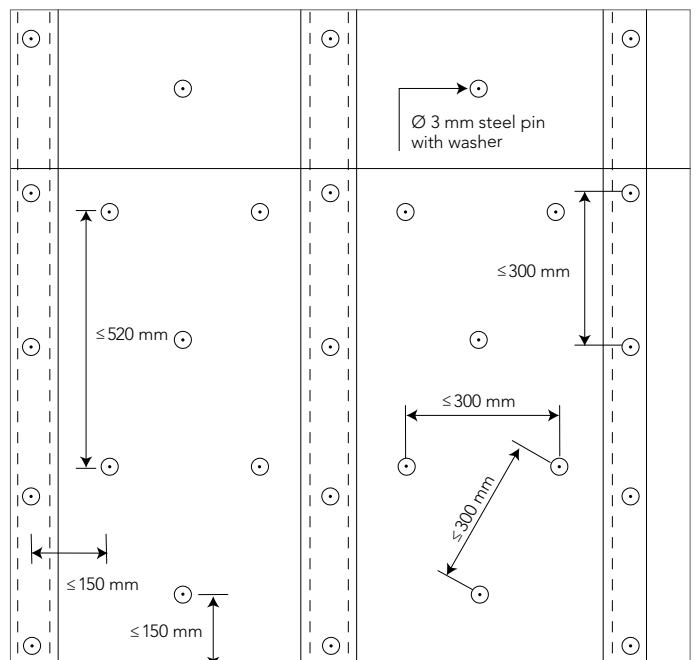
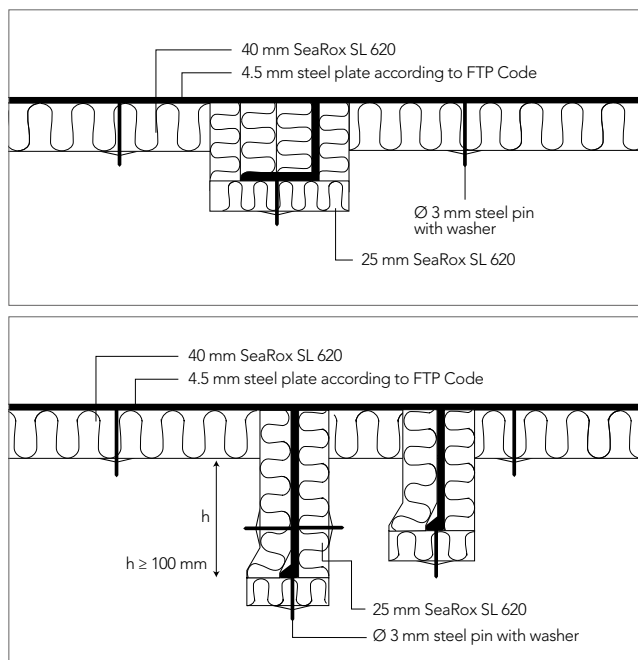
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-2; -7) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox SL 620, 40 mm,  $\alpha_w = 0.80$

### Construction details





## A-60 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox WM 620	45 mm	90 kg/m <sup>3</sup>	4.1 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox WM 620	45 mm	90 kg/m <sup>3</sup>	4.1 kg/m <sup>2</sup>



### Construction notes:

- Plate and stiffeners insulated with one layer of 45 mm SeaRox WM 620.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Insulation secured with washers of Ø 38 mm.

### Application notes:

- All connections must be tight.
- Wire mesh must be twisted together at joints.
- The pins should exceed the insulation by approx. 10 mm.

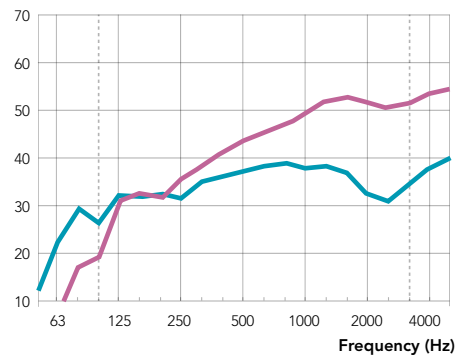
### Advantages:

-  Lowest water absorption - optimal insulation performance
-  Secures excellent noise reduction and better comfort

### Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	10.1
63	8.4
80	17.2
100	19.4
125	31.4
160	32.7
200	32.1
250	35.8
315	38.8
400	41.1
500	43.7
630	45.2
800	47.1
1000	49.5
1250	52.1
1600	53.0
2000	51.8
2500	50.9
3150	51.6
4000	53.8
5000	54.7

Sound Insulation, R (dB)



■ Test set-up: Plate /Stiffener: SeaRox WM 620, 45 mm

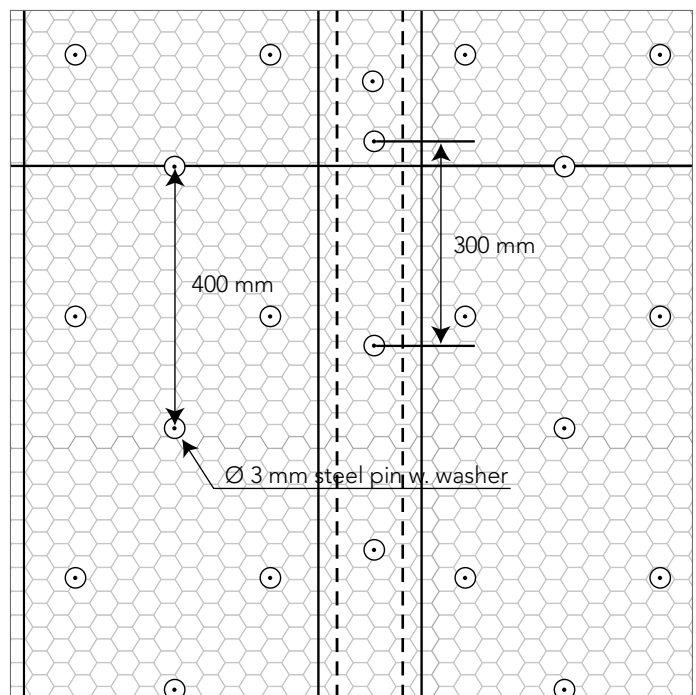
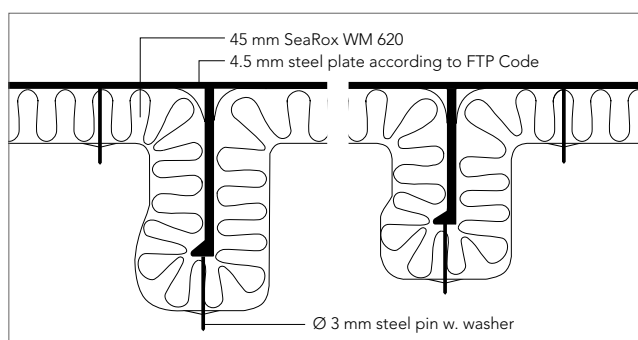
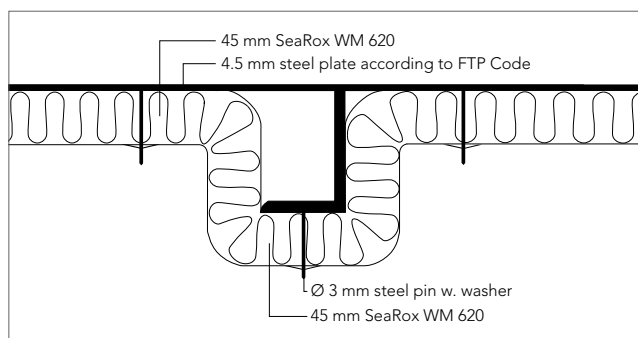
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-2; -8) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRoxWM 620, 45 mm,  $\alpha_w = 0.90$

### Construction details



## A-60 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 640	40 mm	130 kg/m <sup>3</sup>	5.2 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 640	40 mm	130 kg/m <sup>3</sup>	5.2 kg/m <sup>2</sup>

### Construction notes:

- Plate between stiffeners insulated with one layer of 40 mm SeaRox SL 640.
- Stiffeners insulated with 40 mm SeaRox SL 640.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Insulation secured with washers of Ø 38 mm.

### Application notes:

- All connections must be tight.
- Gap under the stiffener must be filled out completely.
- The pins should exceed the insulation by approx. 10 mm.

### Advantages:



Lowest water absorption - optimal insulation performance

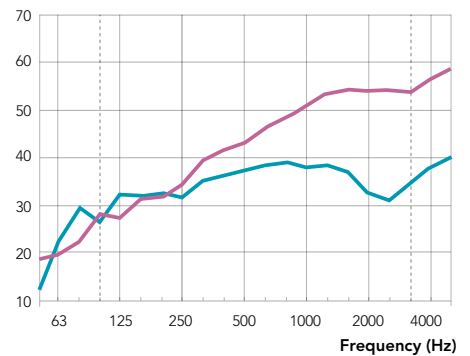


Secures excellent noise reduction and better comfort

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	18.7
63	19.7
80	22.5
100	28.1
125	27.5
160	31.8
200	32.1
250	35.2
315	39.8
400	41.9
500	43.0
630	46.4
800	48.4
1000	51.2
1250	53.7
1600	54.5
2000	54.4
2500	54.1
3150	53.7
4000	56.7
5000	59.3

Sound Insulation, R (dB)



■ Test set-up: Plate /Stiffener: SeaRox SL 640, 40 mm

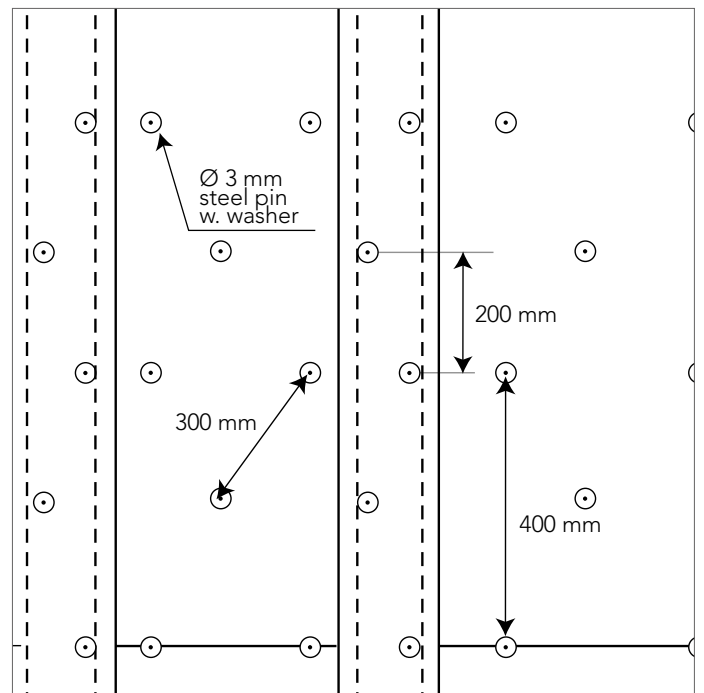
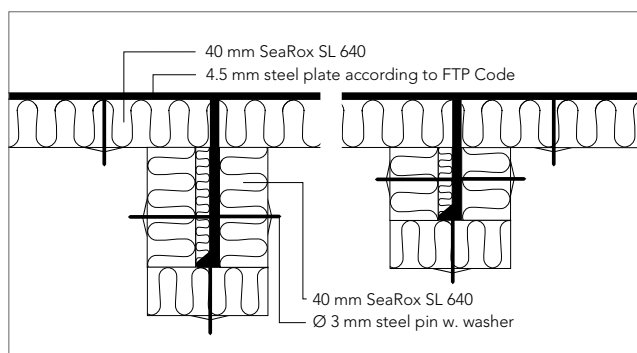
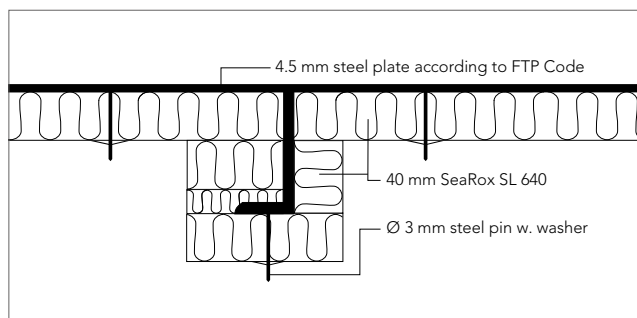
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 47 (-2; -6) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: SeaRox SL 640 , 40 mm,  $\alpha_w = 0.90$

### Construction details



Index of

# Floating floor



## Floating floor

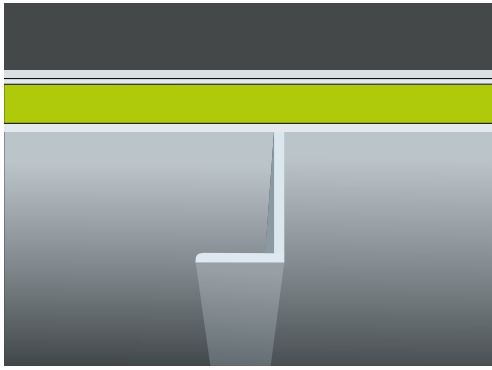
Floating floor		Page
A-60	SeaRox SL 436/SeaRox SL 440/SeaRox SL 480	61







## A-60 Floating floor



	Product	Thickness	Density
<b>Plate</b>	SeaRox SL 436 SeaRox SL 440 SeaRox SL 480	60 mm	140-200 kg/m <sup>3</sup>

### Construction notes:

- The floor insulated with one or two layers of equal thickness and staggered joints with a total insulation thickness of 60 mm of SeaRox SL 436, SeaRox SL 440 or SeaRox SL 480.
- Insulation covered by a 2 x 1.5 mm steel plate applied staggered and glued together with a two-component solvent-free glue (certified for low flame spread).

### Application notes:

- Do not step directly on the wool during installation. Always use a board or similar when moving around on the wool.
- To avoid sound from travelling finishing the construction with a rigid ROCKWOOL product placed edgewise and sealed with a flexible sealant is recommended.

### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance

### Covering:

- The wool must be covered by at least two layers of 1.5 mm thick steel sheets glued together with butted joints.
- Indication for static load on insulation material:  
SeaRox SL 436: ≥ 12 kPa  
SeaRox SL 440: ≥ 30 kPa  
SeaRox SL 480: ≥ 40 kPa

### Sound reduction:

SeaRox SL 436:

$$R_w(C) = 55 (-4) \text{ dB}$$

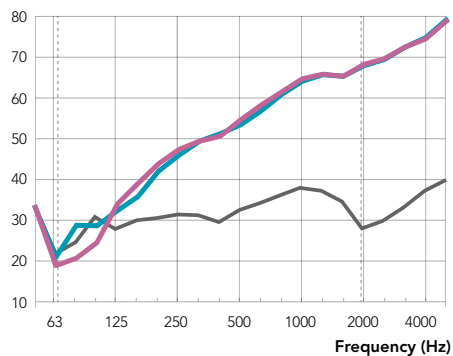
f Frequency	R 1/3 Octave	f Frequency	R 1/3 Octave
Hz	dB	Hz	dB
50	33.0	630	58.0
63	18.9	800	61.2
80	20.7	1000	64.4
100	24.5	1250	65.5
125	33.9	1600	65.0
160	38.9	2000	67.9
200	43.7	2500	69.3
250	47.2	3150	72.1
315	49.2	4000	74.1
400	50.4	5000	78.4
500	54.4		

SeaRox SL 480:

$$R_w(C) = 54 (-2) \text{ dB}$$

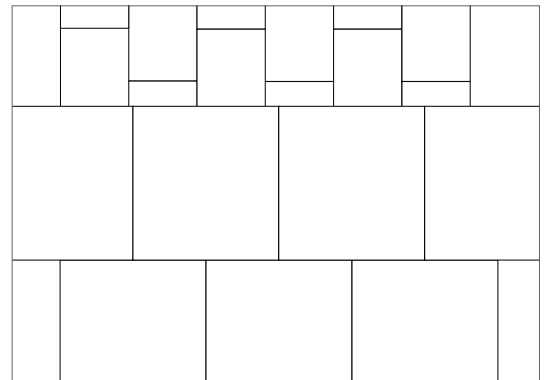
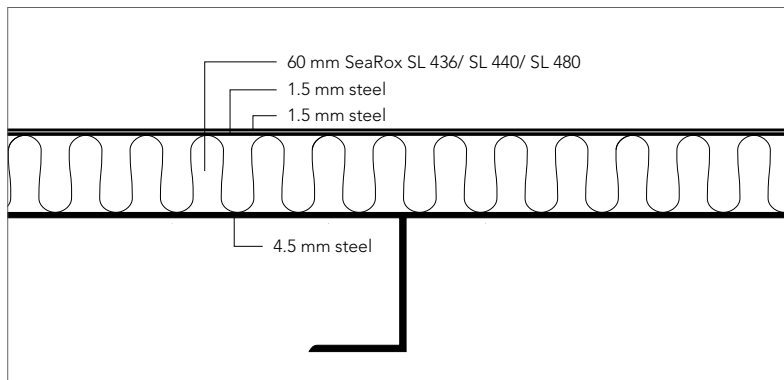
f Frequency	R 1/3 Octave	f Frequency	R 1/3 Octave
Hz	dB	Hz	dB
50	33.0	630	56.6
63	20.9	800	60.6
80	28.7	1000	63.8
100	28.6	1250	65.4
125	32.3	1600	65.0
160	35.7	2000	67.6
200	41.9	2500	69.1
250	45.8	3150	72.1
315	49.2	4000	74.4
400	51.0	5000	78.7
500	53.2		

Sound Insulation, R (dB)



- Test set-up: 6mm test deck, 60mm SeaRox SL 436, 2x1.5mm steel plate
- Test set-up: 6mm test deck, 2x30mm SeaRox SL 480, 2x1.5mm steel plate
- Reference deck

### Construction details

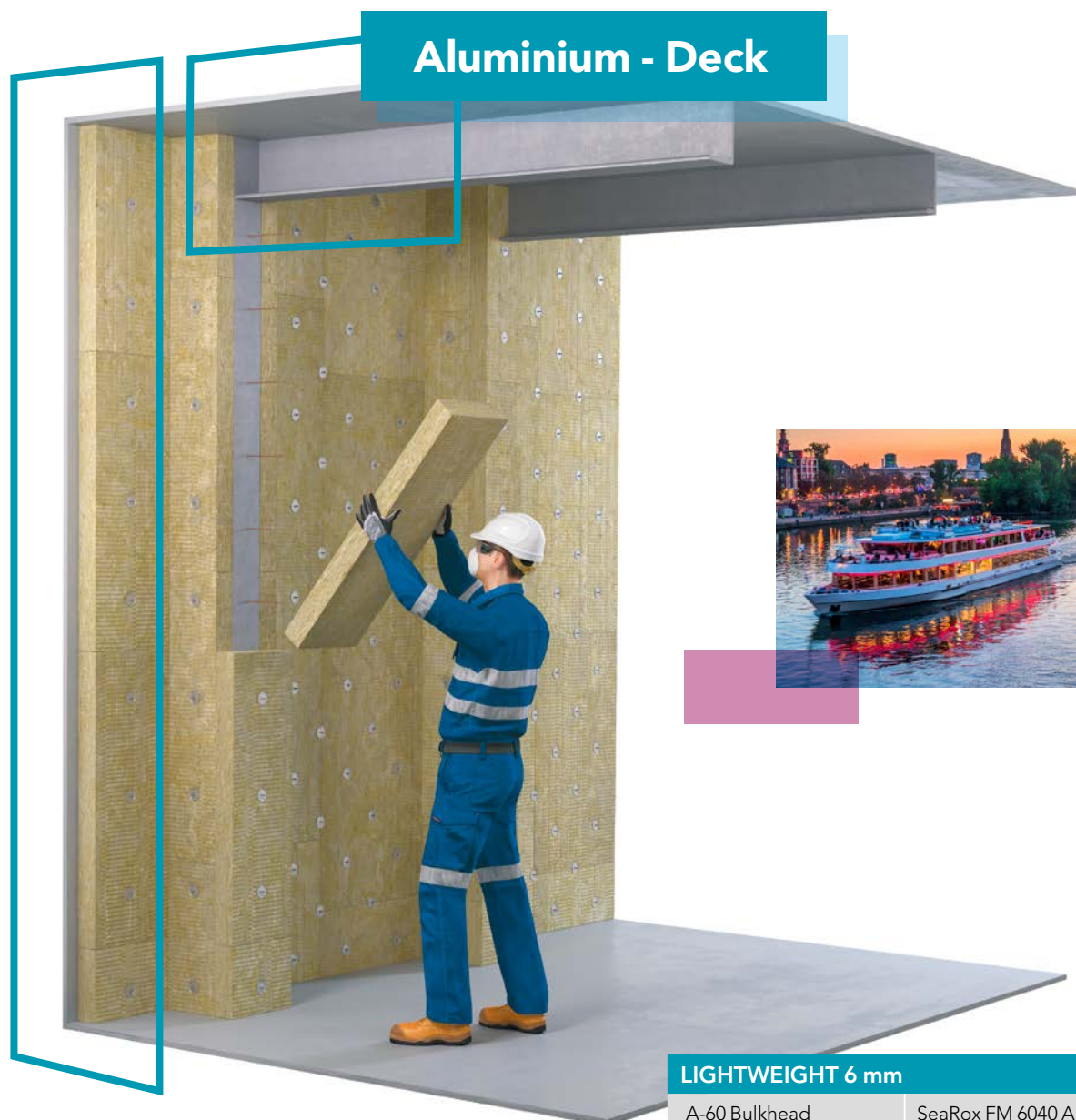




Index of

# A-constructions

## Aluminium Bulkhead & Deck

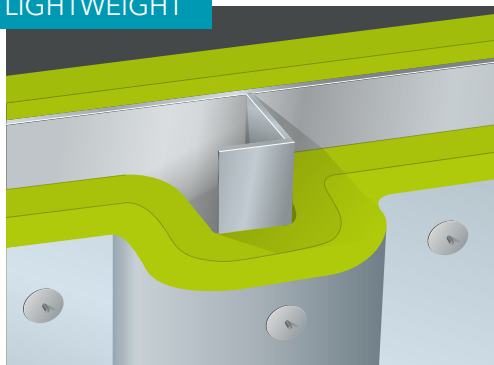


### Aluminium - Bulkhead

LIGHTWEIGHT 6 mm		Page
A-60 Bulkhead	SeaRox FM 6040 ALU	64
A-60 Bulkhead restricted	SeaRox FM 6040 ALU	65
A-60 Deck	SeaRox FM 6040 ALU	66

LIGHTWEIGHT 4 mm		Page
A-60 Bulkhead	SeaRox FM 6050 ALU	67
A-60 Bulkhead restricted	SeaRox FM 6050 ALU	68
A-60 Deck	SeaRox FM 6050 ALU	69

STANDARD 6 mm		Page
A-60 Bulkhead	SeaRox SL 620	70
A-60 Deck	SeaRox SL 620	71



## A-60 Aluminium Bulkhead 6 mm

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FM 6040 ALU	2 x 35 mm*	60 kg/m <sup>3</sup>	4.2 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6040 ALU	2 x 35 mm	60 kg/m <sup>3</sup>	4.2 kg/m <sup>2</sup>

\* insulation of both sides of aluminium plate

### Construction notes:

- Steel plate and stiffeners insulated with two layers of min. 35 mm SeaRox FM 6040 ALU on both sides of aluminium plate.
- Ø 3 mm aluminium-tipped pins fixed with max. 300 mm distance.
- Insulation secured with Ø 38 mm stainless steel spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Joints must be staggered according to test drawings.

### Surface (as standard):

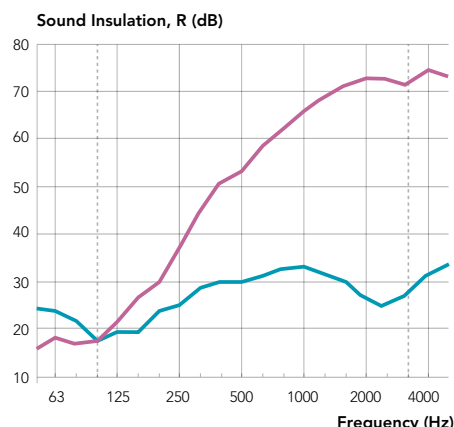
- Reinforced aluminium foil

### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	15.7
63	18.4
80	16.8
100	17.3
125	21.5
160	26.7
200	30.0
250	37.5
315	44.9
400	50.6
500	53.5
630	58.4
800	61.9
1000	65.7
1250	68.7
1600	71.0
2000	72.7
2500	72.5
3150	71.3
4000	74.5
5000	73.1

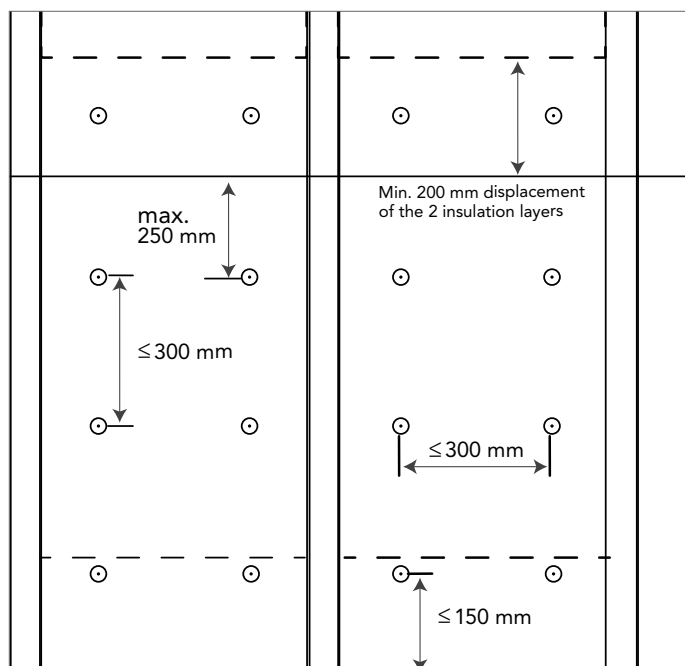
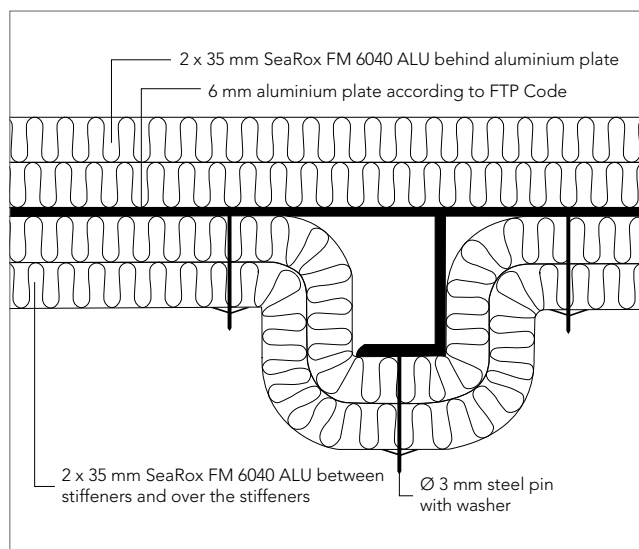


■ Test set-up: Plate: SeaRox FM 6040 ALU, 2 x 35 mm  
Stiffener: SeaRox FM 6040 ALU, 2 x 35 mm

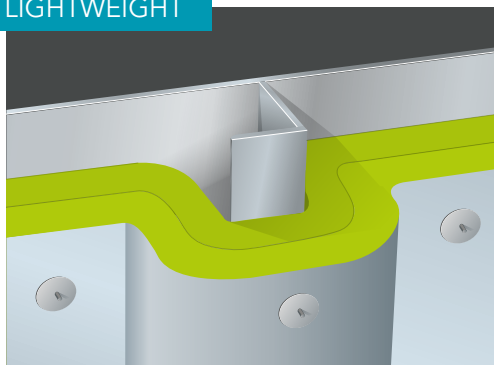
■ Aluminium Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 46 (-4; -11) \text{ dB}$$

### Construction details







## A-60 Aluminium Bulkhead restricted 6 mm

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FM 6040 ALU	2 x 35 mm	60 kg/m <sup>3</sup>	4.2 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6040 ALU	2 x 35 mm	60 kg/m <sup>3</sup>	4.2 kg/m <sup>2</sup>

### Construction notes:

- Steel plate and stiffeners insulated with two layers of min. 35 mm SeaRox FM 6040 ALU.
- Ø 3 mm aluminium-tipped pins fixed with max. 300 mm distance.
- Insulation secured with Ø 38 mm stainless steel spring washers.






### Application notes:

- Restricted application (fire against insulated side).
- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Joints must be staggered according to test drawings.

### Surface (as standard):

- Reinforced aluminium foil

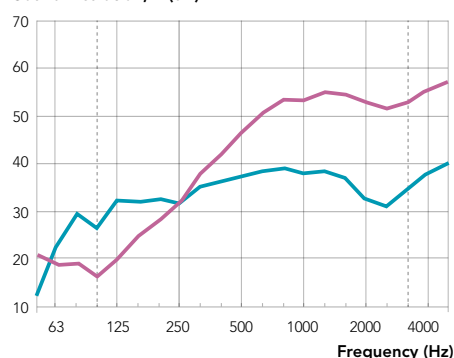
### Advantages:

-  Ensures highest fire safety on board
-  Secures excellent noise reduction and better comfort
-  Low weight to reduce energy consumption and emissions
-  Cuts labour time and reduces the total cost of installation
-  Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	21.1
63	18.9
80	19.3
100	16.6
125	20.2
160	25.5
200	28.3
250	32.1
315	38.2
400	42.5
500	46.6
630	51.1
800	53.2
1000	53.5
1250	54.6
1600	54.5
2000	52.7
2500	51.9
3150	52.6
4000	55.5
5000	57.5

Sound Insulation, R (dB)

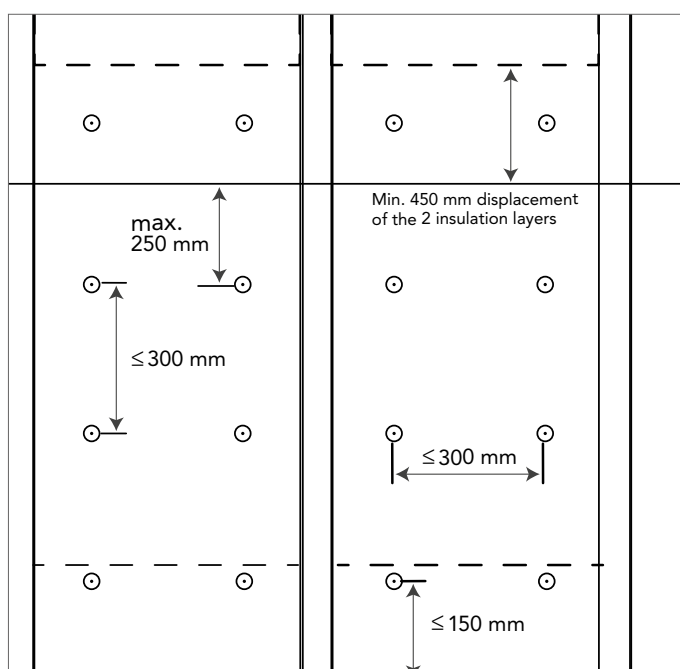
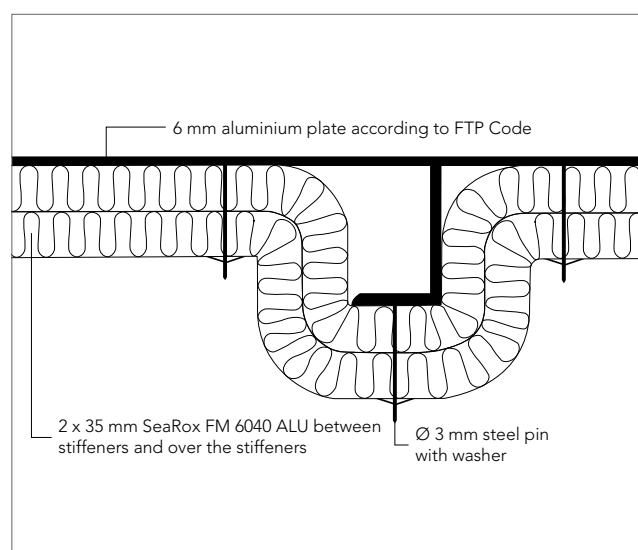


■ Test set-up: Plate: SeaRox FM 6040 ALU, 2 x 35 mm  
Stiffener: SeaRox FM 6040 ALU, 2 x 35 mm

■ Aluminium Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 43 (-3; -9) \text{ dB}$$

### Construction details





## A-60 Aluminium Deck 6 mm

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FM 6040 ALU	2 x 35 mm	60 kg/m <sup>3</sup>	4.2 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6040 ALU	2 x 35 mm	60 kg/m <sup>3</sup>	4.2 kg/m <sup>2</sup>

### Construction notes:

- Steel plate and stiffeners insulated with two layers of min. 35 mm SeaRox FM 6040 ALU.
- Ø 3 mm aluminium-tipped pins fixed with max. 300 mm distance.
- Insulation secured with Ø 38 mm stainless steel spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.
- Joints must be staggered according to test drawings.

### Surface (as standard):

- Reinforced aluminium foil

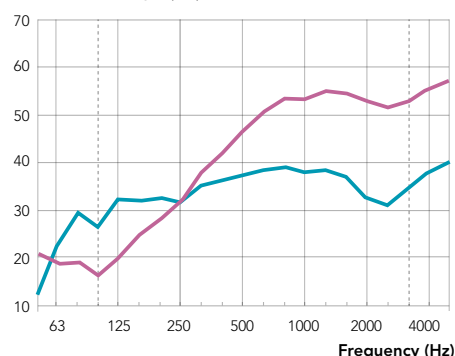
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f	R
Frequency	1/3 Octave
Hz	dB
50	21.1
63	18.9
80	19.3
100	16.6
125	20.2
160	25.5
200	28.3
250	32.1
315	38.2
400	42.5
500	46.6
630	51.1
800	53.2
1000	53.5
1250	54.6
1600	54.5
2000	52.7
2500	51.9
3150	52.6
4000	55.5
5000	57.5

Sound Insulation, R (dB)

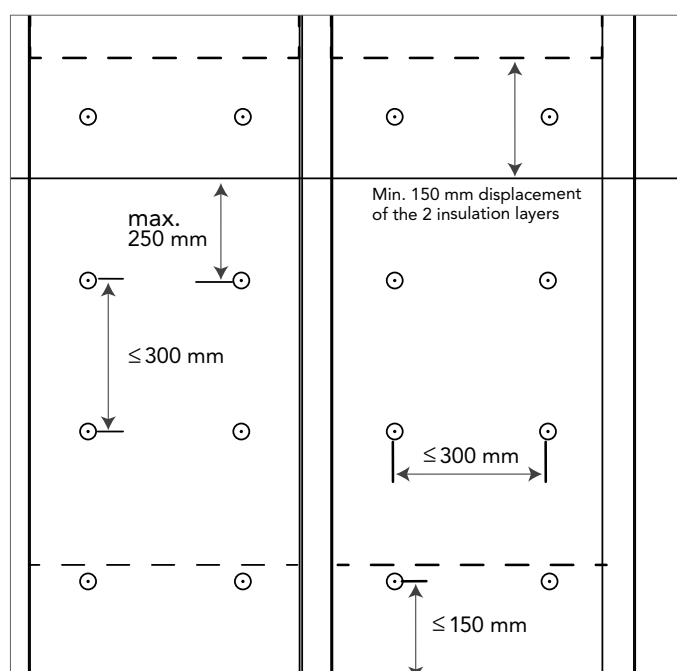
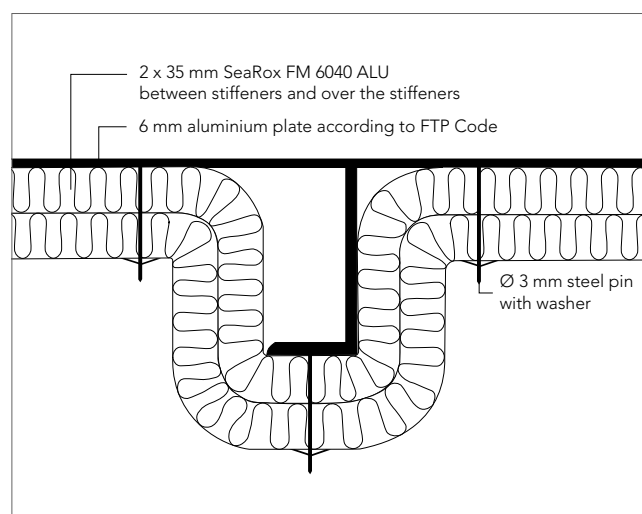


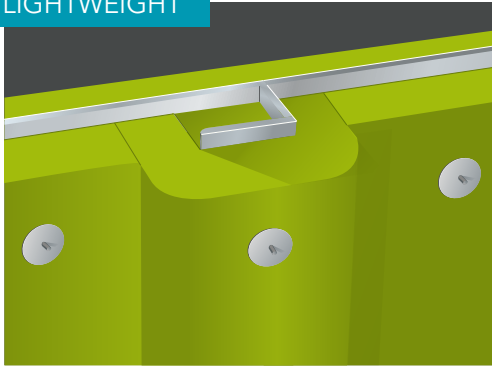
■ Test set-up: Plate: SeaRox FM 6040 ALU, 2 x 35 mm  
Stiffener: SeaRox FM 6040 ALU, 2 x 35 mm

■ Aluminium Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 43 (-3; -9) \text{ dB}$$

### Construction details





## A-60 Aluminium Bulkhead 4 mm

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FM 6050 ALU*	75 mm**	70 kg/m <sup>3</sup>	5.3 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6050 ALU*	75 mm	70 kg/m <sup>3</sup>	5.3 kg/m <sup>2</sup>

\* alternative product SeaRox FB 6050 \*\* insulation on both sides of alu plate

### Construction notes:

- Aluminium plate and stiffeners insulated with one layer of 75 mm SeaRox FM 6050 ALU or SeaRox FB 6050.
- Fire test on 70 mm insulation thickness, approved for 75 mm.
- Ø 3 mm aluminium-tipped steel pins fixed with max 300 mm distance.
- Insulation secured with Ø 38 mm stainless steel spring washers.

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.

### Surface:

- SeaRox FM 6050 ALU: reinforced aluminium (as standard)
- SeaRox FB 6050: reinforced aluminium (optional)

### Advantages:



Ensures highest fire safety on board



Secures excellent noise reduction and better comfort



Low weight to reduce energy consumption and emissions

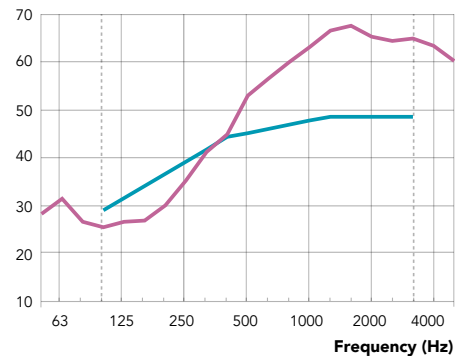


Cuts labour time and reduces the total cost of installation

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	21.2
63	24.9
80	19.2
100	17.9
125	19.2
160	19.6
200	23.2
250	29.4
315	36.3
400	40.7
500	50.1
630	54.3
800	58.4
1000	62.0
1250	66.1
1600	67.2
2000	64.6
2500	63.5
3150	64.1
4000	62.4
5000	58.7

Sound Insulation, R (dB)

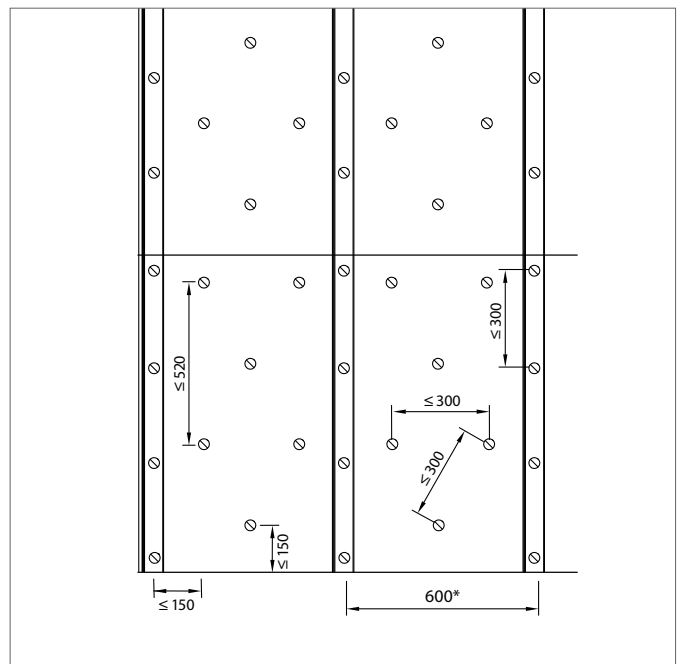
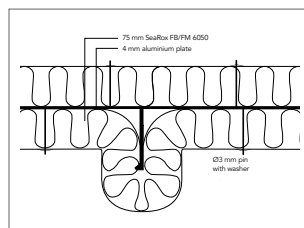
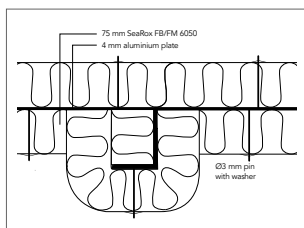
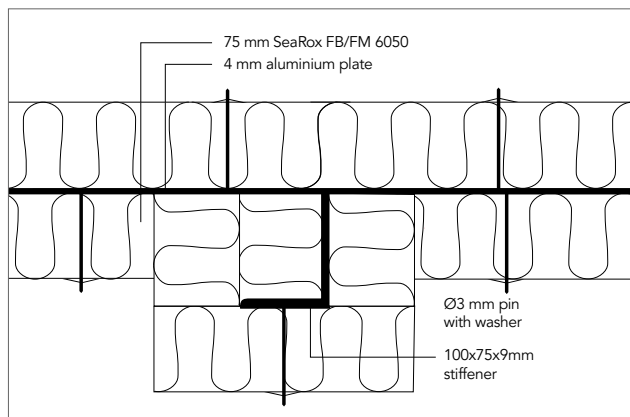


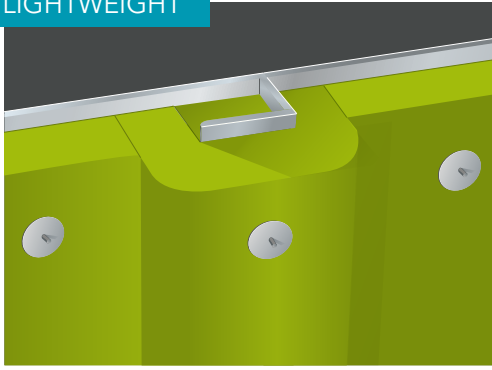
Test set-up:  
Plate (4mm): SeaRox FB 6050, 75mm (both sides of alu plate), Stiffener (140x10mm): SeaRox FB 6050, 75mm

Alu Bulkhead: 1500 / 1180 / 4 mm  
Bulb profile: 1820 / 140 / 10mm (without insulation)

$$R_w(C;C_{tr}) = 41 (-3; -9) \text{ dB}$$

### Construction details





## A-60 Aluminium Bulkhead restricted 4 mm

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FM 6050 ALU*	75 mm	70 kg/m <sup>3</sup>	5.3 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6050 ALU*	75 mm	70 kg/m <sup>3</sup>	5.3 kg/m <sup>2</sup>

\* alternative product SeaRox FB 6050

### Construction notes:

- Aluminium plate and stiffeners insulated with one layer of 75 mm SeaRox FM 6050 ALU or SeaRox FB 6050
- Ø 3 mm aluminium-tipped steel pins fixed with max 300 mm distance
- Insulation secured with Ø 38 mm stainless steel spring washers

### Application notes:

- All connections must be tight
- The pins should exceed the insulation by approx. 10 mm.

### Surface:

- SeaRox FM 6050 ALU: reinforced aluminium (as standard)
- SeaRox FB 6050: reinforced aluminium (optional)

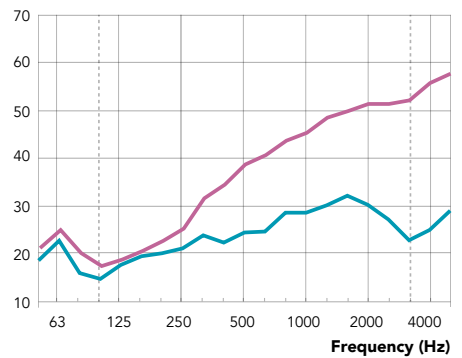
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	21.3
63	25.0
80	20.3
100	17.6
125	18.9
160	20.8
200	22.8
250	25.4
315	31.6
400	34.4
500	38.6
630	40.5
800	43.5
1000	45.1
1250	48.3
1600	49.5
2000	51.0
2500	51.1
3150	51.8
4000	55.3
5000	57.3

Sound Insulation, R (dB)

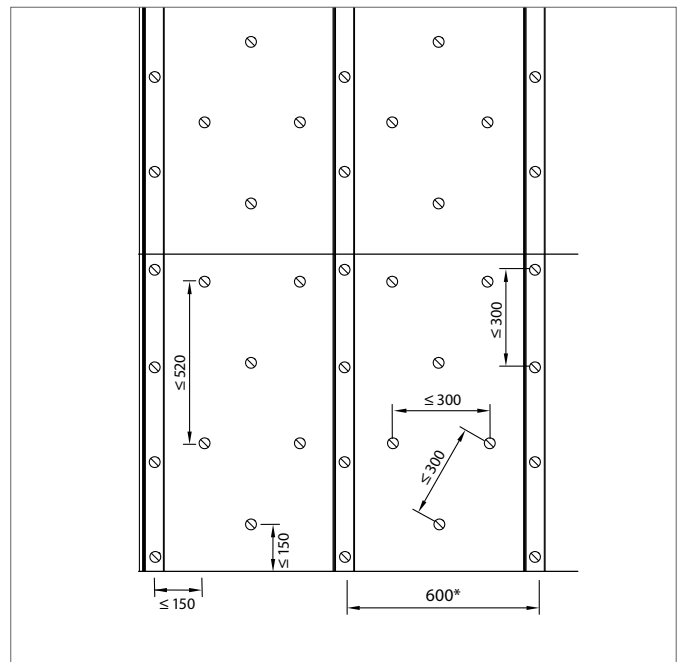
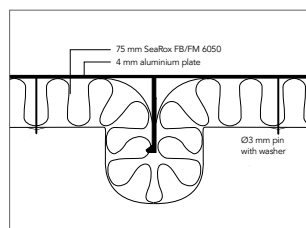
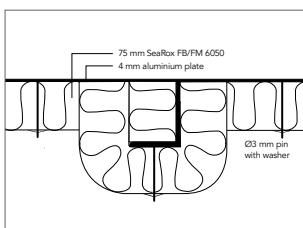
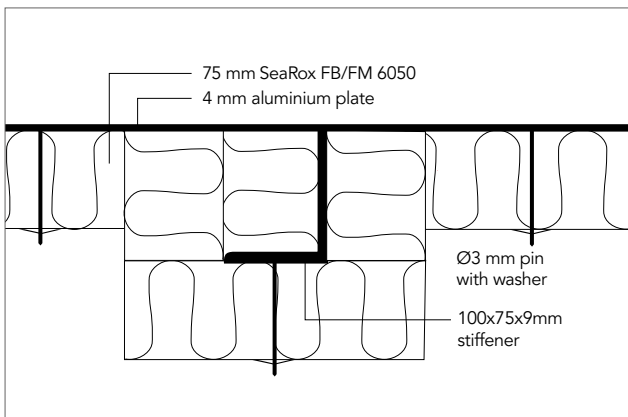


■ Test set-up: Plate: SeaRox FB 6050, 75 mm  
Stiffener: SeaRox FB 6050, 75 mm

■ Alu Bulkhead: 1500 / 1180 / 4 mm  
Bulb profile: 1820 / 140 / 10 mm (without insulation)

$$R_w(C;C_{tr}) = 39 (-3; -8) \text{ dB}$$

### Construction details







## A-60 Aluminium Deck 4 mm

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox FM 6050 ALU*	75 mm	70 kg/m <sup>3</sup>	5.3 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox FM 6050 ALU*	75 mm	70 kg/m <sup>3</sup>	5.3 kg/m <sup>2</sup>

\* alternative product SeaRox FB 6050

### Construction notes:

- Aluminium plate and stiffeners insulated with one layer of 75 mm SeaRox FM 6050 ALU or SeaRox FB 6050
- Ø 3 mm aluminium tipped steel pins fixed with max 300 mm distance
- Insulation secured with Ø 38 mm stainless steel spring washers

### Application notes:

- All connections must be tight.
- The pins should exceed the insulation by approx. 10 mm.

### Surface:

- SeaRox FM 6050 ALU: reinforced aluminium (as standard)
- SeaRox FB 6050: reinforced aluminium (optional)

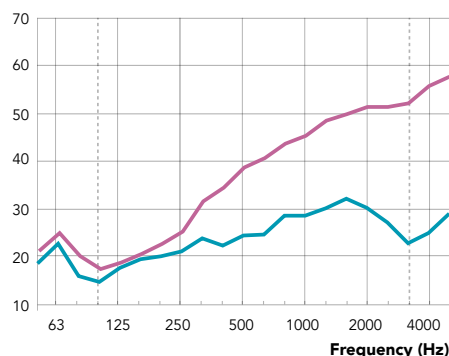
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Low weight to reduce energy consumption and emissions
- Cuts labour time and reduces the total cost of installation

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	21.3
63	25.0
80	20.3
100	17.6
125	18.9
160	20.8
200	22.8
250	25.4
315	31.6
400	34.4
500	38.6
630	40.5
800	43.5
1000	45.1
1250	48.3
1600	49.5
2000	51.0
2500	51.1
3150	51.8
4000	55.3
5000	57.3

Sound Insulation, R (dB)

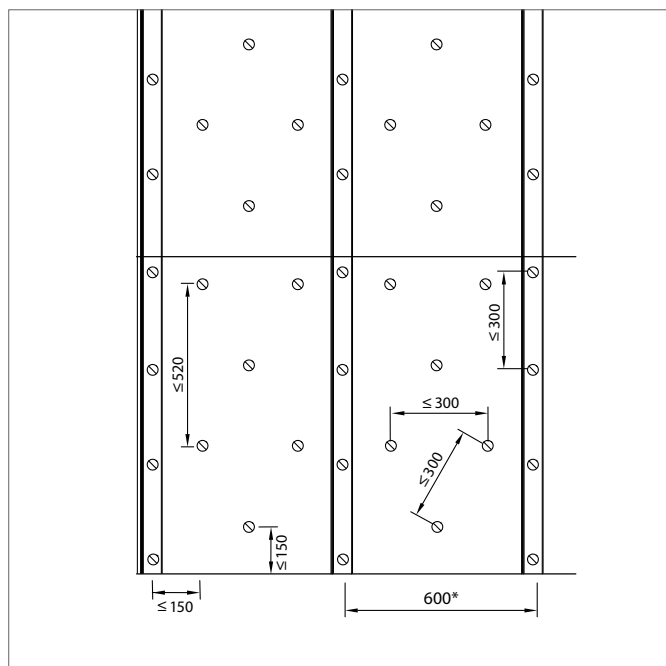
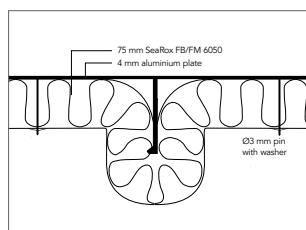
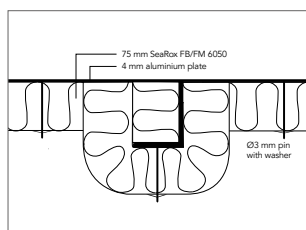
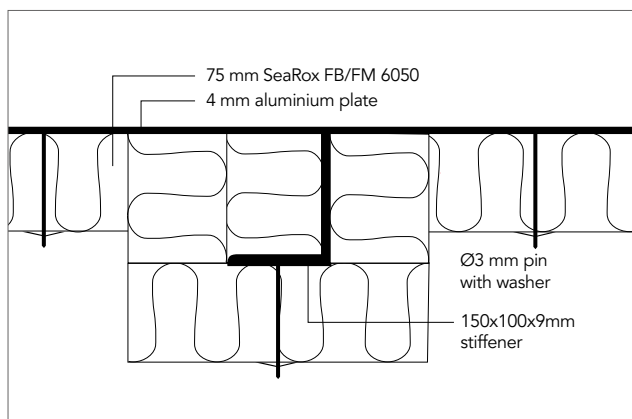


■ Test set-up: Plate: SeaRox FB 6050, 75mm  
Stiffener: SeaRox FB 6050, 75mm

■ Alu Bulkhead: 1500 / 1180 / 4 mm  
Bulb profile: 1820 / 140 / 10 mm (without insulation)

$$R_w(C;C_{tr}) = 39 (-3; -8) \text{ dB}$$

### Construction details





## A-60 Aluminium Bulkhead 6 mm

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	2 x 30 mm*	100 kg/m <sup>3</sup>	6.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 620	2 x 30 mm	100 kg/m <sup>3</sup>	6.0 kg/m <sup>2</sup>

\* insulation of both sides of aluminium plate

### Construction notes:

- Stiffeners insulated with two layers of min. 30 mm SeaRox SL 620.
- Plate between stiffeners insulated with two layers of 30 mm SeaRox SL 620. Insulation on both sides of the aluminium plate.
- Ø 3 mm aluminium-tipped stainless steel pins fixed with approx. 300 mm distance.
- Insulation secured with stainless steel washers of Ø 38 mm.

### Application notes:

- All the connections must be tight.
- Gap under the stiffener must be filled out completely.
- Joints must be staggered, 150 mm overlap is recommended.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

### Advantages:



Secures excellent noise reduction and better comfort

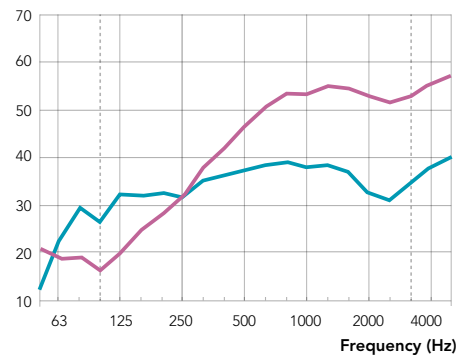


Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	13.2
63	16.8
80	18.0
100	18.1
125	16.8
160	20.1
200	23.2
250	29.5
315	35.1
400	40.7
500	45.6
630	49.3
800	52.6
1000	55.8
1250	58.0
1600	59.6
2000	61.0
2500	58.9
3150	56.4
4000	59.1
5000	59.5

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 2 x 30 mm  
Stiffener: SeaRox SL 620, 2 x 30 mm

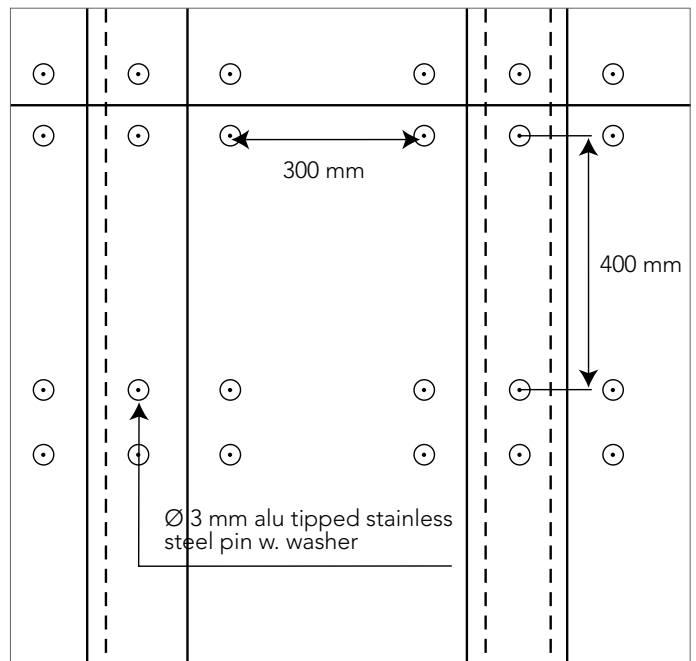
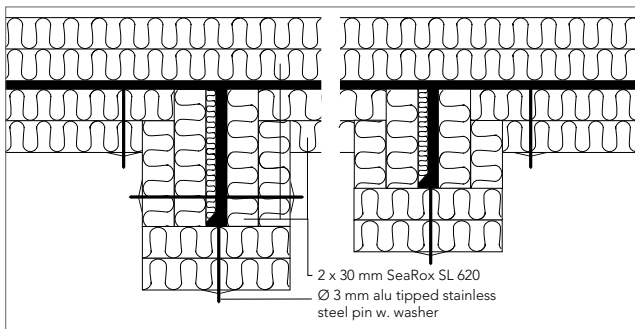
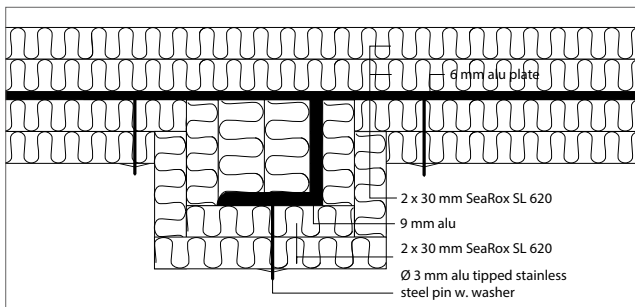
■ Aluminium Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

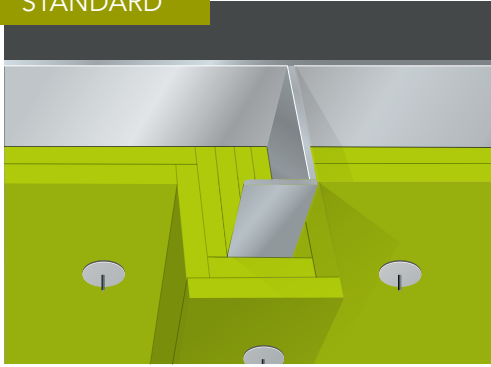
$$R_w(C;C_{tr}) = 40 (-3; -8) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: **SeaRox SL 620, 60 mm**;  $\alpha_w = 0.90$

### Construction details





## A-60 Aluminium Deck 6 mm

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	2 x 30 mm	100 kg/m <sup>3</sup>	6.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 620	2 x 30 mm	100 kg/m <sup>3</sup>	6.0 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with two layers of 30 mm SeaRox SL 620.
- Plate between stiffeners insulated with two layers of 30 mm SeaRox SL 620.
- Ø 3 mm aluminium-tipped stainless steel pins fixed with approx. 300/400 mm distance.
- Insulation secured with stainless steel washers of Ø 38 mm.

### Application notes:

- All the connections must be tight.
- Gap under the stiffener must be filled out completely.
- Joints must be staggered, 150 mm overlap is recommended.
- The pins should exceed the insulation by approx. 10 mm.

### Optional surface (on request):

- Reinforced aluminium foil
- Glass cloth

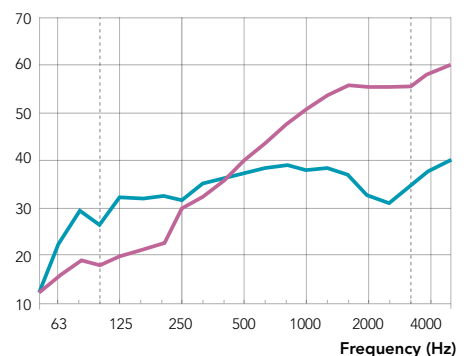
### Advantages:

- 🎵 **Secures excellent noise reduction and better comfort**
- 🔧 **Lowest water absorption - optimal insulation performance**

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	12.4
63	16.3
80	19.6
100	18.5
125	19.9
160	21.5
200	23.0
250	30.0
315	32.7
400	36.2
500	40.4
630	43.8
800	47.6
1000	50.9
1250	53.8
1600	55.6
2000	55.2
2500	55.3
3150	55.5
4000	58.4
5000	59.6

Sound Insulation, R (dB)



■ Test set-up: Plate: SeaRox SL 620, 2 x 30 mm  
Stiffener: SeaRox SL 620, 2 x 30 mm

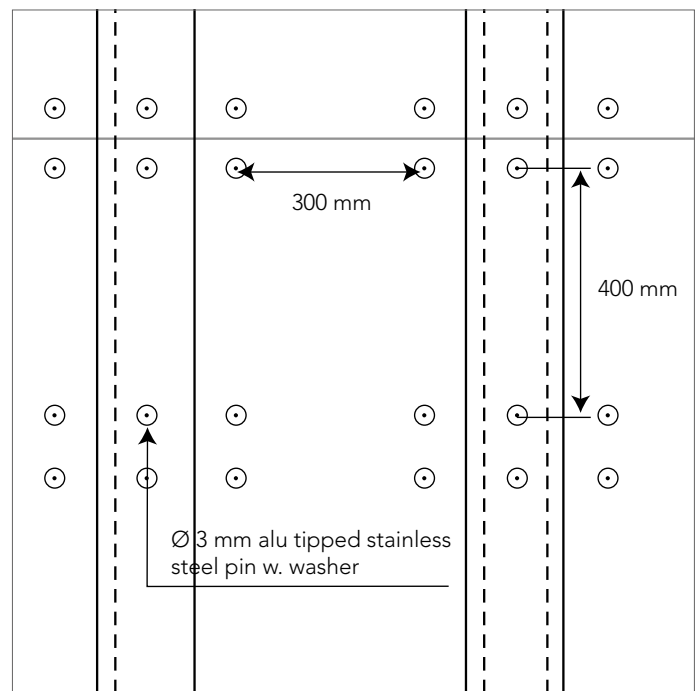
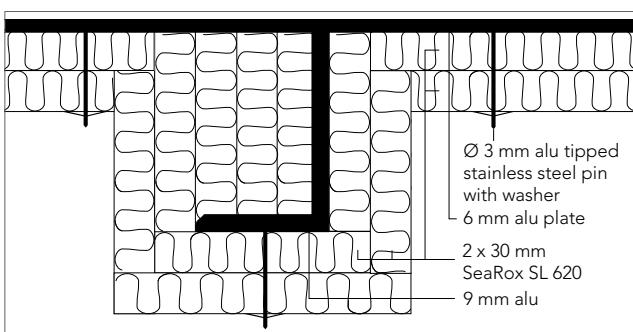
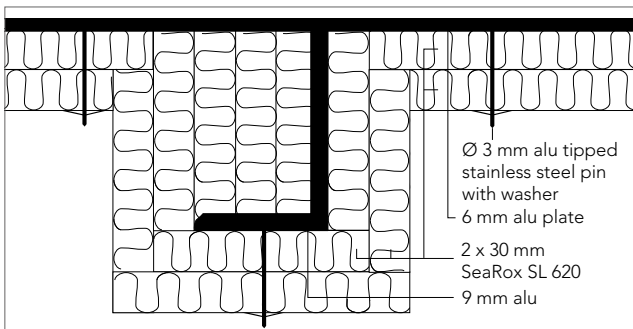
■ Aluminium Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 40 (-2; -7) \text{ dB}$$

### Sound absorption:

Weighted sound absorption: **SeaRox SL 620, 60 mm**;  $\alpha_w = 0.90$

### Construction details









# Index of

## H-constructions

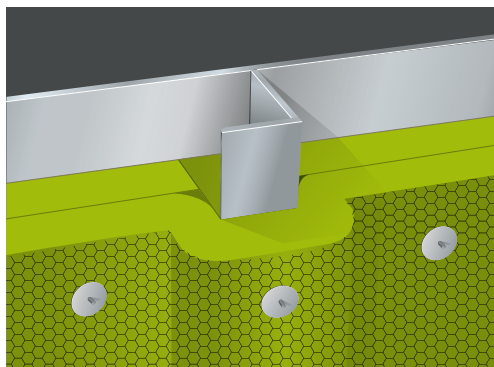
## Steel Bulkhead



### Steel - Bulkhead

All steel bulkheads and steel decks with stiffeners are normally considered loadbearing. To ensure the loadbearing capability and integrity of the structure during a 2 hour hydrocarbon pool fire, ROCKWOOL recommend that the insulation is always installed against the fire. If there is a hydrocarbon fire risk on both sides of a steel bulkhead, then both sides need insulation/protection.

Steel - Bulkhead		Page
H-60	SeaRox SL 660 + SeaRox WM 660	74
H-120	SeaRox SL 660 + SeaRox WM 660	75
H-60 corr.	SeaRox SL 660 + SeaRox WM 660	76
H-120 corr.	SeaRox SL 660 + SeaRox WM 660	77



## H-60 Steel Bulkhead restricted

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 660	30 mm	150 kg/m <sup>3</sup>	10.5 kg/m <sup>2</sup>
	SeaRox WM 660	40 mm		
<b>Stiffener</b>	SeaRox WM 660	40 mm	150 kg/m <sup>3</sup>	6.0 kg/m <sup>2</sup>

### Construction notes:

- Plate insulated with one layer of 30 mm SeaRox SL 660 and one layer of 40 mm SeaRox WM 660.
- Stiffeners insulated in the same process with 40 mm of SeaRox WM 660.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Insulation secured by washers of Ø 38 mm.

### Application notes:

- Restricted application (fire against insulated side).
- All the connections must be tight.
- Gap under the stiffener must be filled out completely.
- Joints between layers must be staggered, 150 mm overlap is recommended.
- The pins should exceed the insulation by approx. 10 mm.
- Wire mesh must be twisted together at joints.

### Optional surface (on request):

- Reinforced aluminium foil

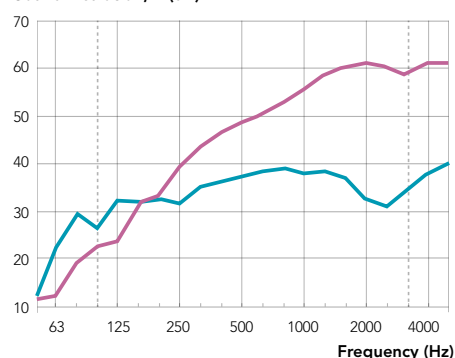
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	11.5
63	12.0
80	19.3
100	22.8
125	23.6
160	31.5
200	33.0
250	39.2
315	43.7
400	46.5
500	48.6
630	50.7
800	52.7
1000	55.6
1250	59.0
1600	60.3
2000	61.4
2500	60.5
3150	58.8
4000	61.2
5000	61.1

Sound Insulation, R (dB)

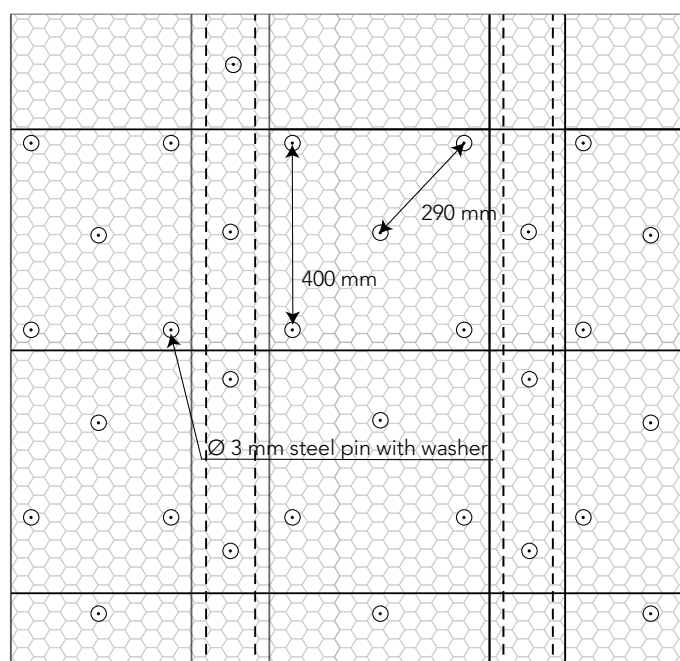
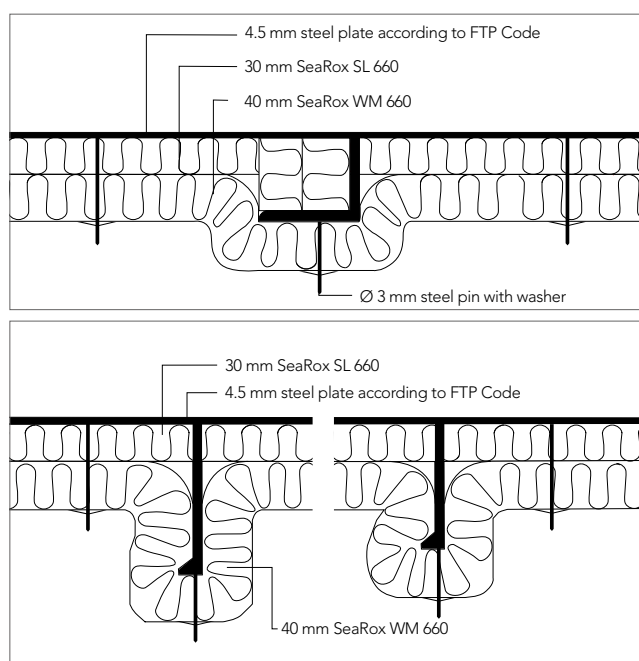


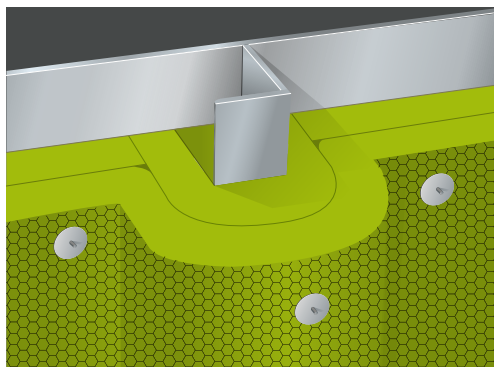
■ Test set-up: Plate: SeaRox SL 660, 30 mm  
+ SeaRox WM 660, 40 mm.  
Stiffener: SeaRox WM 660, 40 mm

■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-3; -9) \text{ dB}$$

### Construction details





## H-120 Steel Bulkhead restricted

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 660	30 mm	150 kg/m <sup>3</sup>	10.5 kg/m <sup>2</sup>
	SeaRox WM 660	40 mm		
<b>Stiffener</b>	SeaRox WM 660	2 x 40 mm	150 kg/m <sup>3</sup>	12.0 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with 2 x 40 mm SeaRox WM 660. Second layer in the same process as insulation of the plate.
- Plate insulated with one layer of 30 mm SeaRox SL 660 and one layer of 40 mm SeaRox WM 660.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Insulation secured by washers of Ø 38 mm.

### Application notes:

- Restricted application (fire against insulated side).
- All connections must be tight.
- Gap under the stiffener must be filled out completely.
- Joints between layers must be staggered, 150 mm overlap is recommended.
- The pins should exceed the insulation by approx. 10 mm.
- Wire mesh must be twisted together at joints.

### Optional surface (on request):

- Reinforced aluminium foil

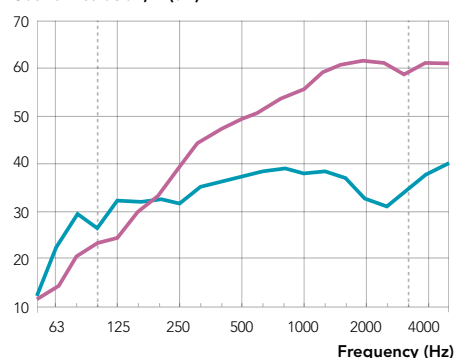
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	11.1
63	14.5
80	20.9
100	23.3
125	24.7
160	30.3
200	33.4
250	39.7
315	44.9
400	47.7
500	49.3
630	51.7
800	54.2
1000	55.9
1250	59.7
1600	61.1
2000	61.9
2500	61.1
3150	59.2
4000	61.6
5000	61.3

Sound Insulation, R (dB)

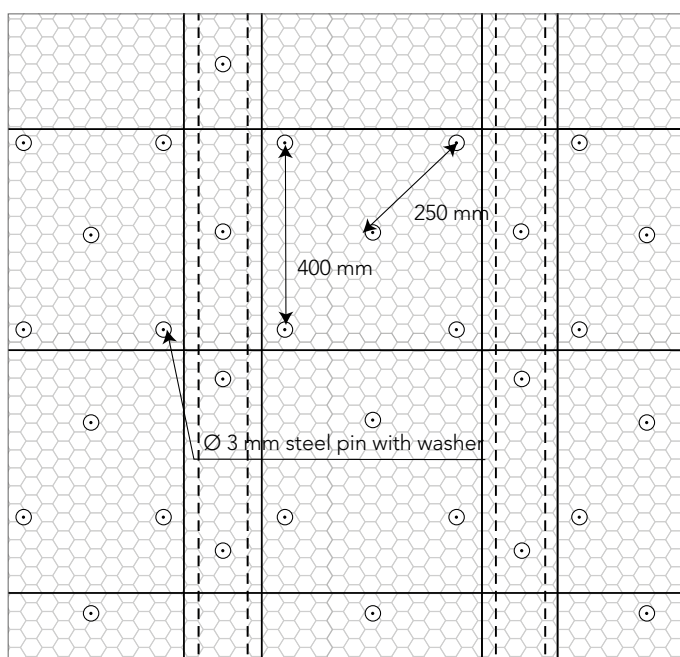
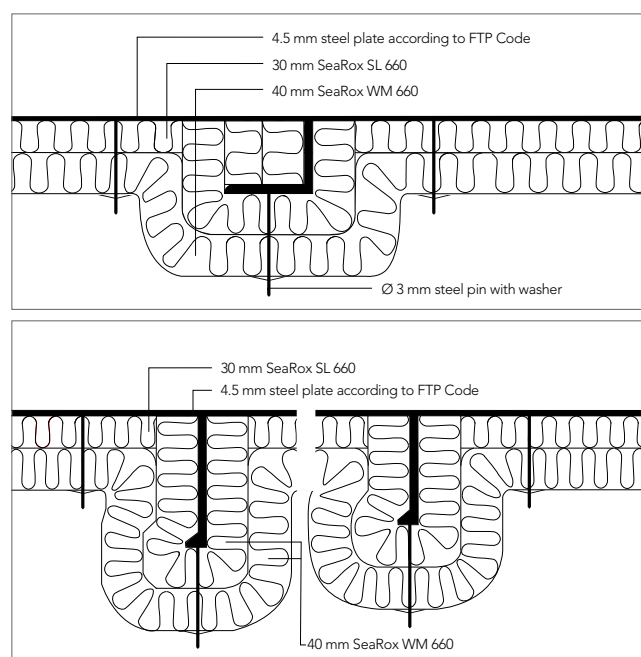


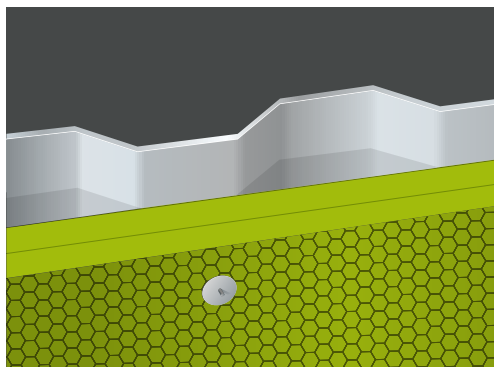
■ Test set-up: Plate: SeaRox SL 660, 30 mm  
+ SeaRox WM 660, 40 mm.  
Stiffener: SeaRox WM 660, 2 x 40 mm

■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 49 (-3; -10) \text{ dB}$$

### Construction details





## H-60 corrugated Steel Bulkhead restricted (non load-bearing)

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 660 SeaRox WM 660	50 mm + 40 mm	150 kg/m <sup>3</sup>	13.5 kg/m <sup>2</sup>

### Construction notes:

- Corrugated steel plate insulated with 50 mm SeaRox SL 660 and 40 mm SeaRox WM 660.
- Corrugated steel plate of min. 1.5 mm.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Pins fixed on top of corrugated steel plate by washers of Ø 38 mm.
- No fill of corrugation.

### Application notes:

- Restricted application (fire against insulated side).
- All connections must be tight.
- Joints between layers must be staggered, 150 mm overlap is recommended.
- The pins should exceed the insulation by approx. 10 mm.
- Wire mesh must be twisted together at joints.
- Same solution as H-120.

### Optional surface (on request):

- Reinforced aluminium foil

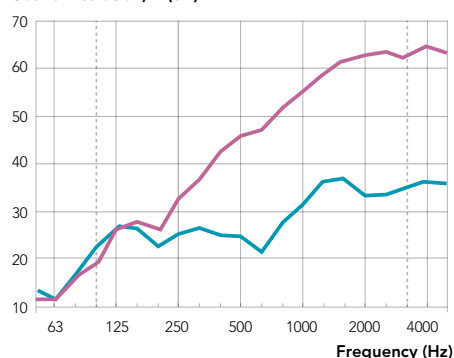
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	12.2
63	11.7
80	16.5
100	19.3
125	26.4
160	27.9
200	26.5
250	32.9
315	37.2
400	42.7
500	45.9
630	47.1
800	51.7
1000	55.0
1250	58.7
1600	61.3
2000	62.8
2500	63.3
3150	62.3
4000	64.7
5000	63.2

Sound Insulation, R (dB)

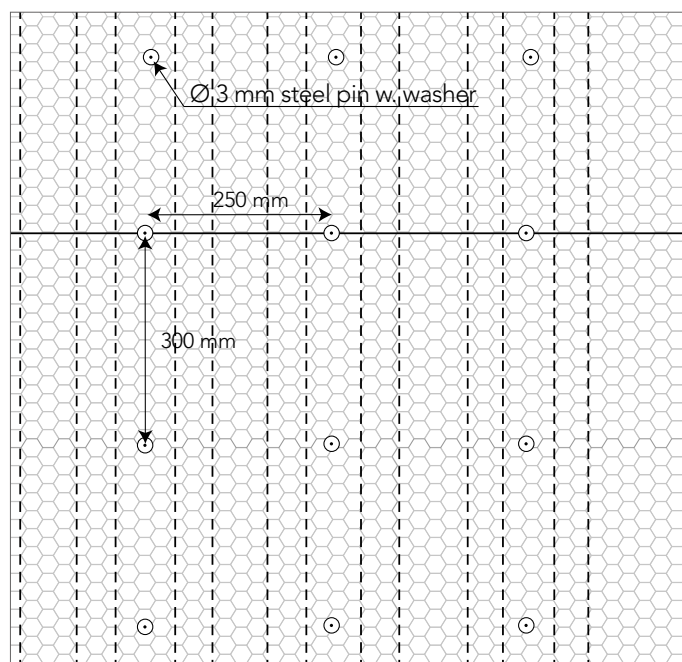
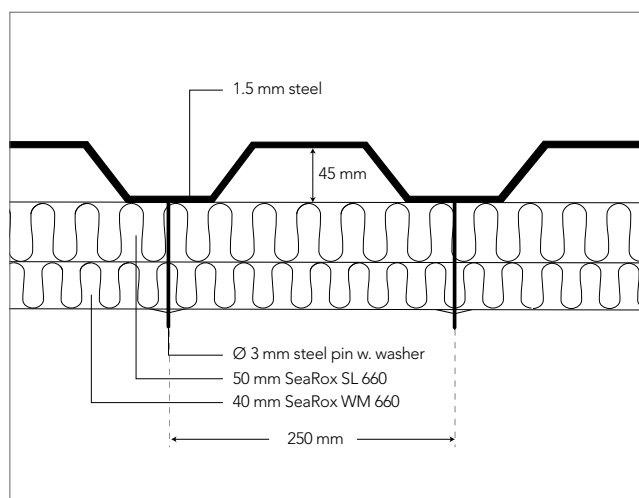


■ Test set-up: Plate: SeaRox SL 660, 50 mm  
+ SeaRox WM 660, 40 mm

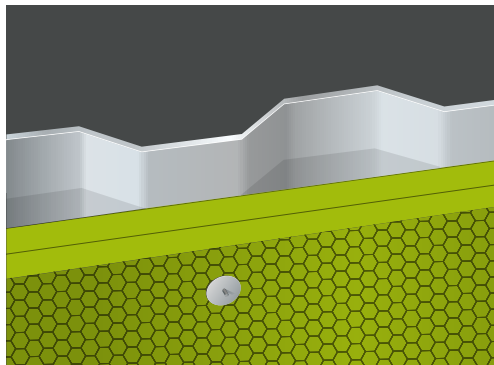
■ Corrugated steel plate: 1.5 mm  
(without insulation)

$$R_w(C;C_{tr}) = 44 (-2; -8) \text{ dB}$$

### Construction details







## H-120 corrugated Steel Bulkhead restricted (non load bearing)

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 660 SeaRox WM 660	50 mm + 40 mm	150 kg/m <sup>3</sup>	13.5 kg/m <sup>2</sup>

### Construction notes:

- Corrugated steel plate insulated with 50 mm SeaRox SL 660 and 40 mm SeaRox WM 660.
- Corrugated steel plate of min. 1.5 mm.
- Ø 3 mm pins fixed with approx. 300 mm distance.
- Pins fixed on top of corrugated steel plate by washers of Ø 38 mm.
- No fill of corrugation.

### Application notes:

- Restricted application (fire against insulated side).
- All connections must be tight.
- Joints must be staggered, 150 mm overlap is recommended.
- The pins should exceed the insulation by approx. 10 mm.
- Wire mesh twisted together of joints.
- Same solution as H-60.

### Optional surface (on request):

- Reinforced aluminium foil

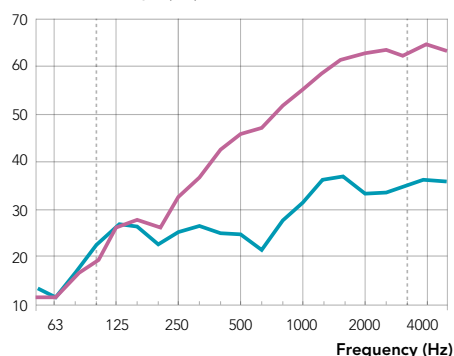
### Advantages:

- Ensures highest fire safety on board
- Secures excellent noise reduction and better comfort
- Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency Hz	R 1/3 Octave dB
50	12.2
63	11.7
80	16.5
100	19.3
125	26.4
160	27.9
200	26.5
250	32.9
315	37.2
400	42.7
500	45.9
630	47.1
800	51.7
1000	55.0
1250	58.7
1600	61.3
2000	62.8
2500	63.3
3150	62.3
4000	64.7
5000	63.2

Sound Insulation, R (dB)

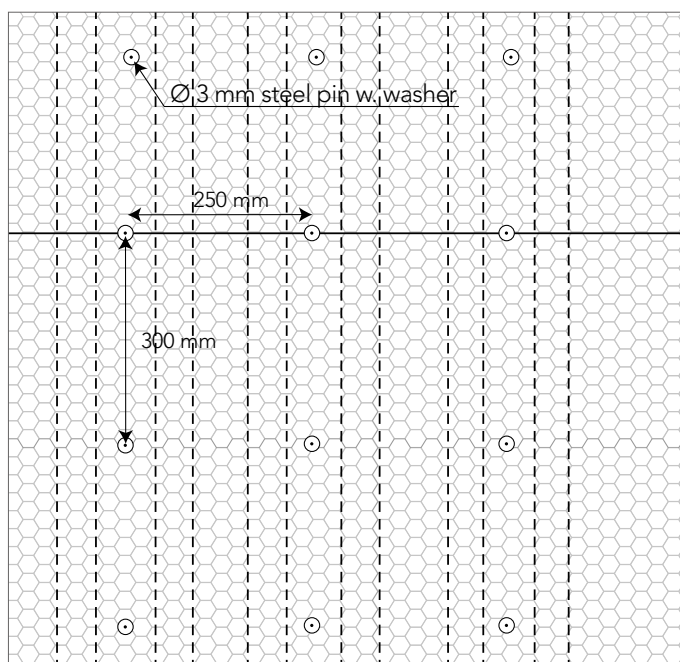
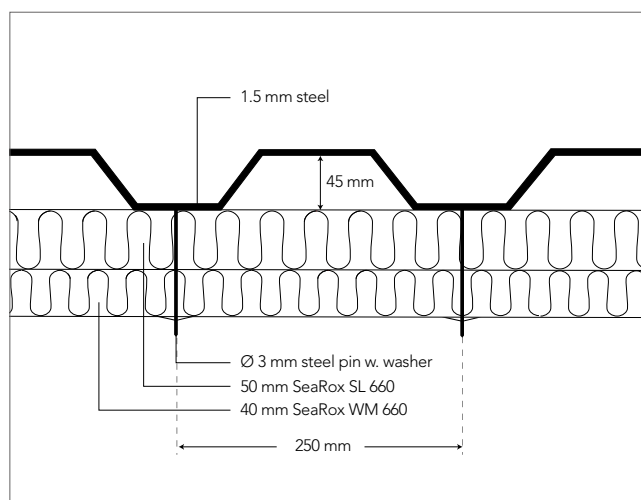


■ Test set-up: Plate: SeaRox SL 660, 50 mm  
+ SeaRox WM 660, 40 mm

■ Corrugated steel plate: 1.5 mm  
(without insulation)

$$R_w(C;C_{tr}) = 44 (-2; -8) \text{ dB}$$

### Construction details









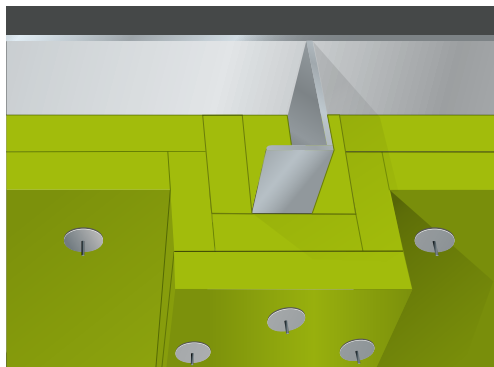
Index of

# H-constructions

## Steel Deck



Steel - Deck		Page
H-60	SeaRox SL 660	80
H-120	SeaRox SL 620	81



## H-60 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 660	50+50 mm	150 kg/m <sup>3</sup>	15.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 660	50+50 mm	150 kg/m <sup>3</sup>	15.0 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with 2x50 mm SeaRox SL 660.
- Plate insulated with two layers of 50 mm SeaRox SL 660.
- Ø 3 mm pins fixed with approx. 100/400 mm distance.




### Application notes:

- All connections must be tight.
- Gap under the stiffener must be filled out completely.
- The pins should exceed the insulation by approx. 10 mm.
- Joints to be staggered, 150 mm overlap is recommended.

### Optional surface (on request):

- Reinforced aluminium foil

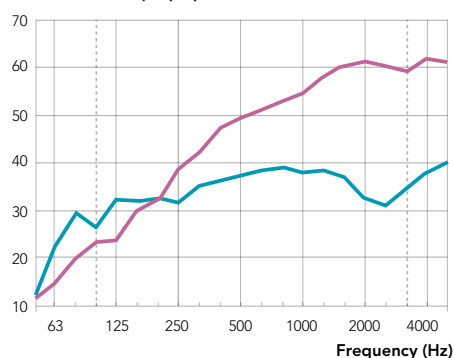
### Advantages:

-  Ensures highest fire safety on board
-  Secures excellent noise reduction and better comfort
-  Lowest water absorption - optimal insulation performance

### Sound reduction:

f Frequency	R 1/3 Octave
Hz	dB
50	12.1
63	15.2
80	20.2
100	23.6
125	23.6
160	23.7
200	32.7
250	38.8
315	42.4
400	47.7
500	49.7
630	51.4
800	53.4
1000	54.9
1250	58.7
1600	60.2
2000	61.2
2500	60.4
3150	59.3
4000	61.9
5000	61.6

Sound Insulation, R (dB)

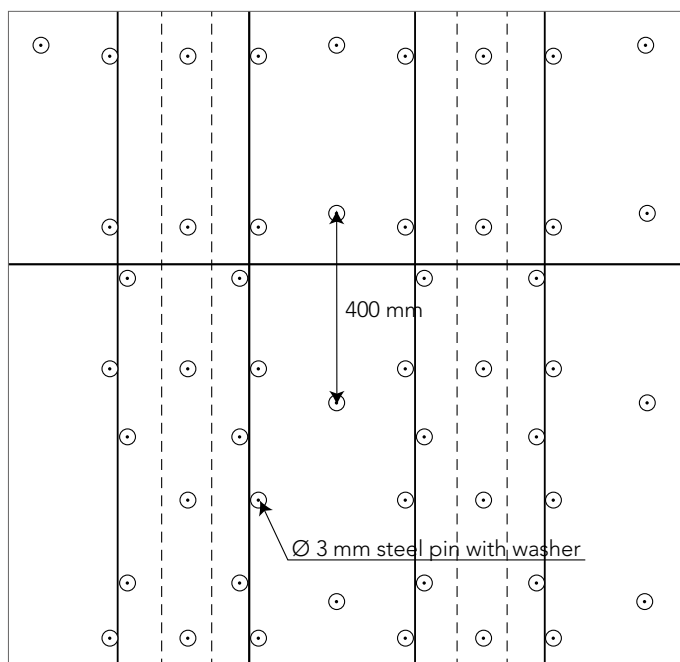
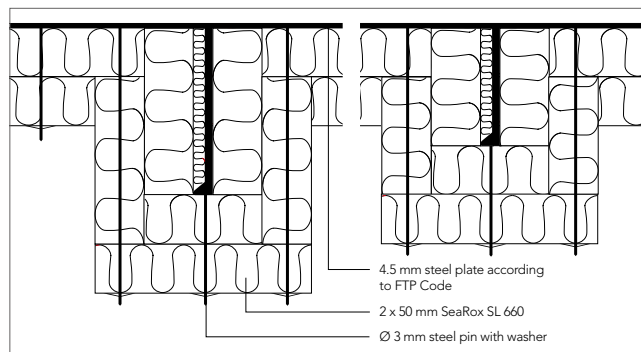
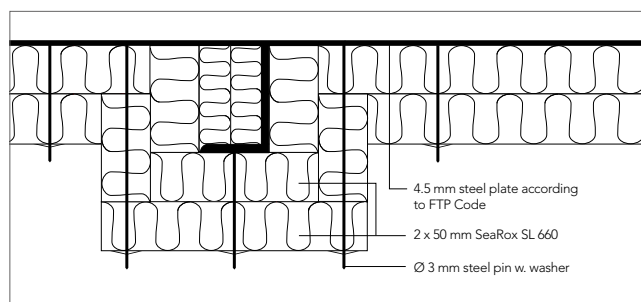


■ Test set-up: Plate: SeaRox SL 660, 50 + 50 mm  
Stiffener: SeaRox SL 660, 50 + 50 mm

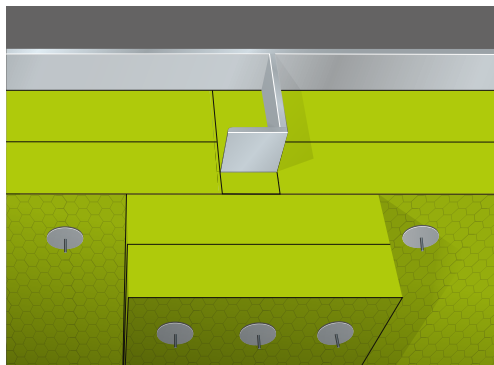
■ Steel Bulkhead 1500 / 1880 / 6 mm  
Bulb profiles, 1820 / 140 / 10 mm  
(without insulation)

$$R_w(C;C_{tr}) = 48 (-3; -9) \text{ dB}$$

### Construction details







## H-120 Steel Deck

	Product	Thickness	Density	Weight
<b>Plate</b>	SeaRox SL 620	2 x 60 mm	100 kg/m <sup>3</sup>	12.0 kg/m <sup>2</sup>
<b>Stiffener</b>	SeaRox SL 620	2 x 60 mm	100 kg/m <sup>3</sup>	12.0 kg/m <sup>2</sup>

### Construction notes:

- Stiffeners insulated with 2x60 mm SeaRox SL 620.
- Plate insulated with 2x60 mm SeaRox SL 620.
- Ø 3 mm pins fixed with a nominal spacing of approx. 310/290 mm lengthwise and 195/205 crosswise.
- The insulation is secured by a final layer of galvanised steel wire mesh (25x25x0.6) and Ø 38 mm steel spring washers.




### Application notes:

- All connections must be tight.
- Gap under the stiffener must be filled out completely.
- The pins should exceed the insulation by approx. 40 mm and bent in different directions after installation.
- Joints to be staggered, approx. half of previous layer is recommended.

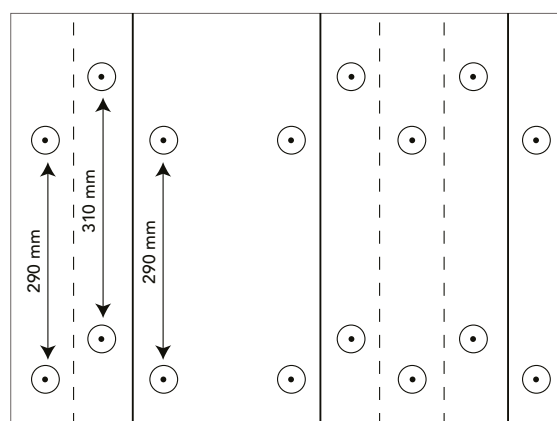
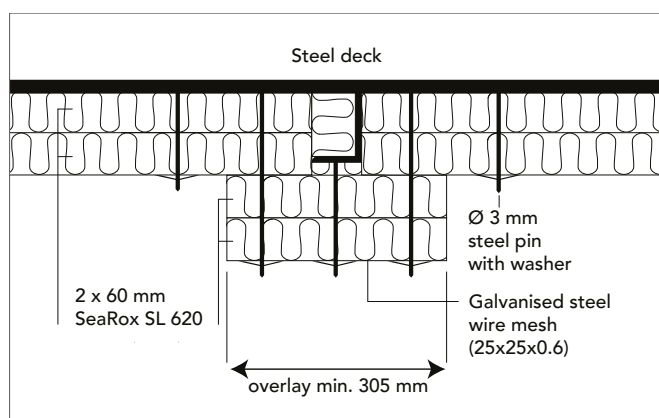
### Optional surface (on request):

- Reinforced aluminium foil, glass cloth facing.

### Advantages:

-  Ensures highest fire safety on board
-  Secures excellent noise reduction and better comfort
-  Lowest water absorption - optimal insulation performance

### Construction details

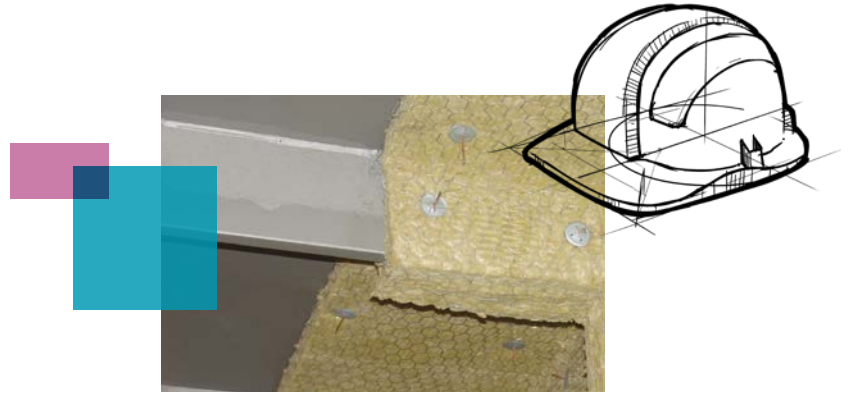


Certification: Check [rti.rockwool.com](http://rti.rockwool.com) for latest update.

# Index of Constructions details

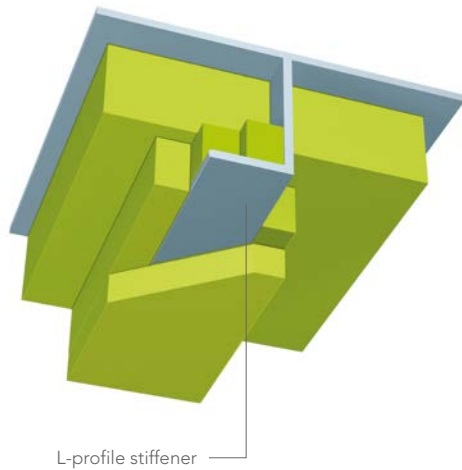


	Page
Stiffeners	82
Bulkhead and deck connections	84
Installations of steel plate surface protections	86



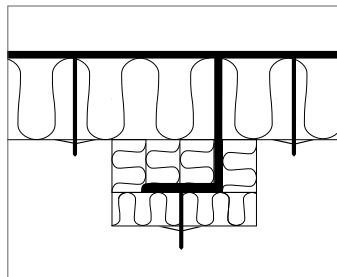
# Stiffeners

Stiffeners are used in most bulkhead and deck constructions to give them the strength they need. In order to prevent heat transmission it is important that the stiffener is insulated correctly. In general, insulation of the stiffeners must follow the official drawings according to the fire tests.

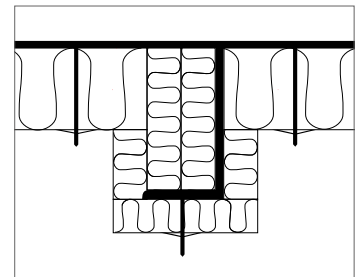


## L-profile stiffener

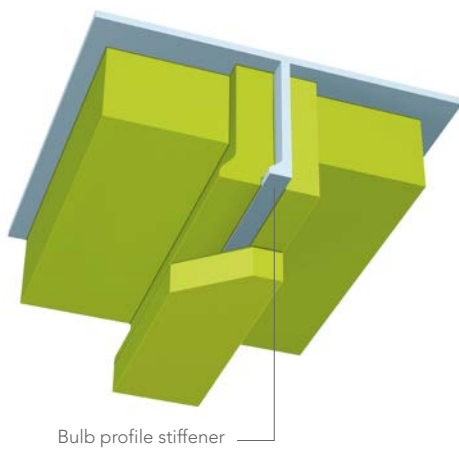
An alternative design can be used, depending on the product and construction:



*Insulation of L-profile,  
with SeaRox SL 620*

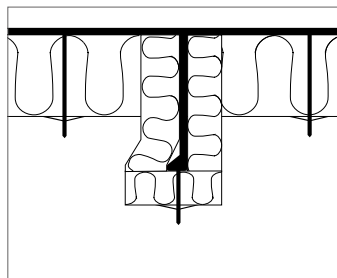


*Insulation of L-profile,  
with SeaRox SL 620*

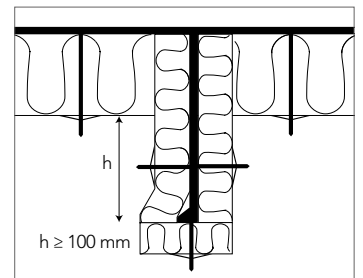


## Bulb profile stiffener

The insulation of the bulb-profile stiffener typically follows the profile and is fixed depending on the length of the profile as shown below:



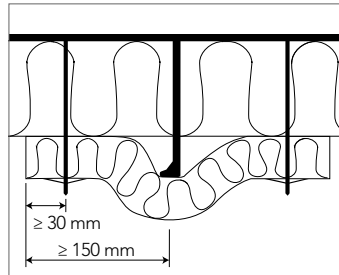
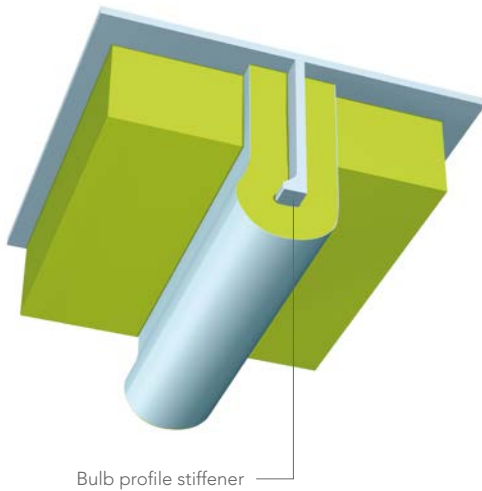
*Insulation of Bulb profile,  
with SeaRox SL 620*



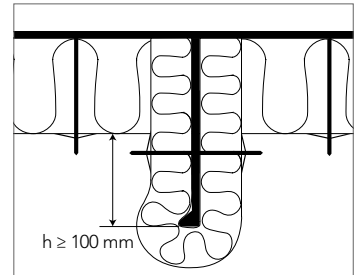
*Insulation of Bulb profile,  
with SeaRox SL 620*

## Insulation of stiffeners with "hybrid solutions" (combined slab and mat solutions)

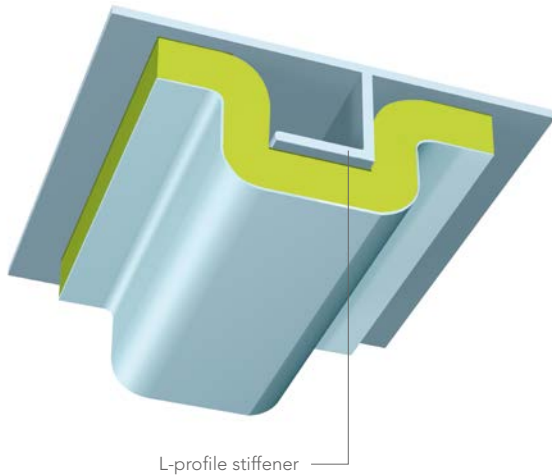
For solutions combining the use of SeaRox slabs and mats developed to make the installation process easier, alternative insulation of stiffeners is used as shown below:



Insulation of Bulb profile, with SeaRox FB 6040 between the stiffeners and SeaRox FM 6040 ALU on top of stiffeners

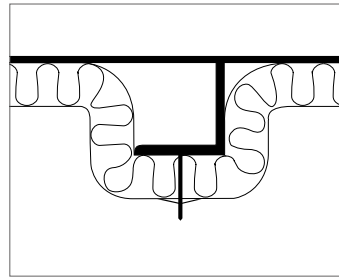


Insulation of Bulb profile, with SeaRox FM 6040 ALU around the stiffeners and SeaRox FB 6040 between the stiffeners

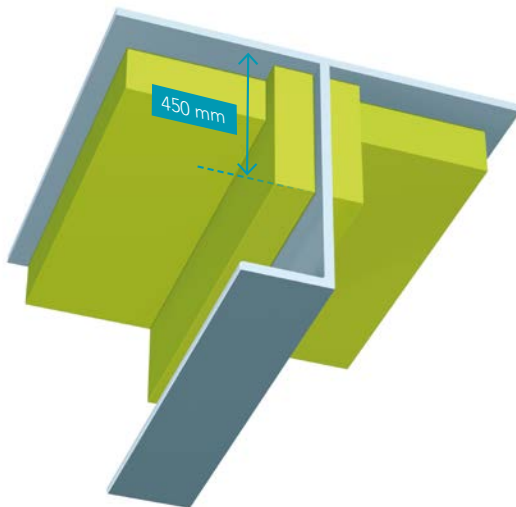


## Mat solution

In other situations, the insulation can follow the shape of the stiffener:

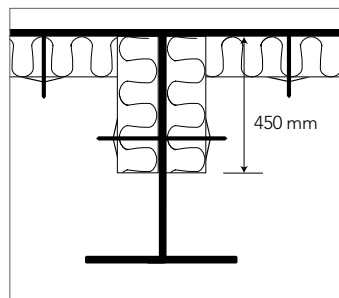


Insulation of L-profile, with SeaRox FM 6040 ALU

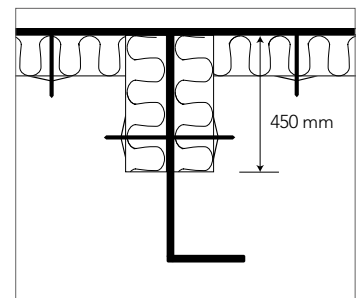


## Profile > 450 mm

If the stiffener depth is more than 450 mm the insulation can be stopped at 450 mm. The procedure for insulation of stiffeners should be approved by a local surveyor.



Insulation of stiffener with SeaRox SL 620

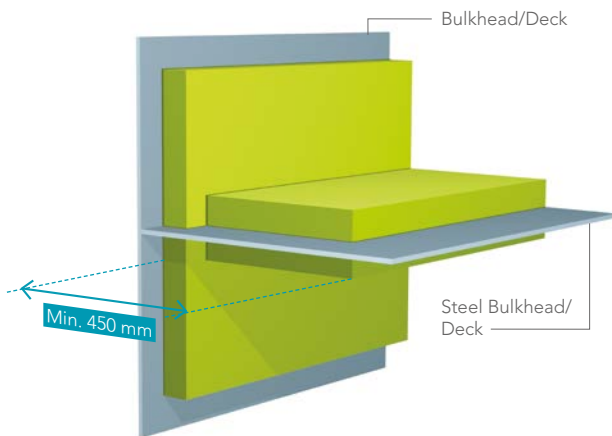


Insulation of stiffener with SeaRox SL 620



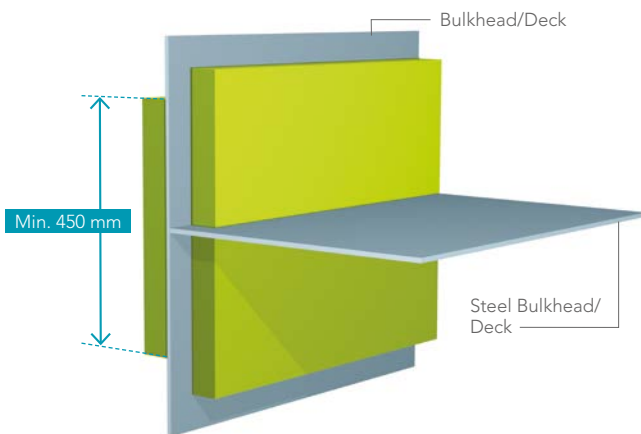
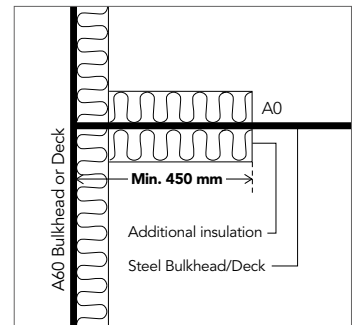
# Bulkhead and deck connections

When two plates are connected in a corner, the heat bridge should always be kept in mind when insulating. The structure must have insulation so that heat cannot be transferred from one unexposed surface through the structure onto another unexposed surface. The heat must always go at least 450 mm below the insulation before reaching an unexposed surface (acc. to SOLAS MSC/circ. 1120 annex reg. 9.3.4).



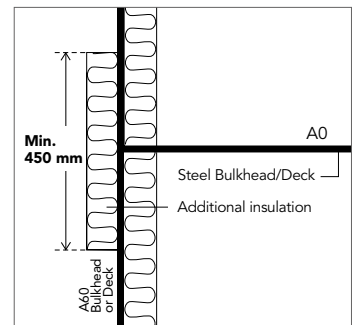
## Deck and bulkhead connection 1

Connections between A-60 and A-0 constructions should be insulated by adding a layer of A-60 insulation to the A-0 construction in a minimum width of 450 mm. This minimizes the effect of the heat bridge.

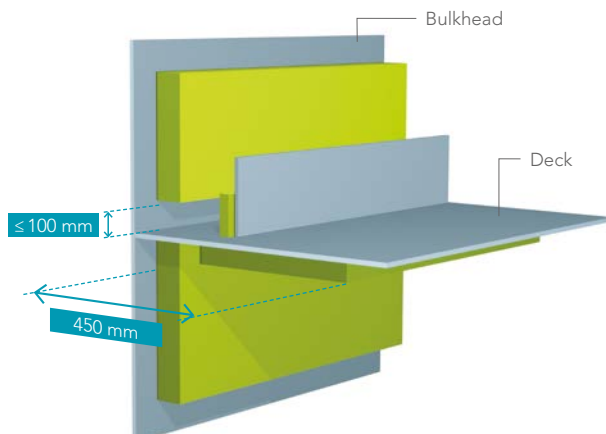


## Deck and bulkhead connection 2

Another alternative way to insulate the heat bridge is to install at least 450 mm\* of insulation on the other side of the construction. This will reduce the transferred heat and so minimise the risk of self-ignition inside the connecting room.

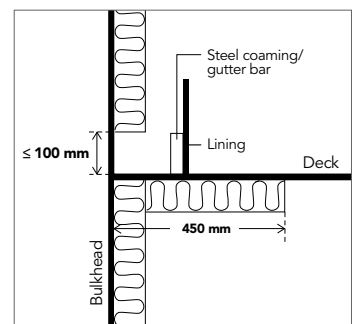


\* ROCKWOOL recommends 900 mm to secure that the heat always goes min. 450 mm below the insulation before reaching an unexposed surface.



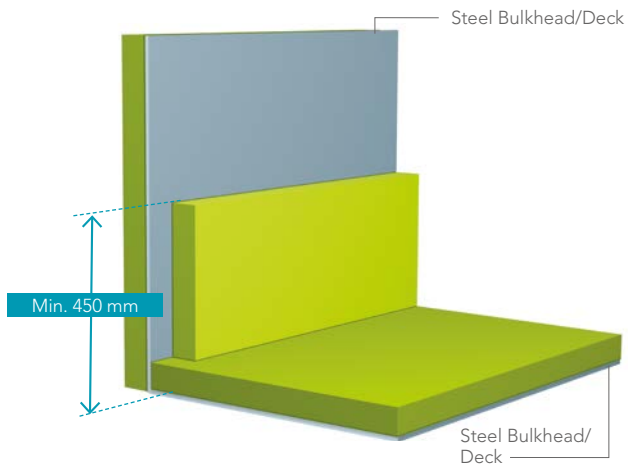
## Floor connection

This floor connection is relevant in relation to the A-class insulation of a cold (outer) bulkhead, where water vapour may condense on the interior cold steel in case of defects in the vapour barrier. The water can be collected and either drained or evaporate from the gutter. (Ref. IMO MSC.1/ Circ.1510)



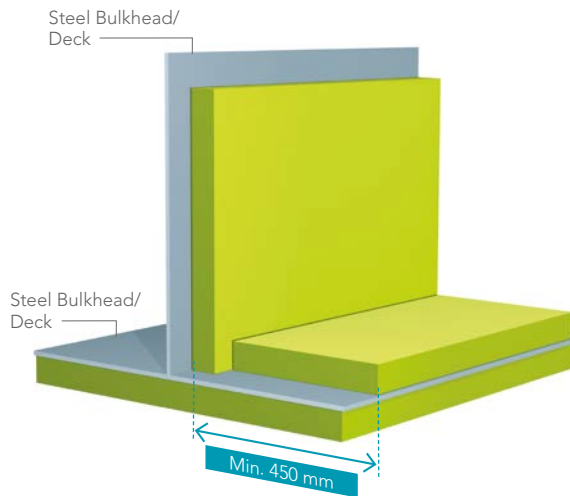
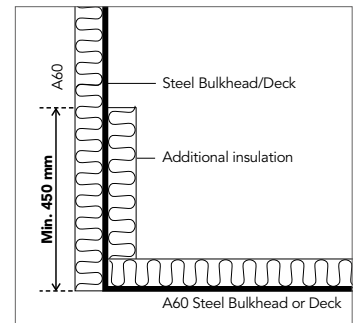
In relation to MSC.1/Circ. 1510, the following floor connection is clarified. Lining and steel coaming/gutter bar are for accommodation spaces only. Only for steel constructions.

In connection with insulation it is important to pay special attention to the details related to junctions, corners etc. in order to avoid potential heat bridges. Examples of construction details are provided below:



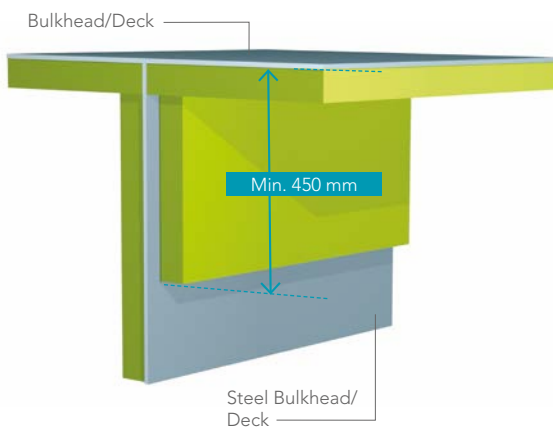
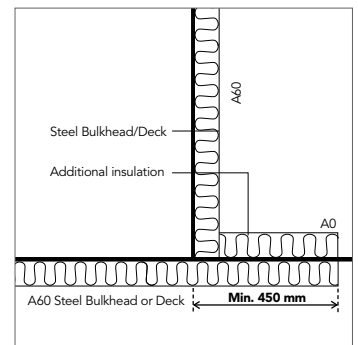
### Corner example

Insulation on either side of Bulkhead/Deck



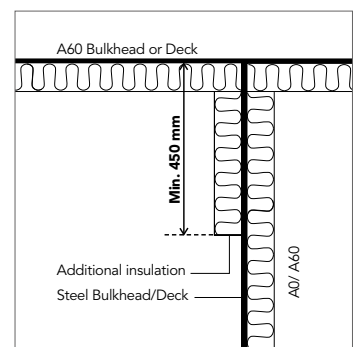
### Junction example 1

Insulation on the outside of Bulkhead/Deck



### Junction example 2

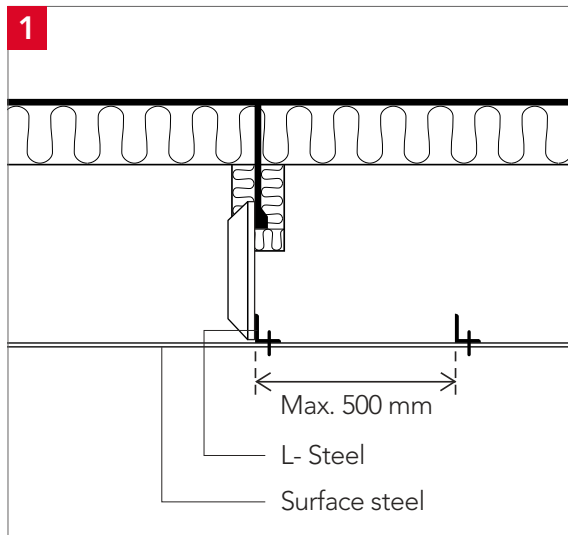
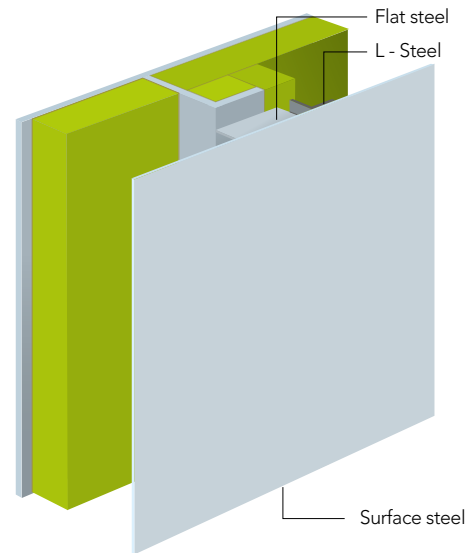
Insulation on the inside of Bulkhead/Deck



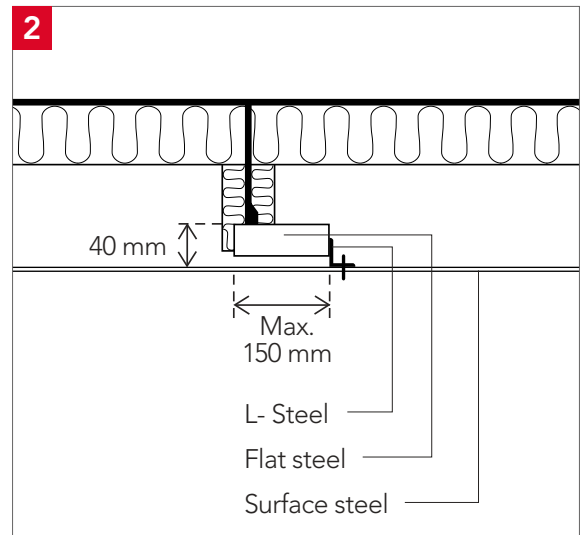
# Installation of surface steel plate

A surface protection of sheet metal can be installed in different ways, depending on the layout of the stiffeners and the amount of insulation.

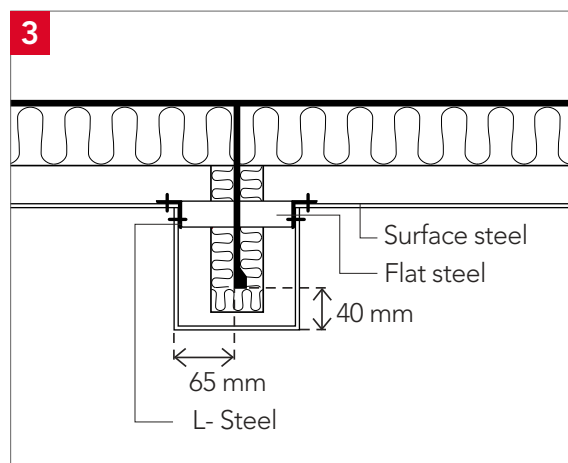
It is important to fix it in a way that minimizes heat bridges and structural noise transmitted through the hull.



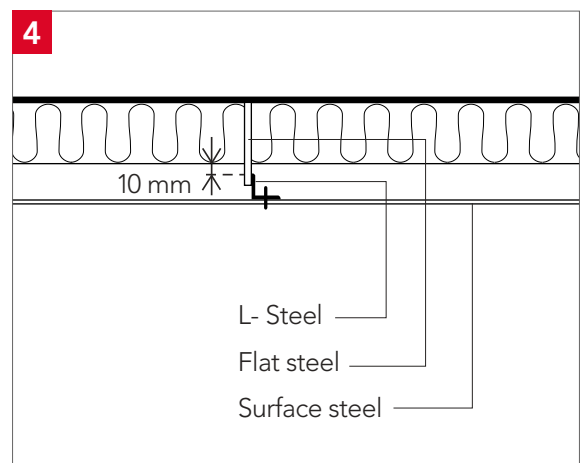
Fixing of surface steel where space is needed for pipes etc.



Fixing of surface steel as close to the steel plate as possible.

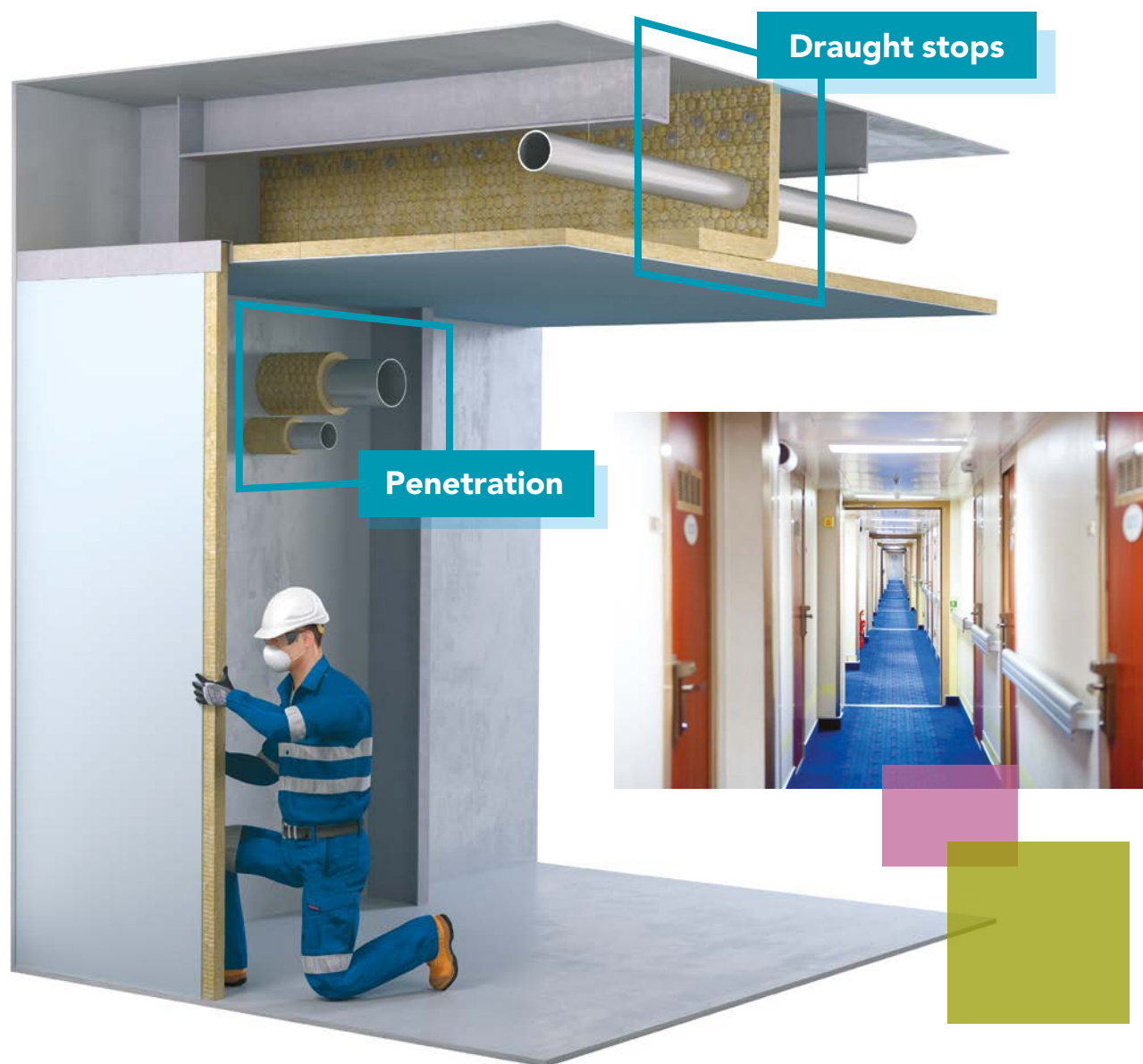


Fixing of surface steel taking large stiffeners into consideration.



Fixing of surface with no stiffeners or stiffeners on the other side of steel plate.

# Index of **Additional fire protection**



	Page
Draught stops	88
Penetration	88
Ventilation ducts and other steel pipes insulated to A-60	89
Penetrations of A-class fire divisions	90



# Draught stops

Draught stops are divisions installed between ceilings or linings and the ship's structure. The purpose of draught stops is to prevent the spread of smoke and flames in concealed spaces.

SOLAS chapter II, Part C, regulation 8 (control of smoke spread) states that: "air spaces enclosed behind ceilings, panelling or linings shall be divided by close-fitting draught stops spaced not more than 14 m apart. In the vertical direction, such enclosed air spaces, including those behind linings of stairways, trunks, etc., shall be closed at each deck".

MSC/Circ. 1120, 2004 explains the construction and location in more detail and, among other things, recommends the use of non-combustible mineral wool insulation, not less than 20 mm in thickness, faced on each side with expanded metal mesh, the mesh on one side being attached to the ship's structure. Alternatively, expanded metal mesh may be fitted on one side and non-combustible cloth (glass cloth) on the other side of mineral wool insulation.

Other equivalent arrangements may be accepted.

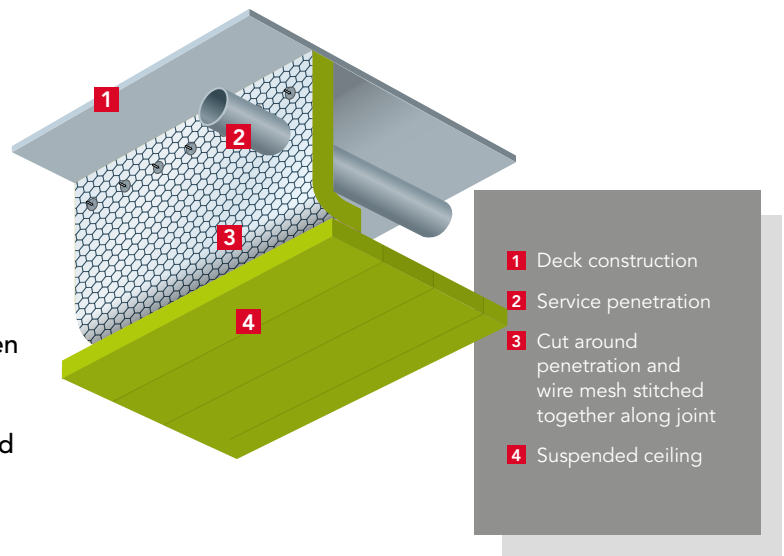
Occasionally there will be a requirement that the draught stop or panel extension is of B-0 class.

**The ROCKWOOL recommendation for a class B-0 draught stop, based on the IMO rules, is as follows:**

## Construction

- SeaRox WM 640, min. 50 mm, with reinforced alu. foil
- or
- SeaRox SL 620, min. 50 mm, with reinforced alu. foil.

Insulation fixed with Ø 3 mm pins and secured with Ø 38 mm washers. If SeaRox SL 620 is used, it should be fitted with wire mesh on one side – the side where the washers are applied and the insulation is fixed.

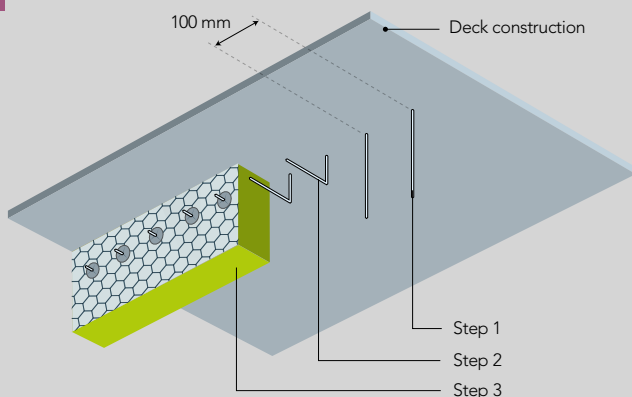


## Penetrations (B-0 division)

Penetrations other than steel or copper pipes, for the passage of electric cables, pipes, trunks, ducts etc., must be protected by a fire tested penetration device or a steel sleeve not less than 1.8 mm thick and not less than 900 mm long for pipe diameters of at least 150 mm and not less than 600 mm long for pipe diameters of less than 150mm (preferably equally divided on each side of the division). The pipe should be connected to the ends of the sleeve by flanges or couplings; or the clearance between the sleeve and the pipe should not exceed 2.5 mm; or any clearance between pipe and sleeve should be tightened by means of non-combustible or other suitable material. Uninsulated metallic pipes penetrating a B class division should be in materials with a melting temperature greater than 850°C for a B-0 class division.

## MSC/Circ.1120, 2004 explains the construction and location in more detail:

Construction of extended bulkhead behind continuous ceilings or linings. The extension of the bulkhead should be made of non-combustible material and the construction of the extension should correspond to the fire class of the extended bulkhead. If the extended bulkhead is B-0, then the extension may be made of thin steel plates of 1mm thickness and tightened (for example, with mineral wool). Alternatively, B-0 class extensions may be constructed of a suitably supported mineral wool (density at least 100 kg/m<sup>3</sup>, thickness at least 50 mm).



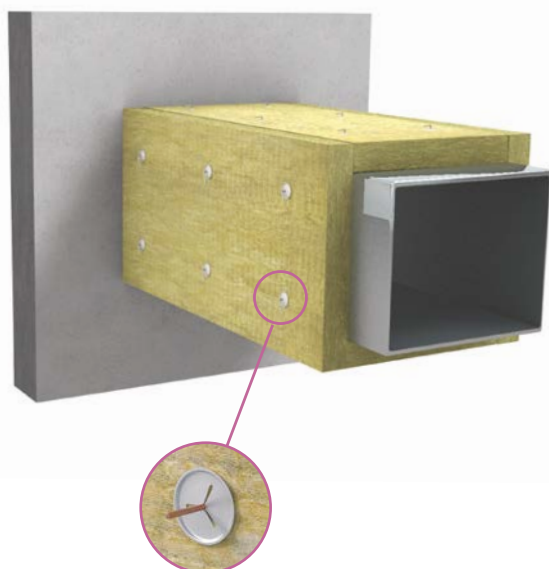
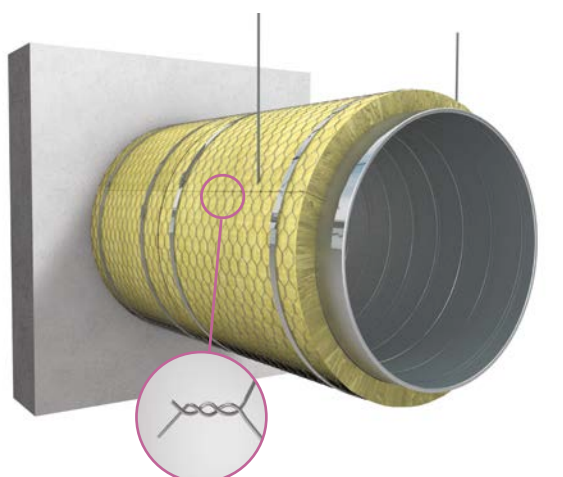
## Installation

- Step 1: Pins are welded vertically to the underside of the deck in alignment with the required position of the draught stop – with a distance of approx. 100 mm between the pins.
- Step 2: The pins are then bent 90° in a staggered pattern as on the drawing to the left.
- Step 3: The ROCKWOOL product (and for SeaRox SL 620 additional wire mesh) is then pushed over the pins so that they protrude at least 25 mm. The insulation is secured by spring steel washers. The insulation against the lining/ceiling is bent back approx. 100 mm, (for SeaRox SL 620, a 40 mm V-cut is made on the compression side to facilitate bending).

# Ventilation ducts and other steel pipes insulated to A-60



Ventilation ducts and steel pipes including sprinkler pipes may in some cases need to be insulated "with A-60 standard" insulation for fire protection. In accordance with IMO MSC 1/Circ. 1369, this can be done as follows:



## Pipes and circular ducts:

### System

- SeaRox WM 620, min. 45 mm  
(restricted application only)
- SeaRox WM 640, min. 75 mm  
(unrestricted application)

The insulation should be fixed by twisting together the wire mesh at joints and additionally secured with steel bands or galvanised steel wires ( $\varnothing$  min. 0.7 mm) should be fitted circumferentially to the system - at least 3 per running meter of insulation to keep all joints and grooves tightly closed.

## Sprinklers pipes:

### System

- ProRox PS 960, min. 50 mm  
(restricted application only)

The pipe section with or without aluminum foil surface should be fixed with steel bands or galvanised steel wires ( $\varnothing$  min. 0.7 mm) should be fitted circumferentially to the system - at least 3 per running meter of insulation to keep all joints and grooves tightly closed.

## Rectangular ducts:

### System

- SeaRox SL 620, min. 40 mm  
(restricted application only)
- SeaRox SL 620, min. 60 mm  
(unrestricted application)

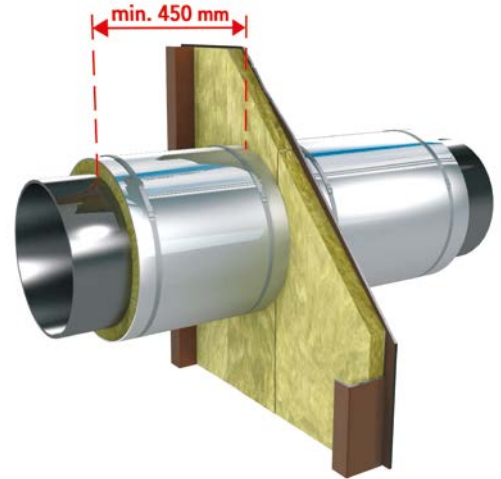
The insulation should be attached by welded steel pins and washers with slab joints butted together.

Welded pins are generally spaced at 350 mm maximum centres along the length of the duct and at 500 mm maximum centres across the width and depth of the duct.

Pins are required on all four sides of vertical ducts, but may be omitted from the top face of horizontal ducts if they are substituted by pigtail screws at 250 mm maximum centres (screw length twice the slab thickness), fixing the side wall to the overlap top slabs. Side wall slabs must overlap top and bottom slabs.



## Penetrations of A-class fire divisions



When pipes, ducts etc. go through a bulkhead or deck it is a penetration. To ensure that the penetration does not compromise the fire division, the penetration shall be protected by a penetration device tested in accordance with the IMO 2010 FTP code. If the pipe penetration is made of steel with a thickness of 3 mm or greater and a length of not less than 900 mm (preferably 450 mm on each side of the division), with no openings (meaning the pipe needs to be welded to the steel bulkhead/deck plate), then testing is not required. Such penetrations should be suitably insulated by extending the insulation at the same level of the division.

ROCKWOOL recommends following "A-60" SeaRox insulation solutions for pipe penetrations made of steel with no openings:

### Construction

- SeaRox WM 620, min. 45 mm, the wire mesh to be twisted together at joints.
- SeaRox FM 6040 ALU, min. 50 mm, secured by aluminium tape.
- SeaRox WM 640, 75 mm, min 75 mm the wire mesh to be twisted together at joints.

Steel bands or galvanised steel wires ( $\varnothing$  min. 0.7 mm) must be fitted circumferentially to the system – at least 2 per 450 mm insulation to keep all joints and grooves tightly closed.



SOLAS, Chapter II-2part C, Regulation 9, sec 3:

*"where a pipe penetration is made of steel or equivalent material having a thickness of 3 mm or greater and a length of not less than 900 mm (preferably 450 mm on each side of the division), and no openings, testing is not required. Such penetrations shall be suitably insulated by extension of the insulation at the same level of the division".*

(L1 + L2 = 900 mm)



# Index of

# Outfitting insulation



	Page
Floating floor constructions	92
Marine panels, ceilings and fire doors	94



# Floating floor constructions, including class A-60



Floating floors are used for optimal reduction airborne and structural noise reduction, including impact noise via the deck.

The design of the floating floor will depend on the actual requirements and often with the involvement of acoustic engineers and/or dedicated flooring companies.

Non combustible stone wool insulation is used as the core material in such constructions due to the superior acoustic properties, but also due to a good balance between dynamic stiffness and compression resistance.

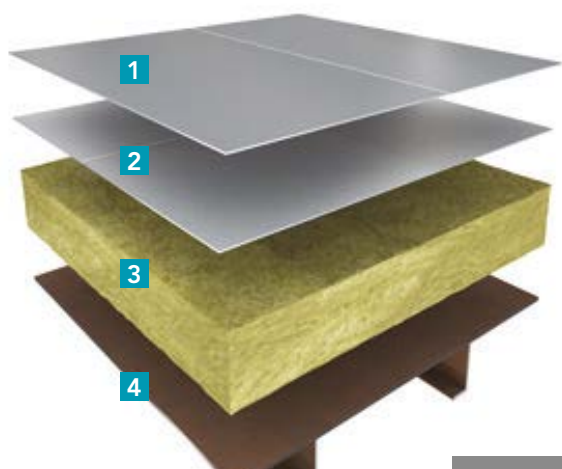
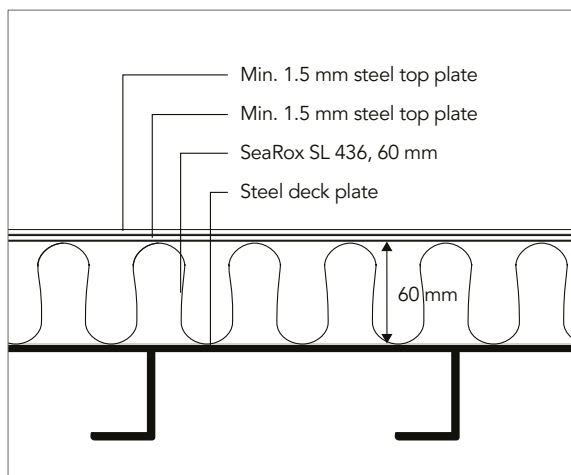
ROCKWOOL offers three main products for floating floor constructions:

SeaRox SL 436 is used for normal accommodation load flooring systems, with an optimised dynamic stiffness to achieve the highest absorption of noise and vibrations. SeaRox SL 436 is also capable of absorbing smaller imperfections in the deck. SeaRox SL 480 and the lighter weight SeaRox SL 440 are aimed for general purpose flooring systems with normal to high load capacity.

When a floating floor is made, it is very important that the top layer has no rigid connection with the steel structure to avoid flanking transmission. For inspiration in terms of the general construction of a floating floor – see overleaf descriptions of the ROCKWOOL A-60 fire rated floating floor construction:



ROCKWOOL Technical Insulation is the preferred supplier of many marine-flooring companies. These companies incorporate ROCKWOOL products in their more sophisticated solutions.



- 1 Steel top plate 1.5 mm
- 2 Steel top plate 1.5 mm
- 3 SeaRox SL 436, SL 440 or SL 480 60 mm
- 4 Steel deck plate (Standard FTP code)

Note: 2 x 1.5 mm steel top plates to be glued together

## ROCKWOOL SeaRox A-60 type approved floating floor construction:

This solution consists of one or two layers (of equal thickness and with staggered joints) with a total insulation thickness of 60-100 mm. The insulation is covered by two layers of 1.5 mm thick steel sheets, with staggered joints and glued together. In addition to the excellent fire protection, noise reduction and thermal insulation properties, the construction also reduces structural noise/ vibrations in the steel deck.

The construction can be made with SeaRox SL 436, 440 or 480 depending on the need for compression resistance.

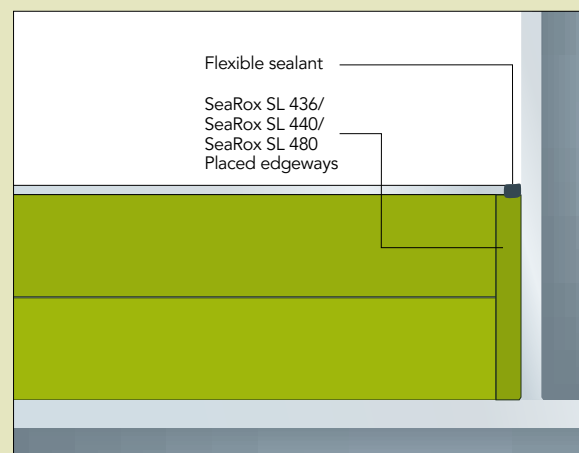
Any surface material to be applied over the steel plates must be decided based upon requirements for mechanical strength and finish, and if relevant shall be type approved for low flame spread.

The maximum recommended free area is 8 x 8 m. If larger free areas are to be made, division flat bars should be made. This allows the insulation to stay in position without the need for gluing. All joints of the slabs must be tightbutted joints.

Smaller weld marks, dents, etc. of an approximate maximum diameter of 50 mm and height of 10 mm will be absorbed. If the deck undulates, an approved self-levelling compound or floor screed – a fire retardant PE compound, cement based filler or similar – must be used as first layer. If a water-based floor screed or levelling compound is used, it must be given sufficient time to cure before the floating construction is installed. It is very important not to encapsulate water/ moisture, as this will enhance corrosion and limit the expected life of the construction.

Note: Deviations from the certified A-60 floating floor construction in any form could require new approval by the Class Society or the National Marine Authority.

**Enclosing:** For the perimeter of the construction it is recommended to finish the insulation with a rigid ROCKWOOL product, such as SeaRox SL 436, SeaRox SL 440 or SeaRox SL 480, placed edgeways and sealed with a flexible sealant. Many of the flooring companies use ROCKWOOL SeaRox slabs in densities of 140-200 kg/m<sup>3</sup>, in combination with more complex top layers. The maximum load for the complete flooring construction will depend also on the top layer and the load capacity of the specific construction should be calculated and tested by the flooring company. ROCKWOOL Technical Insulation is the preferred supplier for many dedicated marine flooring companies. These companies use the SeaRox insulation to create more sophisticated solutions for superb noise reduction in both high and low frequency range.



Sealing of edges to prevent structural noise transmission.



## Marine panels, ceilings and fire doors

Within shipbuilding a lot prefabricated products are being used for wall panels, ceilings, fire doors etc. as part of the accommodation area. The requirements are typical a combination of fire protection and noise insulation. The producers of these products are highly specialized customer with individual solutions which require tailored made insulation products.

The SeaRox range of slab products in higher densities have a great track record in this specific area. We have worked with major customers to develop a large number of special products with high compressive and delaminating strength as well as great fire resistance and acoustic performance. Solutions which have been approved as non-combustible according to the latest IMO regulations.

Solutions are developed in close cooperation with each individual customer taking the final design into consideration. Please contact your local ROCKWOOL Technical Insulation sales representative to get the best advice in order to pick the right SeaRox material offering the best combination of fire protection, noise reduction and mechanical properties.

### Typical SeaRox products:

#### Marine panels and ceilings

SeaRox SL 440 (density 150 kg/m<sup>3</sup>)  
SeaRox SL 470 (density 180 kg/m<sup>3</sup>)  
SeaRox SL 480 (density 200 kg/m<sup>3</sup>)

#### Fire doors

SeaRox SL 660 (density 150 kg/m<sup>3</sup>)



# Index of **Technical insulation**



	Page
Technical insulation in general	96
Insulation with ProRox pipe section	98
Insulation with SeaRox lamella mat	99
Insulation with SeaRox and ProRox wired mat	100
Insulation with SeaRox slabs	101
Cladding	101



# Technical insulation

Technical equipment, pipes, vessels and tanks need insulation to ensure proper process, storage and handling properties (temperature, viscosity, pressure, etc.). The insulation must also reduce heat loss efficiently, so that the installations can operate continuously and economically during the design life. Lastly, the insulation should limit surface temperatures and so the risk of burns.

Principally, a thermal insulation structure consists of an appropriate insulating material, usually covered by sheet metal cladding. This protects the insulation from external influences such as weather or mechanical loads.

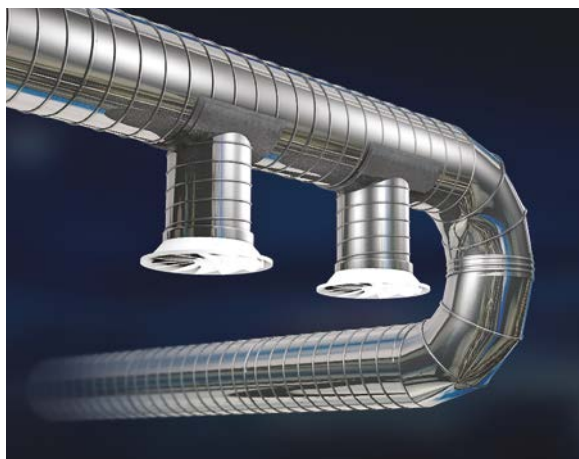
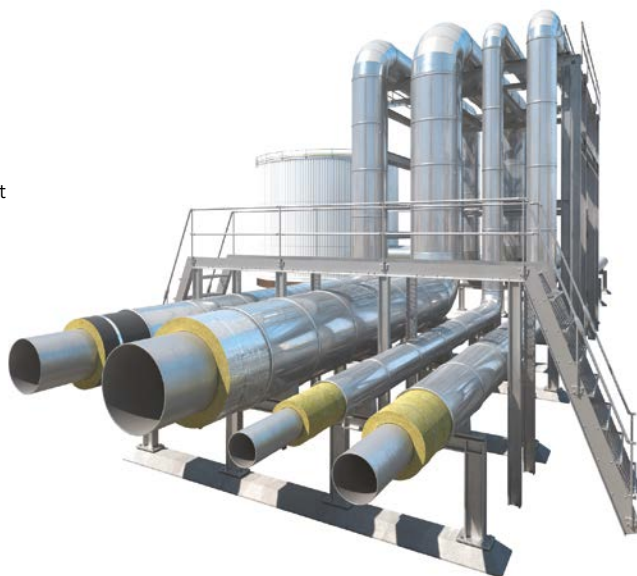
Spacers are also essential with softer insulation materials such as wired mats, which cannot withstand the pressure to hold the weight of the cladding and other external loads. These spacers transfer the loads from the cladding directly onto the equipment to be insulated. In general, support structures and spacers form thermal bridges that must be considered when designing the insulation system.

## The benefits of correct thermal insulation include:

- Reduction of heat losses
- Cost savings
- Reduction of CO<sub>2</sub> emission
- Frost protection
- Process control: ensuring the stability of the process temperature
- Noise reduction
- Condensation prevention
- (Personal) Protection against high temperatures

## HVAC insulation - pipes

ProRox mandrel wound pipe sections with WR-Tech™ or SeaRox lamella mats are most commonly used to insulate the pipes for HVAC (Heating, ventilation and air conditioning) applications onboard ships. The aim is to prevent heat loss in heating and hot water systems. Heating and hot water also need to reach the furthestmost cabin from the source.



## Air ducts

There are many requirements with regard to air ducts. Most important is that consideration is given to the comfort of living quarters onboard vessels and platforms and that no compromises are made with regard to fire safety.

In connection with ventilation of cabins and other rooms, it must also be ensured that no condensation is formed and that the required temperature is maintained at all times. This is achieved by using one of the ROCKWOOL Technical Insulation products in the correct thickness. Rockassist, our thermal calculation program, is available on our website.



## Scrubbers

Scrubbers are used to remove particles and harmful components, such as sulphur oxides (SO<sub>x</sub>) and nitrogen oxides (NO<sub>x</sub>) from the exhaust gasses generated when fuel oil is combusted. The hot flue exhaust gas is passed through a scrubber unit where the gas is cleaned. The exhaust gas is hot and therefore insulation of both gas inlet piping and the actual scrubber unit is necessary.

**We offer a range of products that are ideally suited for insulation of hot equipment including scrubbers:**

- ProRox PS 960 pipe sections are recommended for smaller diameter pipes.
- ProRox WM 950 or WM 960 wired mats and the metal mesh free alternative SeaRox FM 6040 ALU are recommended for larger diameter piping and the actual scrubber unit.

All products have a low chloride content (< 10 mg/kg) and are thus safe for use directly onto stainless steel.

## Combat CUI with the unique Water Repellency Technology WR-Tech™

Our next generation ProRox stone wool insulation products, like pipe sections ProRox PS 960 with WR-Tech helps you get to grips with corrosion under insulation - CUI.

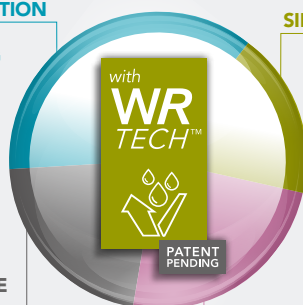
### LOWEST WATER ABSORPTION

< 5X LESS WATER ABSORPTION,  
EVEN AFTER HEATING AND AGING

### SILICONE OIL-FREE

### LOW WATER LEACHABLE CHLORIDE CONTENT

SAFE TO USE OVER STEEL (<10 PPM)



### FASTEST WATER DISSIPATION



## We have a winner!

WR-Tech™, our revolutionary Water Repellency Technology for combatting corrosion under insulation, was a winner at the 2019 Materials Performance Corrosion Innovation of the Year Awards.

## Hot piping and equipment

In the engine room, hot pipes and equipment need to be insulated, both to save energy by reducing the heat emission from surfaces and for safety reasons to prevent burns. ROCKWOOL Technical Insulation has a range of products specially developed for this purpose (ProRox series). The foremost products in this range (pipe sections and wired mats) are marine-approved, which means they complement the SeaRox range.

ProRox PS 960 pipe sections are used for hot piping, including exhaust pipes, while ProRox WM 950/960 wired

mats are used for equipment, vessels and larger diameter piping. SeaRox SL 620 slabs, which are often used for fire divisions, are also perfectly suited as thermal insulation for hot surfaces.

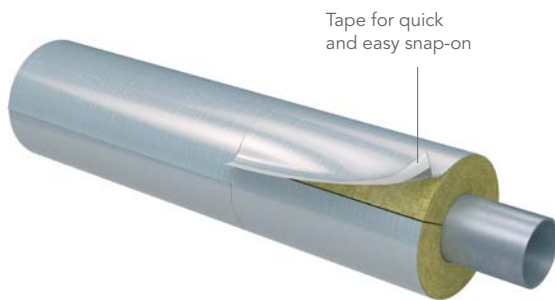
The final choice of product and insulation thickness depends on the geometry of the equipment, process and ambient temperatures, the choice of cladding and, most importantly, the purpose of the insulation.



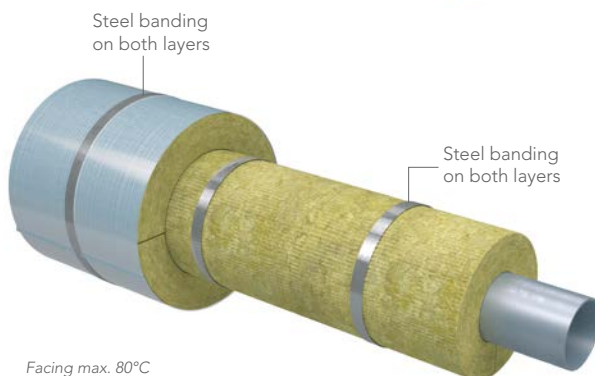
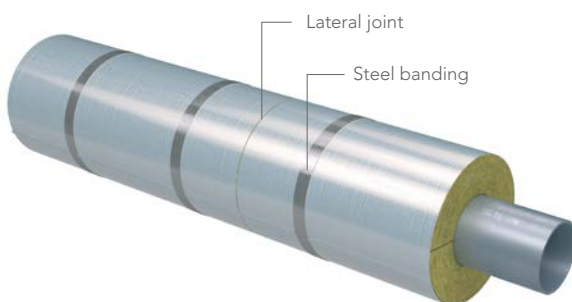
# Insulation with ProRox pipe section

We have a wide selection of marine-approved pipe insulation solutions for large and small pipes that satisfy all requirements. The mandrel wound ProRox pipe sections are made of stone wool and incorporate WR-Tech, an innovative water-repellent binder to mitigate the risk of corrosion under insulation. The ProRox pipe sections are available with or without reinforced aluminium foil covering.

The ProRox pipe sections are especially suitable for ambient to very high temperatures, but with a good water vapour barrier they can also be used for chilled media.



*At temperatures above 300°C the provisional application of spacers must be determined in each individual case due to the evaporation of the binder.*



Facing max. 80°C



## ProRox pipe section with WR-Tech™

Generally, the best insulation is achieved by using ProRox pipe section. The pipe sections can be used up to service temperatures of 620°C according to EN 14707. Facing up to 80°C. The pipe sections are supplied ready split and hinged for quick and easy snap-on assembly and are suitable for thermal and acoustical insulation of pipe work.

Their excellent fit and high compression resistance mean that pipe sections can be applied in a single layer without any additional spacers. Consequently the number of thermal bridges, which have a negative influence on the insulation, is greatly reduced.

## Banding

We recommend that the pipe section be secured to the pipe by applying three steel bands per section length, with the end bands approximately 100 mm from the lateral joints.

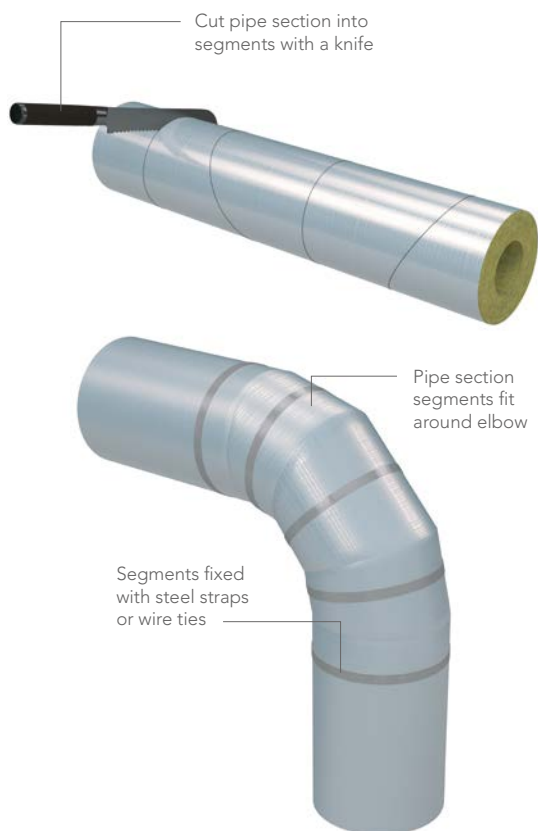
If wire ties or spiral binding are to be used, they should only be considered on pipe sections with an outer surface diameter of 200 mm or less.

### In those cases, there should be:

- At least three wire ties per section.
- Spiral binding must be per section (tied off at each end of each pipe section).

## Multiple layers

- If more than one layer of pipe section is required, both layers should be banded to ensure a consistently tight fit of the insulation.
- The outer layer(s) of the section should be applied with staggered joints, both laterally and longitudinally.



## Elbows/bends

- To form insulated elbows with pipe section, the section is cut at angles to form segments.
- The amount of segments depends on the size of the pipe and the angle of the elbow.
- When the pipe section segments are fit around the pipe, they are secured with steel banding or wire ties per section.
- Any minor gaps between segments can be filled with pieces of ROCKWOOL insulation.

## Insulation with SeaRox lamella mat

- SeaRox LM 900 ALU consists of stone wool lamellas placed edgeways, with the majority of fibres perpendicular to the facing. The SeaRox lamella mat can be used up to service temperatures of 250°C. Facing up to 80°C.
- The surface finish on the SeaRox lamella mat, should be taped at all joints.
- The mats are secured with steel banding.

Due to the alignment of the ROCKWOOL fibres, SeaRox lamella mat is highly resistant to compression. It is suitable for applications requiring:

- Compression resistance
- Possible mechanical impact
- Operational vibration loads





# Insulation with SeaRox and ProRox wired mat

- SeaRox and ProRox wired mats are lightly bonded stone wool mats faced with a galvanised wire mesh. SeaRox and ProRox WM can be used up to service temperatures of 680°C according to EN 14706.
- Due to their flexibility and high temperature resistance, wired mats can be cut and fixed onto the piping easily.
- SeaRox and ProRox wired mats have relatively low resistance to pressure and from a practical point of view should only be installed in combination with spacers. Due to the thermal bridges of this combination the better insulation performances are often achieved in the lower and middle temperature range with pipe sections rather than with wired mats.

## Fixing

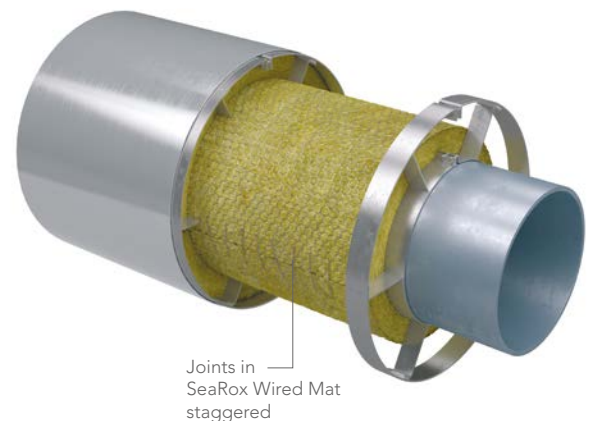
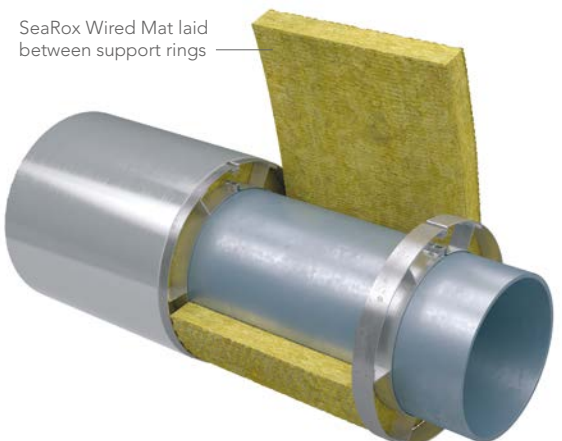
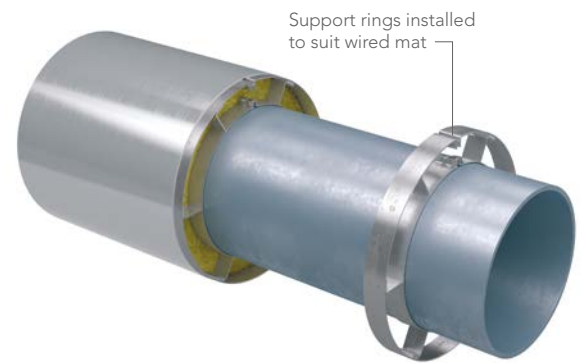
- Any gaps created by the type of support ring installed must be filled with loose ROCKWOOL stone wool.
- SeaRox and ProRox wired mats are secured to the pipe by stitching the edges of the wire mesh together with binding wire or by clipping the mesh together with C-hooks.
- On pipes with a diameter greater than 350 mm, steel straps or additional pins and spring washers are applied to the underside of the pipe to prevent sagging.
- On vertical pipes, the wire mesh of each mat must be tied to the support ring above.

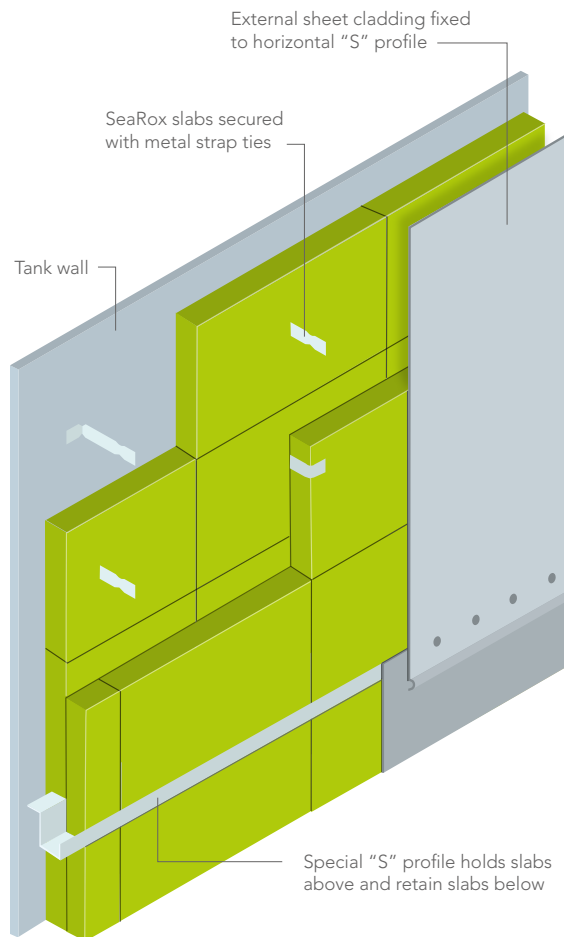
## Multiple layers

- If more than one layer of wired mat is required, it is recommended that all layers are stitched or clipped to ensure a consistently tight fit of the insulation.
- The outer layer(s) of wired mat should be applied with longitudinally staggered joints and, where applicable, with staggered joints laterally.

These SeaRox and ProRox wired mats are ideal where pipe sections are difficult or impossible to use:

- Temperatures above 300°C
- Pipe diameters  $\geq \varnothing 350$  mm
- Piping with a high number of shaped pieces such as elbows or T-joints.





## Insulation with SeaRox slabs

- Tanks and vessels are typically insulated with SeaRox slabs with min. density 45 kg/m<sup>3</sup>. The products can be used up to service temperatures of 250°C. For higher temperatures, products with higher maximum service temperature resistance like SeaRox SL 620 can be used.
- The SeaRox slabs are installed and secured with steel pins and washers or over metal strap ties. These ties are bent over the edge of the outer layer of SeaRox slabs to hold them against the tank wall.
- Where the insulation extends more than 4 m in height, intermediate support profiles must be installed on the tank wall. Special "S" profiles can be used to ensure vertically staggered joints, while supporting the SeaRox slabs above and retaining the SeaRox slabs below.
- If more than one layer of SeaRox slabs is required, all joints must be staggered and tightly butted together to avoid thermal bridges.
- The SeaRox slabs must be covered with a flat or profiled external cladding to protect them from the weather and mechanical damage.



## Cladding

Suitable cladding should be applied to protect the insulation from weather influences, mechanical loads and (potentially corrosive) pollution. Selecting the appropriate cladding is based on an evaluation of various factors, such as working loads, wind loads, ambient temperatures and conditions. When selecting the appropriate cladding, take the following points into account:

- As a general rule, galvanised steel is used indoors, due to its mechanical strength, fire resistance and low surface temperature compared to aluminium cladding.
- In corrosive environments, like on deck where salty water leads to corrosion, aluminised steel, stainless steel or glass reinforced polyester (GRP) is used as cladding. Stainless steel is recommended for use in environments with a fire risk.
- The surface temperature of the cladding is influenced by the material type. As a general rule: the shinier the surface, the higher the surface temperature.
- To exclude the risk of galvanic corrosion, only use combinations of metals that do not accelerate corrosion because of differences in their electrochemical potential.
- For acoustic insulation, a noise-absorbent material (heavy mass layer) could be installed on the insulation or inside the cladding.





# Index of

# Sound solutions



	Page
Rules and regulations	104
Acoustic foil	105
Sound absorption	106
Sound reduction	107
Impact sound reduction	108





## High R =

- good sound insulation
- good sound reduction

# Rules and regulations

When people are exposed to consistent elevated noise levels, their health may be affected. Elevated workplace or environmental noise can cause hearing impairment, hypertension, heart diseases, annoyance, and sleep disturbance. Beyond these effects, elevated noise levels can create stress and increase workplace accident rates.

To improve safety on board ships, the new IMO noise code - resolution MSC.337(91) (implemented 2014) introduced new mandatory requirements with regard to noise-reduction measures on ships covering design, documentation and performance, as well as actual noise levels on-board.

These requirements must be complied along with any additional comfort class requirements or requirements imposed by the flag state.

## The noise code

On 30 November 2012, the IMO Maritime Safety Committee adopted resolution MSC.337(91), the code on noise levels on board ships, also known as the "noise code".

The new rules relate to new ships. The flag administration may also decide to enforce the rules on existing vessels, in relation to major repairs, refurbishments etc. The new noise code is mandatory and replaced the voluntary 1981 noise code A.468(XII).

The code applies to passenger and cargo ships with a gross tonnage of 1600 or higher.

The intention of the code is to provide standards to prevent potentially hazardous noise levels on board ships and an acceptable environment for seafarers:

- To provide safe working conditions (to enable speech communication, hearing of audible alarms and an environment where clear-headed decisions can be made in control stations, navigation, radio spaces and manned machinery spaces).
- To protect seafarers from noise levels that may give rise to noise-induced hearing loss; and
- To provide the seafarer with an acceptable degree of comfort in rest, recreation and other spaces.

The principle is that the ships should be designed and constructed in a way that noise threshold levels specified in the code are followed for all relevant areas. Key is that actual noise levels should be measured and reported during a sea trial. The noise reports will be part of the documentation for the ship.

## New noise levels limits (maximum levels):

Designation of rooms and spaces	Ship size	
	1600 up to 10000 GT	≥ 10000 GT
<b>Work spaces</b>		
Machinery spaces	110	110
Machinery control rooms	75	75
Workshops other than those forming part of machinery spaces	85	85
Non-specified work spaces (other work areas)	85	85
<b>Navigation spaces</b>		
Navigating bridge and chartrooms	65	65
Look-out posts, incl. navigating bridge wings and windows	70	70
Radio rooms (with radio equipment operating but not producing audio signals)	60	60
Radar rooms	65	65
<b>Accommodation spaces</b>		
Cabin and hospitals	60	55
Messrooms	65	60
Recreation rooms	65	60
Open recreation areas (external recreation areas)	75	75
Offices	65	60

The noise code also includes a requirement with regard to the sound insulation index ( $R_w$ ) for bulkheads and decks between cabins, between cabins and mess room etc., as follows.

The airborne sound insulation properties for bulkheads and decks within the accommodation shall comply at least with the following weighted sound reduction index ( $R_w$ ) according to ISO Standard 717-1:1996 as amended (1:2006), part 1.

Designation of division between rooms and spaces	Weighted sound reduction index ( $R_w$ )
Cabin to cabin	35 dB
Messrooms, recreation rooms, public spaces and entertainment areas to cabins and hospitals	45 dB
Corridor to cabin	30 dB
Cabin to cabin with communication door	30 dB

The airborne sound insulation properties shall be determined by laboratory tests in accordance with ISO 10140-2:2010.

The code additionally includes requirements for the use of hearing protectors in areas with high noise levels as well as daily time limit restrictions for people working in high noise areas. It also contains appendixes with formats for noise reports, guidance for the inclusion of noise issues in safety management systems, the suggested method for attenuating (reducing) noise and simplified procedures for determining noise exposure.

The new noise code introduces a set of mandatory minimum requirements. **Actual comfort class or flag state requirements may, however, be stricter and must also be complied with.**

## Noise mitigation

Noise can be reduced by replacing equipment with lower noise-emitting equipment, resilient mounting of machinery, resilient connections between construction elements, silencers in ventilation ducts etc.

But noise can also be reduced with the use of insulation, to create sound absorbing surfaces, improve sound insulation of walls and ceilings or in floating floor constructions. Acoustic insulation is used to reduce the amount of reflected noise within an enclosure (absorption), as well as to reduce the noise passing through a division (reduction).

In the following pages an overview of sound absorption and sound reduction of ROCKWOOL Technical Insulation products and systems are provided.

## Acoustic foil

The insulation is traditionally protected against absorption of oil and oil vapours by reinforced aluminium foil or by steel plates when stronger mechanical solutions are required. However, the challenge has been that aluminium foil, and in particular steel plate, significantly decreases the noise absorption properties of the insulation.

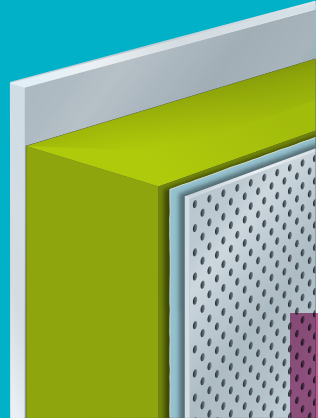
Engine rooms, which are a high risk area in relation to oil contamination of surfaces, are also one of the areas on a vessel with the highest sound levels, and solutions are needed to improve sound absorption without compromising fire safety. This is exactly what the SeaRox acoustic foil system provides.

By using this foil system, the noise absorption properties of the SeaRox material will remain, maintaining mechanical integrity and preventing oil absorption of the insulation. SeaRox acoustic foil is a very strong, thin and durable polymer film that is highly resistant to oil mist compared to the common reinforced aluminium foil solution on the market (measured according to modified version of ASTM E96).

## 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

- Steel plate
- SeaRox insulation
- SeaRox acoustic foil
- Perforated steel plate



The system - SeaRox insulation + SeaRox acoustic foil + 1 mm perforated steel plate - passes the low surface flammability requirements of IMO FTP code part 5 and is certified by recognised classification societies and under the MED scheme.

To obtain the optimal sound properties the film must be fitted loosely with a small gap between the foil and the insulation, the perforated steel plate should be installed as close to the foil as possible, with due consideration for a minimum distance of 5 mm.

### Documented sound properties

The system has also been tested for sound reduction, proving its unique acoustic performance.

### Easy installation

SeaRox acoustic foil must not be fixed directly to the insulation. It is essential that the film is fitted loosely, with a small gap between the insulation and the film. This is done either by wrapping it around the slab or by utilising the welding pins required to secure the wool to the substrate.

The film should be overlapped by at least 100 mm. Although the film is very strong, in some cases it may be necessary to reinforce any penetration (from pins etc.) with self-adhesive transparent tape. SeaRox acoustic foil can be combined with any approved SeaRox fire protection solution or with any SeaRox thermal/acoustic insulation product.

We supply the insulation and the acoustic foil. The remaining parts of the system – perforated steel plate and fitting system – should be acquired locally from the regular metal supplier of the yard or contractor.



SOLAS, Chapter II-2, part B, Regulation 4, sec 3:

### Insulation surfaces protected against oil penetration

*"In spaces where penetration of oil products is possible, the surface of insulation shall be impervious to oil or oil vapours".*

# Sound absorption

Stone wool has good sound absorption because of the porosity and the fibre structure.

The sound is absorbed by the porous fibrous material. When a sound wave enters the absorptive material, the acoustic energy of the air is reduced due to friction against the surface of the fibers and the energy is converted into heat.

Absorption will depend on the actual product and is generally improved by increased thickness. Absorption may be reduced when the insulation has a facing – in particular an aluminum foil facing reduces the absorption properties of the stone wool.

Protection of the insulation by a cover plate is possible without changing the absorption, provided the plate is perforated with a sufficient number of openings. A perforation grade of at least 15% is sufficient for a 1 mm thick cover plate of steel. Thicker cover plates require a higher perforation grade.

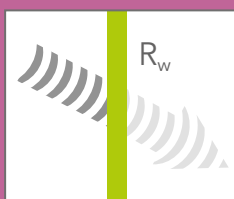
*Sound absorption is a material property that describes how well sound waves are absorbed by a material.*



## Sound reduction

Like for absorption, part of the acoustic energy is converted into heat by friction, but the interaction between the different layers (insulation/structural metal) also significantly reduces the sound passing the division.

Sound insulation is improved if both layers (insulation/structural metal) have high mass. Sound reduction performance is therefore improved by insulation thickness, density and metal wall thickness. Adding extra mass layers can also improve sound reduction performance.



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

### Overview - Absorption measurements

No	Products	Weighted absorption $\alpha_w$
1	SeaRox FB 6020, 70 mm	0.95
2	SeaRox FB 6040, 70 mm	0.90
3	SeaRox FB 6050, 30 mm	0.55
4	SeaRox SL 620, 40 mm	0.80
5	SeaRox SL 620, 40 mm + alu foil	0.50
6	SeaRox SL 620, 60 mm incl. pin's and washer	0.90
7	SeaRox SL 620, 60 mm incl. pin's and washer, covered by 19 $\mu$ foil	0.90
8	SeaRox SL 320, 50 mm	0.85
9	SeaRox SL 340, 50 mm	0.90
10	SeaRox SL 740, 50 mm	0.75
11	SeaRox SL 340, 2 x 50 mm	0.95
12	SeaRox SL 740, 50 mm + alu foil	0.65
13	SeaRox SL 436, 50 mm	0.85
14	SeaRox SL 440, 50 mm	0.75
15	SeaRox SL 480, 50 mm	0.75
16	SeaRox SL 480, 2 x 30 mm	0.80
17	SeaRox SL 640, 30 mm	0.70
18	SeaRox SL 640, 2 x 30 mm	0.90
19	SeaRox SL 660, 2 x 50 mm	0.90
20	SeaRox WM 950, 50 mm	0.90
21	SeaRox WM 950 ALU, 50 mm	0.75
22	SeaRox WM 950, 100 mm	0.95
23	SeaRox WM 950 ALU, 100 mm	0.75
24	SeaRox WM 620, 45 mm	0.90
25	SeaRox WM 620, 45 mm + SeaRox acoustic foil (19 $\mu$ ) + perf. steel plate (suspended)	0.90
26	SeaRox WM 620, 2 x 45 mm	0.95
27	SeaRox WM 640, 30 mm	0.80
28	SeaRox WM 640, 75 mm	0.90
29	SeaRox WM 640, 100 mm	0.90

Determined by laboratory tests in accordance with ISO 10140-2:2010 tested on 6 mm steel plate.



## Overview - Reduction measurements

No	Construction	Products	Weighted reduction $R_w$
1	A15 steel deck	SeaRox FB 6020, 70 mm (no insulation on stiffeners)	45 dB
2	A15 steel deck and bulkhead	SeaRox FB 6040, 35 mm (no insulation on stiffeners)	45 dB
3	A30 steel bulkhead	SeaRox FB 6020, 70 mm / SeaRox FB 6050, 30 mm	46 dB
4	A30 steel bulkhead + thermal	SeaRox FB 6020, 70 mm / SeaRox FB 6050, 30 mm and 50 mm SeaRox MA 720 ALU	49 dB
5	A30 steel bulkhead	SeaRox FB 6020, 70 mm / SeaRox FM 6030 ALU, 30 mm	46 dB
6	A30 steel deck	SeaRox FB 6050, 30 mm / SeaRox FM 6050, 30 mm	45 dB
7	A30 steel deck	SeaRox FM 6030 ALU, 30 mm / SeaRox FM 6030 ALU, 30 mm	46 dB
8	A30 steel deck	SeaRox SL 620, 40 mm / 25 mm and 50 mm SeaRox MA 720 ALU	50 dB
9	A30 steel deck	SeaRox SL 620, 25 mm / 25 mm	47 dB
10	A60 steel bulkhead	SeaRox FB 6040, 70 mm / SeaRox FB 6050, 30 mm	48 dB
11	A60 steel bulkhead	SeaRox FB 6040, 70 mm / SeaRox FM 6040, 35 mm	48 dB
12	A60 steel bulkhead	SeaRox SL 620, 60 mm / 25 mm	48 dB
13	A60 steel bulkhead + thermal	SeaRox SL 620, 60 mm / 25 mm and 50 mm SeaRox MA 720 ALU	49 dB
14	A60 steel bulkhead + thermal	SeaRox FB 6040, 70 mm / SeaRox FB 6050, 30 mm and 50 mm SeaRox MA 720 ALU	50 dB
15	A60 steel bulkhead restr.	SeaRox FB 6020, 70 mm / SeaRox FB 6050, 30 mm	46 dB
16	A60 steel bulkhead restr.	SeaRox FB 6020, 70 mm / SeaRox FM 6040 ALU, 35 mm	46 dB
17	A60 steel bulkhead restr. + thermal	SeaRox FB 6020, 70 mm / SeaRox FB 6050, 30 mm and 50 mm SeaRox MA 720 ALU	49 dB
18	A60 steel deck	SeaRox FB 6020, 70 mm / SeaRox FB 6050, 30 mm	46 dB
19	A60 steel deck	SeaRox FM 6040 ALU, 50 mm / SeaRox FM 6040 ALU, 50 mm	47 dB
20	A60 steel deck	SeaRox FB 6020, 70 mm / SeaRox FM 6040 ALU, 35 mm	46 dB
21	A60 steel deck	SeaRox SL 620, 40 mm / 25 mm	48 dB
22	H60 steel bulkhead restricted	SeaRox SL 660, 30 mm and SeaRox WM 660, 40 mm / 40 mm	48 dB
23	H60 steel bulkhead restr. + thermal	SeaRox SL 660, 30 mm and SeaRox WM 660, 40 mm / 40 mm and 50 mm SeaRox SL 720	50 dB
24	H60 steel bulkhead restr. + thermal	SeaRox SL 660, 30 mm and SeaRox WM 660, 40 mm / 40 mm and 50 mm SeaRox MA 720 ALU	51 dB
25	H120 bulkhead restricted	SeaRox SL 660, 30 mm and SeaRox WM 660, 40 mm / 2 x 40 mm	49 dB
26	H60 steel deck	SeaRox SL 660, 2 x 50 mm / 2 x 50 mm	48 dB
27	A60 aluminium bulkhead	SeaRox SL 620, 2 x 30 mm / 2 x 30 mm (on both sides)	40 dB
28	A60 aluminium bulkhead	SeaRox FM 6040 ALU, 2 x 35 mm / 2 x 35 mm (on both sides)	46 dB
29	Thermal insulation	SeaRox MA 7000 ALU, 50 mm / 50 mm	45 dB
30	Acoustic insulation	SeaRox FM 6020 ALU, 90 mm (no insulation on stiffeners)	49 dB

ISO 10140-2:2010-compliant laboratory test reports are available. Contact your local ROCKWOOL Technical Insulation representative.





## Impact sound reduction

The principles of absorption and reduction work also here, but in floating floor constructions it is possible to enhance the general sound reduction and also impact noise reduction with a mass-spring-mass effect. The insulation is positioned between two mass layers (top steel plate(s) and the steel deck) and the elasticity of the insulation material functions like a spring, dissipating sound energy and so reducing the noise transmitted through the construction.

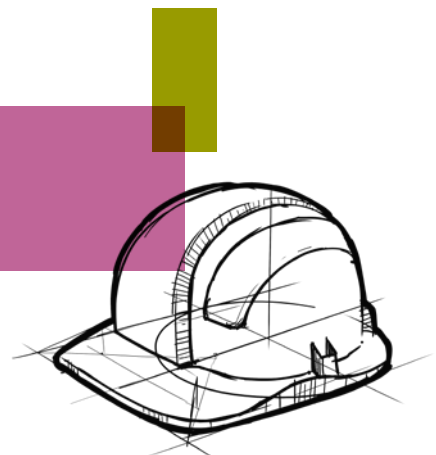
For floating floors the insulation must have the right balance between compression resistance and dynamic stiffness for optimum acoustic performance. Higher insulation thickness improves the sound reduction.

The dynamic stiffness is an important parameter when optimising floating floors. This is true with respect to air- and structure-borne noise and impact noise.

In principle, the dynamic stiffness should be as low as possible in order to obtain a low natural frequency of the floating floor. On the other hand, the load-bearing capacity and the possible unfavourable experience of walking on a floor that is too soft may set a lower limit for the stiffness.

SeaRox SL 436 is the most common product used for floating floors. This product has been optimized for dynamic stiffness.

[Read more about SeaRox SL 436 and floating floors, on page 88.](#)



# Index of **Thermal and comfort insulation**



## **Bulkhead & deck**

	Page
Solutions for thermal insulation	110
Floor connection	111
Thermal calculations	112

# Thermal and comfort insulation

The focus on the requirements of the indoor climate and comfort has increased in recent years. Proper insulation is an important part of maintaining a comfortable indoor temperature with a minimum energy consumption for heating or air conditioning.

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

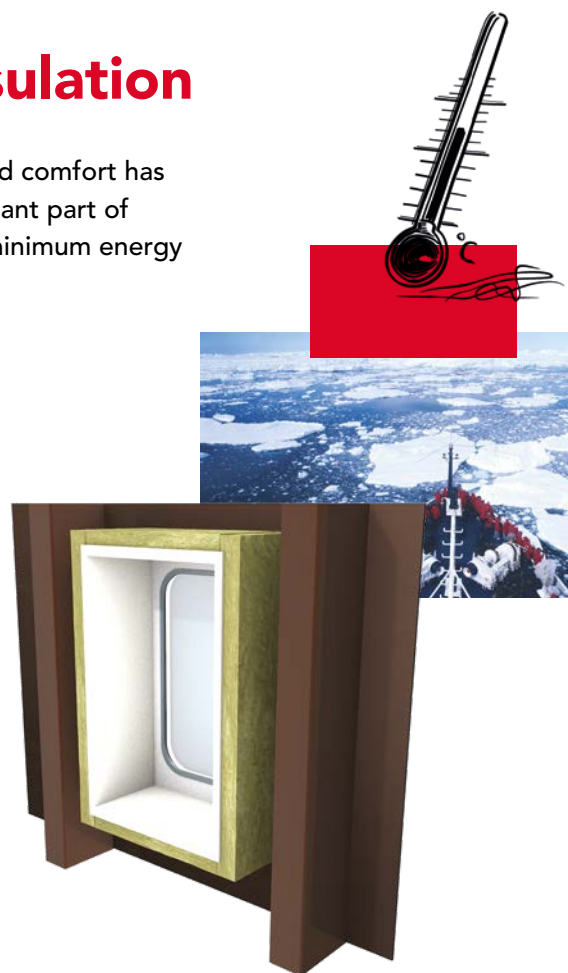
- Coefficient of the thermal transmission (U-value)
- Thermal resistance (R)
- Thermal conductivity ( $\lambda$ )

It is important to note that the  $\lambda$ -value of any given material varies with temperature.

Specification of the ( $\lambda$ )-value should therefore be referred to as "mean" temperature and, if possible, to a standardised method for measurement and calculation.

**Lambda value ( $\lambda$ ) measurements on ROCKWOOL Technical Insulation products (nominal values):**

Product $\lambda$ [W/mK]	$\lambda_{10}$
SeaRox FB 6000 range	0.034
SeaRox FM 6000 range	0.034
SeaRox MA 7000 ALU	0.037
SeaRox SL 720	0.035
SeaRox SL 740	0.035
SeaRox SL 320	0.035
SeaRox SL 340	0.035
SeaRox SL 436	0.037
SeaRox SL 440	0.037
SeaRox SL 480	0.037
SeaRox SL 620	0.035
SeaRox SL 640	0.037
SeaRox LM 900	0.039
SeaRox WM 620	0.035
SeaRox WM 640	0.036
SeaRox WM 660	0.037
SeaRox SL 660	0.037



## NEW SeaRox MA 7000 ALU, the lightweight solution for thermal insulation

Following the success of our lightweight range for fire rated applications we introduce a new lightweight product for the thermal insulation of bulkheads, decks and outer bulkheads, SeaRox MA 7000 ALU.

The product is delivered as a highly compressed, compact roll (in 26 kg/m<sup>3</sup>) and comes as standard with reinforced aluminium on one side.

The lower weight contributes to an overall weight saving, which increases energy efficiency, lowers costs and reduces CO<sub>2</sub> emissions.

The product combines low weight, high thermal performance, excellent acoustic properties and lowest water absorption.

The low density combined with the generic stone wool characteristics ensures easy installation and a high end-result.

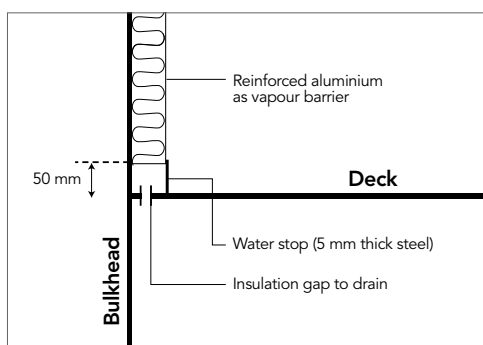
## Thermal insulation in combination with fire and sound protection

- 1: Thermal (or comfort) insulation can be used on its own - applied to the deck or bulkhead.
- 2: Thermal insulation can also be used in combination with fire insulation or sound insulation.

When the minimum insulation thickness has been found for protecting against sound or fire, the thermal transmission (U-value) of this material can be calculated from the  $\lambda$ -value. If a higher thermal insulation level is required, the construction can be improved by adding an extra layer of a lower density product.

In all cases of insulating towards 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 aluminium tape.

Note that combining an A-class fire rated insulation system with additional insulation for added thermal or acoustic performance may require approval from the local surveyor.



### Floor connection

When making a surface towards the exterior it may be necessary to end the insulation 50 mm above the floor. This ensures that any condensate from the bulkhead can be drained away.

*A piece of flat iron can be fit in front of the gap to guide the condensate to a drain.*



### ROCKWOOL SeaRox products fulfil the IMO non-combustibility and low-frame spread rules.

They also have excellent water repellent properties, which are important as thermal insulation is often placed directly up against the outer construction. All ROCKWOOL SeaRox products fulfil the IMO with changing temperatures.



# Thermal calculations

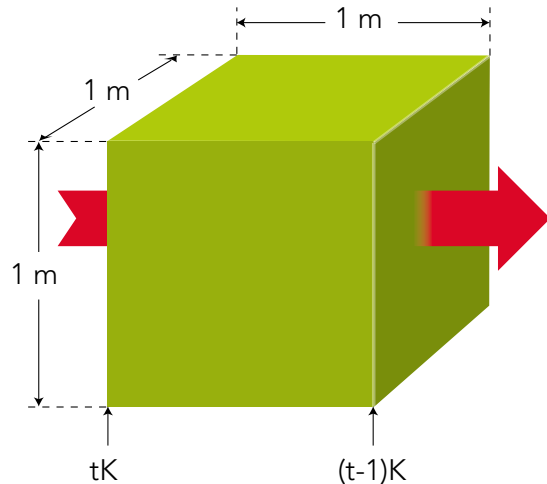
## Lambda value/ thermal conductivity ( $\lambda$ )

The lambda ( $\lambda$ ) value, also referred to as thermal conductivity, is a value indicating how well a material conducts heat. It indicates the quantity of heat (W), which is conducted through a 1 m<sup>2</sup> wall, in a thickness of 1 m, when the difference in temperature between the opposing surfaces of this wall equals 1 K (or 1°C). In practice,  $\lambda$  is a numerical value expressed in terms of W/(mK). The lower the  $\lambda$  value, the better the insulation property of the material.

### Examples at 10°C

■ Steel:	$\lambda = 50$	W/mK
■ Concrete:	$\lambda = 1.6$	W/mK
■ Glass:	$\lambda = 1.1$	W/mK
■ Wood:	$\lambda = 0.12$	W/mK
■ ROCKWOOL:	$\lambda = 0.035$	W/mK

Most materials will increase in  $\lambda$  when temperatures rise.



$$\lambda = \text{W/mK}$$



$$U = \text{W/m}^2\text{K}$$

$$U = \frac{\lambda}{\text{Thickness}}$$

## U value

The transport of thermal energy through a structure is expressed by a coefficient, U (Thermal transmittance coefficient). It represents the flow of heat (in W) through 1 m<sup>2</sup> of a structure, when the difference between the two surrounding temperatures is 1 K (or 1°C). The thermal transmittance coefficient is expressed in W/(m<sup>2</sup>K). The lower the coefficient, the better the structure insulates.

$$R = \frac{1}{U} \quad \text{or} \quad R = \frac{\text{Thickness(m)}}{(\text{W/mK})}$$

## R value

Thermal resistance, R, is a measure used in a construction. The R value is the reciprocal U value. Increasing the thickness of an insulating layer increases the R value.



## Examples

The steel plate is not taken into consideration due to the low added value.

### ■ SeaRox SL 740, 50 mm (10 = 0.035 W/mK)

$$R = 0.05/0.035 = 1.43[\text{m}^2\text{K/W}] \quad U = 0.70[\text{W/m}^2\text{K}]$$

### ■ SeaRox SL 740, 100 mm (10 = 0.035 W/mK)

$$R = 0.1/0.035 = 2.86[\text{m}^2\text{K/W}] \quad U = 0.35[\text{W/m}^2\text{K}]$$

### ■ SeaRox SL 620, 60 mm (10 = 0.035 W/mK)

$$R = 0.06/0.035 = 1.714[\text{m}^2\text{K/W}] \quad U = 0.57[\text{W/m}^2\text{K}]$$

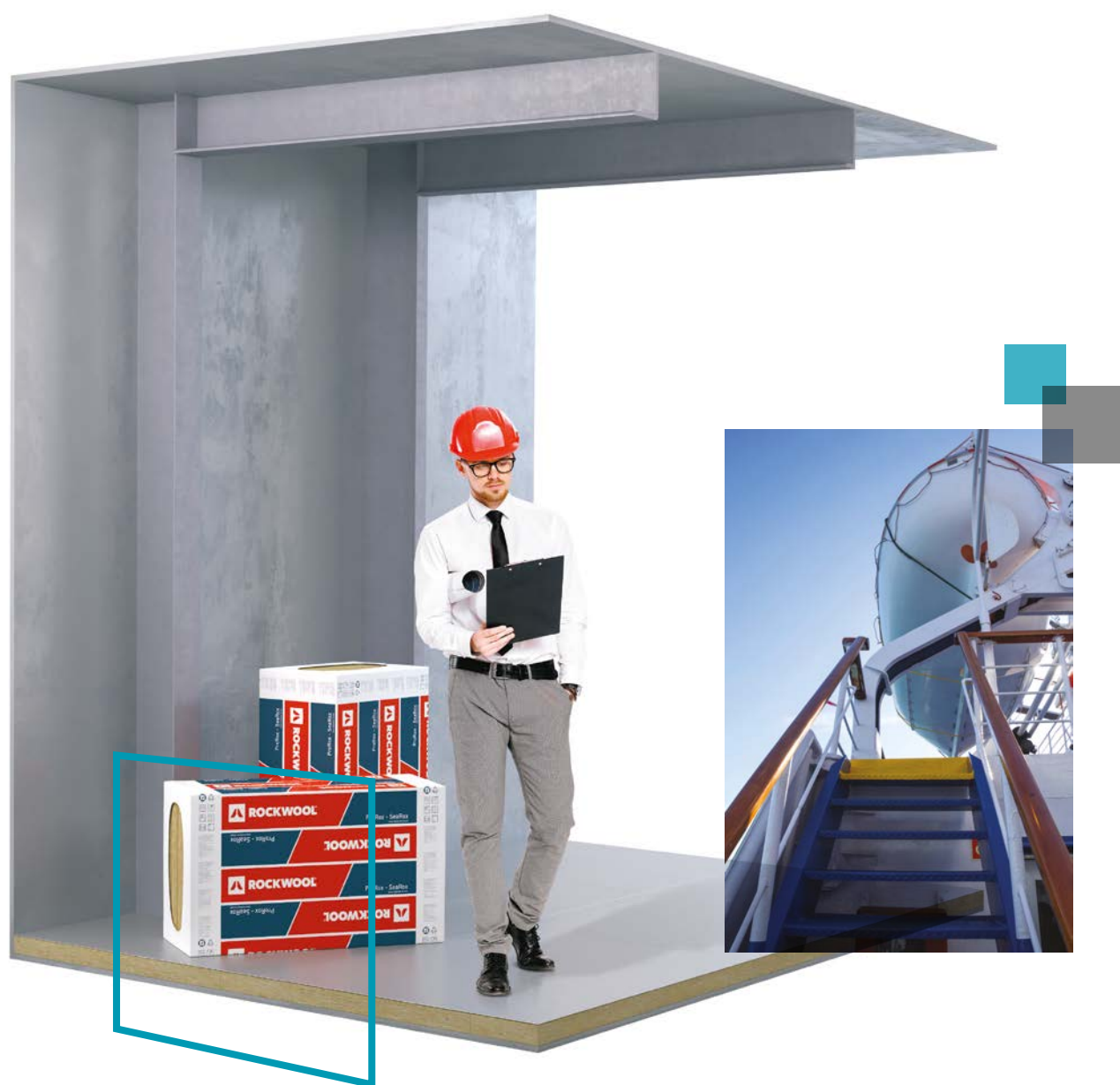
### ■ SeaRox SL 620, 60 mm + SeaRox SL 740, 50 mm (10 = 0.035 W/mK 10 = 0.035 W/mK)

$$R = (0.06/0.035) + (0.05/0.035) = 3.14[\text{m}^2\text{K/W}] \quad U = 0.32[\text{W/m}^2\text{K}]$$

### ■ SeaRox SL 620, 60 mm + SeaRox SL 740, 100 mm (10 = 0.035 W/mK 10 = 0.035 W/mK)

$$R = (0.06/0.035) + (0.1/0.035) = 4.57[\text{m}^2\text{K/W}] \quad U = 0.22[\text{W/m}^2\text{K}]$$

# Index of Product guide



	Page
Product selector	114
Products	115
Surfaces	122

## Product selector

We have developed a special range of marine products that meet the requirements of IMO's regulation in all situations. There is a ROCKWOOL SeaRox product with the required approval for virtually every construction.

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



		SeaRox FB 6020 / FB 6040 / FB 6050	SeaRox FM 6030 ALU	SeaRox FM 6040 ALU	SeaRox FM 6050 ALU	SeaRox MA 7000 ALU	SeaRox SL 720 / SeaRox MA 720 ALU	SeaRox SL 740	SeaRox MA 740 ALU	SeaRox SL 320	SeaRox SL 340	SeaRox SL 436	SeaRox SL 440	SeaRox SL 480	SeaRox SL 620	SeaRox SL 640	SeaRox SL 660	SeaRox WM 620	SeaRox WM 640	SeaRox WM 660	SeaRox LM 900 ALU	ProRox WM 950	ProRox PS 960
<b>Bulkhead and deck</b>																							
Fire (A class divisions)		■	■	■	■							■	■	■	■	■		■	■				
Fire (H class divisions)																	■			■			
Comfort insulation (Thermal)						■	■	■	■														
Outfitting												■	■	■									
Sound insulation										■	■												
<b>Technical installations</b>																							
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)																						■	■

## COMFORT INSULATION



### SeaRox MA 7000 ALU

#### Product description

SeaRox MA 7000 ALU is a lightweight, soft and resilient mat made of stone wool. SeaRox MA 7000 ALU is delivered as a highly compressed, compact roll. The product comes as standard with reinforced aluminium foil on one side.

#### Application

SeaRox MA 7000 ALU is used for thermal insulation of bulkhead, decks and outer bulkheads.

## COMFORT INSULATION



### SeaRox SL 720

#### Product description

SeaRox SL 720 is low weight, soft and resilient slab made of stone wool. The product can be delivered with reinforced aluminium foil.

#### Application

SeaRox SL 720 is used for thermal insulation.

## COMFORT INSULATION



### SeaRox MA 720 ALU

#### Product description

SeaRox MA 720 ALU is a low weight, soft and resilient mat made of stone wool. SeaRox MA 720 ALU is delivered as a highly compressed, compact roll. The product comes as standard with reinforced aluminium foil.

#### Application

SeaRox MA 720 ALU is used for thermal insulation.

## COMFORT INSULATION



### SeaRox SL 740

#### Product description

SeaRox SL 740 is a low weight, semi-rigid and resilient slab made of stone wool. The product can be delivered with reinforced aluminium foil or glass cloth.

#### Application

SeaRox SL 740 is used for thermal insulation.



## COMFORT INSULATION



### SeaRox MA 740 ALU

#### Product description

SeaRox MA 740 ALU is a low weight and semi-rigid mat made of stone wool. SeaRox MA 740 ALU is delivered as a highly compressed, compact roll. The product comes as standard with reinforced aluminium foil.

#### Application

SeaRox MA 740 ALU is used for thermal insulation.

## ACOUSTIC INSULATION



### SeaRox SL 320

#### Product description

SeaRox SL 320 is a semi-rigid slab of stone wool with excellent properties for easy handling and installation.

#### Application

SeaRox SL 320 is primarily used for sound insulation. Perfect as thermal insulation with good noise absorption capability.

## ACOUSTIC INSULATION



### SeaRox SL 340

#### Product description

SeaRox SL 340 is a semi-rigid slab of stone wool with excellent properties for easy handling and installation.

#### Application

SeaRox SL 340 is primarily used for sound insulation with high noise absorption capability.

## ACOUSTIC INSULATION



### SeaRox SL 340 TB

#### Product description

SeaRox SL 340 TB is a semi-rigid slab of stone wool with excellent properties for easy handling and installation. The black tissue gives a dust free surface.

#### Application

SeaRox SL 340 TB is generally developed for sound insulation inside air ducts. The product can also be used as finishing surface in areas where the surface just needs to be dust free. It can also be used behind perforated plates in panels or similar.



## OUTFITTING



### SeaRox SL 436

#### Product description

SeaRox SL 436 is a semi-rigid slab made of stone wool. This product has a special fibre structure, which gives an optimal dynamic stiffness.

#### Application

SeaRox SL 436 is designed for floating floor constructions with low to medium requirement for compression resistance. Included in our A-60 type approved floating floor construction.

## OUTFITTING



### SeaRox SL 440

#### Product description

SeaRox SL 440 is a strong, rigid insulation slab made of stone wool. The high density and the structure of the material provide good noise reduction.

#### Application

SeaRox SL 440 is primarily used for production of marine panels, as a slab or cut into lamellars. The product can also be used in floating floor constructions with requirements for medium to high compression resistance. Included in our A-60 type approved floating floor construction.

## OUTFITTING



### SeaRox SL 480

#### Product description

SeaRox SL 480 is a very strong, rigid insulation slab made of stone wool. The high density and the structure of the material provide a high noise reduction.

#### Application

SeaRox SL 480 is primarily used for production of marine panels, as a slab or cut into lamellars. The product can also be used in floating floor constructions with requirements for high compression resistance. Included in our A-60 type approved floating floor construction.

**FIRESAFE INSULATION****LIGHTWEIGHT****SeaRox FB 6020****Product description**

SeaRox FB 6020 is a low weight fire board made of stone wool. The product can be delivered with reinforced aluminium foil or glass cloth on one side.

**Application**

SeaRox FB 6020 is used for A-class bulkhead and deck constructions. The product is suitable in areas where low construction weight plays an important role. Fire-rated constructions are tested according to IMO 2010 FTP Code. The product combines highest fire safety and optimal acoustic and thermal performance.

**FIRESAFE INSULATION****LIGHTWEIGHT****SeaRox FM 6030 ALU****Product description**

SeaRox FM 6030 ALU is a low weight fire mat made of stone wool. The product comes as standard with reinforced aluminium foil on one side.

**Application**

SeaRox FM 6030 ALU is used for A-class bulkhead and deck constructions. The product is suitable in areas where low construction weight plays an important role. Fire-rated constructions are tested according to IMO 2010 FTP Code. The product combines highest fire safety and optimal acoustic and thermal performance.

**FIRESAFE INSULATION****LIGHTWEIGHT****SeaRox FB 6040****Product description**

SeaRox FB 6040 is a low weight fire board made of stone wool. The product can be delivered with reinforced aluminium foil or glass cloth on one side.

**Application**

SeaRox FB 6040 is used for A-class bulkhead and deck constructions. The product is suitable in areas where low construction weight plays an important role. Fire-rated constructions are tested according to IMO 2010 FTP Code. The product combines highest fire safety and optimal acoustic and thermal performance.

**FIRESAFE INSULATION****LIGHTWEIGHT****SeaRox FM 6040 ALU****Product description**

SeaRox FM 6040 ALU is a low weight fire mat made of stone wool. The product comes as standard with reinforced aluminium foil on one side.

**Application**

SeaRox FM 6040 ALU is used for A-class bulkhead and deck constructions. The product is suitable in areas where low construction weight plays an important role. Fire-rated constructions are tested according to IMO 2010 FTP Code. The product combines highest fire safety and optimal acoustic and thermal performance.



## FIRESAFE INSULATION



### LIGHTWEIGHT

## SeaRox FM 6050 ALU

### Product description

SeaRox FM 6050 ALU is a low weight fire mat made of stone wool. The product comes as standard with reinforced aluminium foil on one side.

### Application

SeaRox FM 6050 ALU is mainly used for 4 mm aluminium, A-class constructions. Fire-rated constructions are tested according to IMO 2010 FTP Code on 4 mm aluminium plates. The product combines highest fire safety and optimal and thermal performance.

## FIRESAFE INSULATION



### LIGHTWEIGHT

## SeaRox FB 6050

### Product description

SeaRox FB 6050 is a low weight fire board made of stone wool. The product can be delivered with reinforced aluminium foil on one side.

### Application

SeaRox FB 6050 is used for A-class bulkhead and deck constructions. The product is suitable in areas where low construction weight plays an important role. Fire-rated constructions are tested according to IMO 2010 FTP Code. The product combines highest fire safety and optimal acoustic and thermal performance.

## FIRESAFE INSULATION



## SeaRox SL 620

### Product description

SeaRox SL 620 is a semi-rigid slab made of stone wool. The product can be delivered with reinforced aluminium foil or glass cloth.

### Application

SeaRox SL 620 is primarily used as part of approved A-class constructions for deck and bulkhead tested according to IMO 2010 FTP Code. The products offer maximum fire safety in thin thicknesses as well as high thermal and acoustic performance.

## FIRESAFE INSULATION



## SeaRox SL 640

### Product description

SeaRox SL 640 is a rigid slab made of stone wool. The product can be delivered with reinforced aluminium or glass cloth.

### Application

SeaRox SL 640 is primarily used as part of approved A-class constructions for deck and bulkhead.



## FIRESAFE INSULATION



### SeaRox SL 660

#### Product description

SeaRox SL 660 is a rigid slab made of stone wool. The product is specially developed to provide maximum fire protection. SeaRox SL 660 can be delivered with reinforced aluminium foil or glass cloth.

#### Application

SeaRox SL 660 is used for hydrocarbon fire (H-class) protection of bulkheads, decks and firewalls.

## FIRESAFE INSULATION



### SeaRox WM 620

#### Product description

SeaRox WM 620 is a lightly bonded wired mat made of stone wool. One side is faced with 1" galvanized wire netting. The wire netting is stitched on with galvanized wire. The product can be delivered with reinforced aluminium foil facing.

#### Application

SeaRox WM 620 is used for insulation of technical installations, particularly pipes with a temperature exceeding 250°C. The product can be used as fire insulation in approved A-class constructions. Max. service temp. 650°C acc. to EN 14706.

## FIRESAFE INSULATION



### SeaRox WM 640

#### Product description

SeaRox WM 640 is a lightly bonded heavy wired mat made of stone wool. One side is faced with 1" galvanized wire netting. The wire netting is stitched on with galvanized wire. The product can be delivered with reinforced aluminium foil.

#### Application

SeaRox WM 640 is used for insulation of technical installations, particularly pipes with a temperature exceeding 250°C. The product can be used as fire insulation in approved A-class constructions. SeaRox WM 640 can be used for insulation of pipe penetrations in connection with A-class constructions. Max. service temp. wool 680°C acc. to EN 14706.

## FIRESAFE INSULATION



### SeaRox WM 660

#### Product description

SeaRox WM 660 is a lightly bonded high density wired mat made of stone wool. One side is faced with 1" galvanised wire mesh. The wire netting is stitched on with galvanised wire.

#### Application

SeaRox WM 660 is used for hydrocarbon fire (H-class) protection of bulkheads and firewalls.



## ProRox WM 950

### Product description

ProRox WM 950 is a lightly bonded wired mat made of stone wool. One side is faced with 1" galvanized wire mesh. The wire netting is stitched on with galvanized wire.

### Application

ProRox WM 950 is used for insulation of technical installations, particularly pipes with a temperature exceeding 250°C. Max. service temp. wool: 640°C acc. to EN 14706. ProRox WM 950 is part of our assortment for process industry, ProRox.



## SeaRox LM 900 ALU

### Product description

SeaRox LM 900 ALU consists of stone wool lamellas placed edgewise, so that the majority of the fibres are perpendicular to the facing. The product comes as standard with a reinforced aluminium foil.

### Application

SeaRox LM 900 ALU is used for insulation of pipes, tanks and ventilation ducts. Max. service temperature 250°C. Facing 80°C.



## ProRox PS 960/PS 960 ALU

### Product description

ProRox PS 960 and ProRox PS 960 ALU are pressure-resistant and non-combustible preformed pipe sections. ProRox PS 960 ALU is delivered with reinforced aluminium foil and self-adhesive tape.

### Application

ProRox PS 960 and ProRox PS 960 ALU are suitable for steam and process pipings. ProRox PS 960 and ProRox PS 960 ALU is part of our ProRox assortment for the process industry.

# Surfaces

There are many reasons for choosing insulation products with facings. In most cases, this is done to create a vapour barrier, which prevents formation of condensation on the cold side of a construction. If vapour is the reason for choosing a new surface, we offer you different products with reinforced aluminium foil. In other cases where a better appearance than the pure wool is demanded, we provide various surfaces, such as glass tissue and glass cloth. If the product needs to be fixed, a surface with wire mesh might be preferable.

## PLAIN INSULATION



### Plain ROCKWOOL insulation

This is our basic product, which is approved and suitable for almost any purpose. The products are based on stone wool which can withstand temperatures above 1,000°C without melting.

## WIRED MAT



### Wired mat with wire mesh

Some of our fire-rated constructions are based on wired mat and the wire mesh can form an additional safety to secure the product. Within technical insulation a wired mat is often used for high temperature applications or if you need to bend the insulation around a pipe, for example.

## WIRED MAT REINFORCED ALU



### Wired mat with reinforced aluminium foil and wire mesh

This surface has the same properties as the wired mat plus the advantage of creating a dust free surface. Please note that the aluminium foil will be perforated due to the stitching process and cannot therefore be used as vapour barrier.

## REINFORCED ALU (ALU)



### Reinforced aluminium foil

The reinforced aluminium surface will be the best solution if you need a vapour barrier. The product will secure that no vapour will enter the product and result in corrosion of steel and damaged wool.





### GLASS CLOTH



#### **Glass cloth**

This surface has three major properties: impact resistant, dust free surface and a nicer outlook. This surface will in many cases save the use of an extra metal cladding as the woven cloth is strong enough to withstand most impacts from the surroundings.

### GLASS TISSUE BLACK (TB)



#### **Black glass tissue**

The thin black tissue is often used in ventilation shafts or behind a perforated plate as it secures a dust free surface and a nice appearance.





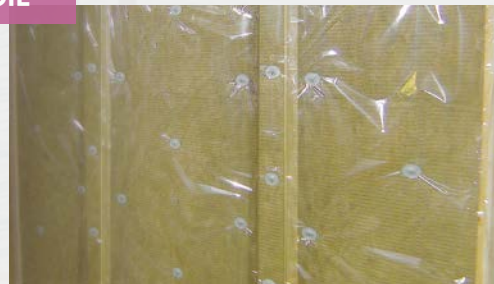
#### GLASS TISSUE NEUTRAL (TN)



#### Neutral glass tissue

The thin neutral surface will secure a dust free surface. The white/transparent look creates a bright surface.

#### SEAROX ACOUSTIC FOIL



#### SeaRox acoustic foil

A very strong and durable thin 19 $\mu$  polymer film, which is resistant to oil, water and most other substances you would expect in an engine room. The noise absorption properties will remain at full capacity (the film is marketed as a separate product).







## The EUCEB mark is your guarantee

Mineral wool products bearing the EUCEB trademark are not classified as hazardous. Specifiers, installers, building owners and the public can have complete confidence in mineral wool products that carry the EUCEB trademark.

EUCEB is a voluntary initiative by the mineral wool industry. EUCEB has assigned an independent certification body who controls that EUCEB rules are applied and who manage non-conformities.





# ROCKWOOL Technical Insulation

ROCKWOOL Technical Insulation, is part of the ROCKWOOL Group, and is offering advanced technical insulation solutions for the process industry as well as the marine & offshore.

At the ROCKWOOL Group, we are committed to enriching the lives of everyone who experiences our product solutions. Our expertise is perfectly suited to tackle many of today's biggest sustainability and development challenges, from energy consumption and noise pollution to fire resilience, water scarcity and flooding. Our product range reflects the diversity of the world's needs, while supporting our stakeholders in reducing their own carbon footprint.

Stone wool is a versatile material and forms the basis of all our businesses. With approximately 11,700 passionate colleagues in 39 countries, we are the world leader in stone wool solutions, from building insulation to acoustic ceilings, external cladding systems to horticultural solutions, engineered fibres for industrial use to insulation for the process industry and marine & offshore.

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 [rti.rockwool.com](http://rti.rockwool.com)

Check [rti.rockwool](http://rti.rockwool.com)  
for latest update



## ROCKWOOL Technical Insulation

ROCKWOOL BV  
Delfstoffenweg 2  
6045 JH Roermond  
Netherlands  
Tel. +31 (0) 475 35 36 18  
Fax +31 (0) 475 35 36 01  
E-mail: [rti.export@rockwool.com](mailto:rti.export@rockwool.com)  
[rti.rockwool.com](http://rti.rockwool.com)

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