

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Fire-Resisting Division for High Speed Craft

with type designation(s)
**60 minute Load-bearing Composite Deck -
FireMaster Marine Plus Blanket**

Issued to
**Thermal Ceramics UK Ltd
WIRRAL MERSEYSIDE, United Kingdom**

is found to comply with
**IMO International Code of Safety for High-Speed Craft (HSC CODE)
DNV GL rules for classification – High speed and light craft**

Application :

Approved as a loadbearing fire-resisting deck 60.

This Certificate is valid until **2021-11-03**.

Issued at **Høvik** on **2016-11-04**

DNV GL local station: **Manchester**

Approval Engineer: **Helge Bjørnarå**

for **DNV GL**

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**Petter Langnes
Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

60 minute Load-bearing Composite Deck - FireMaster Marine Plus Blanket, consists of a fire reinforced polymer (FRP) sandwich insulated on the exposed side (underside deck) with 4 x 25 mm FireMaster Marine Plus Blanket secured with washers and special stainless steel pins with self-tapping screws. The insulation shall following the contours of the stiffeners. Aluminium foil shall be applied between the insulation layers.

The approved product is described in detail below. The product is in general only approved for use on vessels built according to HSC Code or rules based on this Code (e.g. yachts, navy ships, patrol boats etc.).

Application/Limitation

Approved as a loadbearing fire-resisting deck 60.

Only the combined product (insulation and FRP structure) is approved as a fire resisting division. The product is to be installed as tested, with the below details considered being the main issues. See the product's "Fire Protection Systems Information" for more details.

Insulation, foil and pins

The insulation shall be applied on the underside of the structural FRP deck with 4 x 25 mm FireMaster Marine Plus Blanket. The inner layer (close to FRP) has a density of 64 kg/m³, whereas the three outer layers have a density of 70 kg/m³. The transversal joints between the layers are to be installed in a staggered pattern, whereas the longitudinal joints shall be pressed tight together (the nominal blanket width is 610 mm and is to be compressed to a width of 580 mm to ensure this compression).

An aluminium foil has to be provided between each insulation layer (between layer one/two, two/three and three/four). This foil can be an integrated part of the insulation.

The insulation and foil shall be secured with 38 mm friction fit washers and special stainless steel pins (typically 125 mm long, 3 mm in diameter) with 5 mm self-tapping screws (penetrating 30 mm into skin/core). The pins are to be installed with a nominal spacing of 240 mm across the layers, 270 mm along the layers, whereas pins at the joints between blankets shall have a nominal spacing of 100 mm from the blanket edge.

FRP structure

The insulation was tested on a deck with the following specification:

Laminate:	E-glass fibres (biaxial 0/90°, 1200 or 1600 g/m ²) and vinyl ester resin, (thickness of entire laminate: 1.0 mm or 1.4 mm)
Core:	Divinycell H80/GPC1 (semi-rigid PVC core)

The sandwich deck was assembled with a 50 mm Divinycell core with a 1.4 mm laminate on top of the core and 1.0 mm laminate under the core. Two stiffeners of 54 x 205 (width x height) were joined to the deck with infusion. The laminates on the stiffeners were of 2.0 mm thickness (sides) and 3.6 mm thickness (bottom). The spacing between stiffeners was 2.0 m (the deck was only 3.2 wide and extra load was been added to simulate an "effective spacing" between stiffeners of 2.0 m).

Application of other FRP materials

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 and found to be acceptable by the flag administration. The following issues are to be addressed:

1. The deck shall have stiffness and mechanical properties (cold conditions) equivalent to or better than that being tested
2. The materials (core, fibre, resin, etc.) shall have mechanical properties at the relevant temperature range (typically 20 °C to 250 °C) equivalent to the material used in the test. The heat

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distortion temperature for each material, thickness of laminate and density of the core may be applied as criteria

Any surface materials used have to be approved for smoke and toxicity and low flame spread characteristics (IMO 2010 FTP Code Annex 1 Parts 2 and 5) when required according to relevant rules.

Each product is to be supplied with its manual for installation and maintenance.

Type Approval documentation

Certification in accordance with Class Programme DNVGL-CP-0338, October 2015.

Test report No. BRm6075-04B dated 24 May 2006 from SP, Borås, Sweden.

Thermal Ceramics Fire Protection Systems Information, reference No. FM-MS 05 PW and No. FM 4.72, Rev. 1.

Tests carried out

Tested according to IMO FTP Code Part 11 (IMO Res. MSC.45(65) and IMO Res. A.754(18)) and in compliance with IMO 2010 FTP Code Ch. 8.

Marking of product

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

Transport Canada Approval

Based on the procedures laid down in the Transport Canada Publication entitled "Approval Procedures for, Life Saving Equipment and Structural Fire Protection Products (TP 14612)", DNV GL confirms that the product/s listed in this certificate is/are in accordance with Transport Canada's requirements.

Periodical assessment

DNV GL's surveyor is to be given permission to perform Periodical Assessments at any time during the validity of this certificate and at least every second year. The arrangement is to be in accordance with procedure described in Class Programme DNVGL-CP-0338, Section 4.