Certificate No:
TAK000028J

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Insulation Materials for Gas Carriers

with type designation(s)
Uninflammable RIM Coating Spray: KRRIMC200A / KRRIMC200B and KRRIM2000A / KRRIM2000B

Issued to
Kangrim Insulation Co., Ltd.
Busan, **Korea, Republic of**

is found to comply with
DNV rules for classification – Ships

Application :

Spray coating for protection of PUF insulation material for LNG/LGP/LEG independent cargo and fuel tanks, and pipeworks.

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

Issued at **Hamburg** on **2023-07-05**
This Certificate is valid until **2028-07-04**.
DNV local unit: **Gimhae Station**

Approval Engineer: **Gisle Hersvik**

for **DNV**

Thorsten Lohmann
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.

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.

Product description

KRRIMC200A / KRRIMC200B and **KRRIM2000A / KRRIM2000B**: a two-component uninflammable coating resin (RIM) Spray coating for protection of PUF insulation material for LNG/LGP/LEG independent tanks and pipeworks.

- Mixing ratio as per Manufacturer's Technical Data Sheet (TDS).

General properties of **KRRIMC200A / KRRIMC200B** spray coating:

Properties	Test Method	Test Result	Manufacturer's Specification
Density	ASTM D1622	1,00 g/cm^3	1.0 – 1.2 g/cm^3
Hardness (Shore D)	ASTM D2240	35	≥30
Flammability	DIN 4102-1	Class B2	Class B2

General properties of **KRRIM2000A / KRRIM2000B** spray coating:

Properties	Test Method	Test Result	Manufacturer's Specification
Density	ASTM D1622	1,09 g/cm^3	1.0 – 1.2 g/cm^3
Hardness (Shore D)	ASTM D2240	45.8	≥43
Flammability	DIN 4102-1	Class B2	Class B2

Other properties may need to be documented for specific installations.

Manufactured by

PU-CHEM Ltd., 66-42, Gimhae-daero 927beon-gil, Hallim-myeon, Gimhae-si, Gyeongsangnam-do, Republic of Korea

DNV local station: Gimhae

Responsibility

The Company (stated on the front page of this Certificate) takes the responsibility that both design and production are in compliance with Rules, Standards and/or Regulations listed on page 1 of this certificate.

Application/Limitation

For protection of PUF insulation material for LNG/LGP/LEG independent cargo and fuel tanks, and pipeworks.

For each installation on DNV classed vessel the complete thermal insulation scheme, including the spray coating system, shall be reviewed and approved by DNV prior to installation.

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

Storage, handling and installation of the coating system components shall be in in accordance with manufacturer's recommendations.

When installed, the complete insulation system, insulation material plus spray coating, shall protect or 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:

ISO 2781	Density
ASTM D2240	Hardness
DIN 4102-1	Flammability (B2)

Other tests may be required for specific applications/projects.

Marking of product

Product/package shall be marked with *manufacturer's name*: **Kangrim Insulation Co., Ltd., Korea**, *place of manufacture* and *type designation;* ***KRRIMC200A*** *and* ***KRRIM2000A***.

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