



Certificate no.:
TAK00002C7

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Insulation Materials for Gas Carriers

with type designation(s)
FINEpol 140-40FH

issued to

Dongsung finetec Co., Ltd.
Anseong, Gyeonggi-Do, Republic of Korea

is found to comply with
DNV rules for classification – Ships

Application:

Rigid cellular polyurethane foam for insulation.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Issued at **Hamburg** on **2024-03-20**

This Certificate is valid until **2029-03-19**.

for **DNV**

DNV local unit: **Seoul**

Approval Engineer: **Gisle Hersvik**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Form code: TA 251

Revision: 2023-09

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Product description

FINEpol 140-40FH: Two-component rigid cellular polyurethane foam.

Component A: FINEpol 140-40FH (premixed polyol)

Component B: Methylene diphenyl diisocyanate (MDI)

Mixing ratio (by weight) 100:100

General properties of Polyurethane Spray Foam System

Property	Test Method	FINEpol140-40FH	Test results
Density ¹⁾	ASTM D1622	36-50 kg/m ³	39.5 kg/m ³
Dimensional stability, -20°C	ASTM D2126	≤1.0 vol%	-0.08 vol%
Dimensional stability, 70°C	ASTM D2126	≤1.0 vol%	-0.10 vol%
Tensile strength, 20°C	ISO 1926	≥2.0 kg/cm ²	2.71 kg/cm ²
Tensile strength, -170°C	ISO 1926	≥1.2 kg/cm ²	2.69 kg/cm ²
Closed cell content	ASTM D6226	≥90 %	95.9 %
Thermal conductivity, 20°C, fresh	ASTM C518	≤ 0.021 W/(m·K)	≤ 0.020 W/(m·K)
Thermal conductivity, 20°C, aged ²⁾	ASTM C518	≤ 0.023 W/(m·K)	≤ 0.020 W/(m·K)
Resistance to Fire and Flame spread	DIN 4102-1	B2	B2
Cohesion (adhesion-tensile)	ASTM D1623	≥2.0 kg/cm ²	4.55 kg/cm ²

¹⁾ Typical sprayed density of spray foam including 1 skin layer.

²⁾ Test conducted after 15 days.

Properties of Polyurethane Spray Foam System after immersion in LNG (15 days)

Property	Test Method	FINEpol140-40FH	Test results
Dimension stability: -Solubility in the cargo -Absorption of the cargo -Shrinkage	ASTM D2126	≤1.0 vol% Weight change: -	-0.06 vol% Weight change: 0.51%
Compressive strength, 20°C	ASTM D1621	≥1.7 kg/cm ²	3.00 kg/cm ²
Compressive strength, -170°C	ASTM D1621	≥1.7 kg/cm ²	6.47 kg/cm ²
Tensile strength, 20°C	ISO 1926	≥2.0 kg/cm ²	2.67 kg/cm ²
Tensile strength, -170°C	ISO 1926	≥1.2 kg/cm ²	2.19 kg/cm ²

The tabulated properties have been specified by the manufacturer and confirmed by type testing.

Other properties may need to be documented for specific installations.

Application/Limitation

Insulation material for LNG/LGP/LEG independent cargo and fuel tanks and pipeworks for marine applications. It should be noted that the 'reaction to liquids' is only documented for LNG immersion.

For each installation on DNV classed vessel the complete insulation scheme shall be reviewed and approved by DNV prior to installation.

Depending on the thickness of the spray foam the need for any crack arrestors or similar must be evaluated by the insulation system designer.

The spray foam applicators must have adequate training and relevant experiences in accordance with manufacturer's recommendations.

Storage, handling and installation of the insulation material shall be in accordance with manufacturer's recommendations.

When installed, the insulation material shall be adequately protected against penetration of water vapor and mechanical damage.

Where the thermal insulation is located on or above the exposed deck, and in way of tank cover penetrations, it shall have suitable fire resistance properties in accordance with recognized standards or be covered with a material having low flame-spread characteristics and forming an efficient approved vapor seal.

Any significant changes in design and / or quality of the material will render the approval invalid.

Type Approval documentation

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**, including:

- Type test for General Properties
- Type test for LNG immersion. Note that the compatibility testing has been carried out only for LNG. Compatibility testing with other cargoes than LNG or with fuels must be carried out prior to installation on DNV classed ships.

Marking of product

Product/package shall be marked with *manufacturer's name*: **Dongsung Finetec Co., Ltd.**, *type designation*: **FINEpol 140-40FH**, *lot number, dates, net and gross weights and mix ratio*.

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV Type Approval Certificate.

Periodical assessment

The scope of the Periodical Assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

Periodical assessments (for Certificate Retention / Certificate Renewal) shall be performed according to DNV-CP-0338.

This certificate is only valid if required Periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>

END OF CERTIFICATE