



# DET NORSKE VERITAS TYPE APPROVAL CERTIFICATE

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**CERTIFICATE NO. F-16965**

This Certificate consists of 4 pages

*This is to certify that the*

**Fire-Resisting Division for High Speed Craft**

*with type designation(s)*

**Rohacell - Fire Systems**

*Manufactured by*

**RÖHM GmbH Chemische Fabrik**

**Darmstadt, Germany**

*is found to comply with*

*Application*

Approved for use as a fire resisting division in light crafts, meeting for 30 / 60 minutes the requirements to stability, integrity and thermal insulation. Fire against insulated side.

*Place and date*  
Høvik, 2002-06-03  
*for Det Norske Veritas AS*

*This Certificate is valid until*  
2004-06-30

Erik Bråten  
*Head of Section*

*Local Office*  
DNV Essen

Anders Tosseviken  
*Surveyor*

## **Product description**

Four structural fire protection systems for FRP composites are approved. The approved products are described in detail below. The products are in general only approved for use on vessels built according to HSC Code or rules based on this Code.

## **Application/Limitation**

The approval covers four different insulation systems applied to FRP composite structures with

defined properties. Only the combined product (insulation and FRP structure) is approved as a fire resisting division. Maker is to ensure that the product is installed as tested, with the below details considered being the main issues.

### **Insulation System 1 - 30 minutes load carrying deck**

One layer of 15 mm Solimide HT340 (onto FRP composite)

One layer of 35 mm Silica, 100 kg/m<sup>3</sup>

One layer of 15 mm Solimide HT340

Glass cloth "CF", 460 g/m<sup>2</sup> (exposed layer)

Insulation layers are to be bonded to each other by 3M #77 glue (40 g/m<sup>2</sup>). Details of the fastening arrangement of this insulation system are defined below. The entire insulation system has the brand name "Firesafe" and is manufactured by Reilly Benton, USA.

### **Insulation System 2 - 30 minutes load carrying deck**

One layer of 25 mm Firemaster X-607, 64 kg/m<sup>3</sup> (onto FRP composite)

One layer of aluminium foil, minimum 0.05 mm

One layer of 25 mm Firemaster X-607, 96 kg/m<sup>3</sup>

Insulation (including that covering stiffener) is to be applied transverse to stiffeners

Onto stiffeners, in addition to the above:

One layer of aluminium foil, minimum 0.05 mm

One layer of 25 mm Firemaster X-607, 96 kg/m<sup>3</sup>

Insulation to be applied longitudinal to stiffeners

Details of the fastening arrangement of this insulation system are defined below. The Firemaster is manufactured by Thermal Ceramics, UK / USA.

### **Insulation System 3 - 30 minutes load carrying bulkhead**

One layer of 25 mm FiReCore, ~110 kg/m<sup>3</sup> (onto FRP composite)

One layer of 12.7 mm FIRELINER FPG MK II, ~125 kg/m<sup>3</sup> + approved laminate

The 25 mm FiReCore to be screwed into the FRP composite (c/c 600 mm), while the 12.7 mm FIRELINER is to be screwed into the FiReCore (c/c 300 mm)

On top of stiffeners, in addition to the above:

In lieu of the 12.7 mm FIRELINER, a 25 mm FiReCore and a 0.7 mm tophat steel profile (60 mm deep and ~140 mm wide) is applied.

Onto side of stiffeners, in addition to the basic composite protection:

In lieu of the 25 mm FiReCore, a 30 mm FiReCore is applied.

Additional screws to be applied along all joints.

The FiReCore and Fireliner are manufactured by XFire, Norway (produced by subvendors).

#### **Insulation System 4 - 60 minutes load carrying deck**

One layer of 50 mm Firemaster X-607, 64 kg/m<sup>3</sup> (onto FRP composite)

One layer of aluminium foil, minimum 0.05 mm

One layer of 38 mm Firemaster X-607, 96 kg/m<sup>3</sup>

Insulation (including that covering stiffener) is to be applied transverse to stiffeners

Onto stiffeners, in addition to the above:

One layer of aluminium foil, minimum 0.05 mm

One layer of 25 mm Firemaster X-607, 96 kg/m<sup>3</sup>

Insulation to be applied longitudinal to stiffeners

Details of the fastening arrangement of this insulation system are defined below.

For all systems (unless specified otherwise) the below will apply.

For system 1, 2 and 4, insulation is to be fastened to composite with 3 mm steel pins with perforated support plate (50 by 50 mm, 0.5 mm plate thickness) and washers. The support plate should be secured with screw or rivets. All these components are to be made of steel. Pins are to be centred at maximum 375 mm and maximum 50 mm from edge of insulation mats.

The structural fire protection systems may be covered by alternative approved surfaces. Examples of approved surfaces may be perforated or non-perforated metallic plate and surfaces approved by DNV certificate F-16728.

The systems are in general only approved for composite cores with same materials and dimensions as tested. On a case by case basis other equivalent composites may be applied when confirmed acceptable and documented by the maker. The following issues are to be addressed:

1. Composite shall have stiffeners (200 mm deep, 40 mm wide) per 1.25 m width of deck (system 1). System 2 is approved with 2.0 m spacing, system 3 with 2.5 m spacing and system 4 with 1.9 m spacing between stiffeners. Thickness of main deck plate is 40 mm. Equivalent stiffness will be accepted
2. Flange laminate on stiffener shall be made of minimum 3 x 800 g/m<sup>2</sup> unidirectional glass - (3 x 560 g if carbon), minimum 150 mm wide tapes
3. Web and joints shall be made of minimum 2 x 800 g/m<sup>2</sup> ( \_ 45\_ or \_ 90\_ ) - (3 x 560 g if carbon)
4. Flat sandwich shall be made of minimum 1600 g/m<sup>2</sup> continuous glass fabric (biaxial 0/90\_ or \_ 45\_, triaxial with minimum 50% transverse to stiffeners, or quadriaxial) - 1120 g if carbon
5. Resin shall have a minimum heat distortion temperature of 78 \_C
6. Core shall be minimum 50 kg/m<sup>3</sup> and have minimum equivalent mechanical properties at 20 - 200 \_C

## Type Approval documentation

Certification in accordance with Certification Note No. 1.2, Type Approval, December 1996.

SINTEF task no. 250000.42\95.349 dated 17 November 1995

SINTEF report no. 103020.03 A dated 16 November 2001

SINTEF report no. 103020.03 B dated 27 November 2001

SINTEF report no. 103020.01 dated 17 April 2001

SINTEF report no. 103200.54 dated 22 January 2002

Omega Point Laboratories, Project no. 15606-107409 dated 7 February 2001

Tested according IMO Res. A.754 (18) and IMO MSC.45 (65). The insulation is also tested according to IMO FTPC Part 1, IMO Res. A.799 (19), ASTM E136-99 and IMO MSC.40 (64) / IMO MSC.90 (71).

## Marking of product

The product is to be marked with name of manufacturer, type designation and fire-technical rating.

## Certificate retention survey

Det Norske Veritas' surveyor is to be given permission to perform Certificate retention surveys at any time during the validity period of this certificate. The arrangement is to be in accordance with procedure described in item 4.3, Certification Note No. 1.2.

END OF CERTIFICATE

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**Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.**

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

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