DNV·GL

Certificate No:
TAF000012G

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Structural Fire Protection

with type designation(s)
THERMO-LAG 3000 - I sections

Issued to
Carboline Company
Saint Louis, MO, USA

is found to comply with
DNV GL offshore standards

Application :

Approved for use as a system for fire protection of structural steel I sections.

Issued at **Høvik** on **2019-01-18**
This Certificate is valid until **2024-01-17**.
DNV GL local station: **Houston**

for **DNV GL**

Approval Engineer: **Helge Bjørnarå**

Mårten Schei-Nilsson
Head of Section

Product description

"THERMO-LAG 3000" – I sections
consisting of a two component, thermally activated, subliming, epoxy coating reinforced by Type "E" fiberglass (180 g/m^2) or high temperature fabric reinforcements supplied by Nu-Chem Inc.

The materials are manufactured at the following locations:

- Carboline Company, Dayton, Navada, USA
- Carboline Company, Lake Charles, Louisiana, USA

Application/Limitation

The thickness of THERMO-LAG 3000 structural fire protection to be applied to avoid temperatures to rise on the steel substrate less than 200 °C, 250 °C, 300 °C, 350 °C, 400 °C, 450 °C, 500 °C, 538 °C, 550 °C, 600 °C, 650 °C and 700 °C are given in appendix table 1-12.

The protective coating is not defined as non-combustible and should not be used in accommodation or enclosed areas.

The approval refers only to the fire resistance properties of the system.

The application of the protective coating is to be performed in accordance with the manufacturer's application manual. Alternative primers and topcoats may be used provided they have been tested and approved by the manufacture.

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

Type Approval documentation

Certification in accordance with Class Programme DNVGL-CP-0338, September 2018.

Test report No. 15521-103050/103051/103052 dated 10 August 1998 from Omega Point Laboratories, Inc., Texas, USA.

THERMO-LAG 3000 Fire Barrier System Application Manual, Nu-Chem Doc. No. 111397, Rev.0, May 1998 and Rev.6, May 2006.

Tests carried out

Tested according to The Hydrocarbon Fire Resistance Test for Elementals of Construction for Offshore Installations, Test Specification – Issue 1: January 1990 and Test Procedure – Issue 1: January 1990, issued by the Department of Energy, Petroleum Engineering Division (UK) with HC-curve according to ISO 834-3.

Marking of product

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

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.

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Table 1 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 200°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 2 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 250°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 3 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 300°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 4 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 350°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 5 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 400°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 6 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 450°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 7 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 500°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 8 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 538°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 9 - T*hickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 550°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 10 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 600°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 11 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 650°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]

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Table 12 - *Thickness in [mm] of THERMO-LAG 3000 needed for fire protection of I-sections*

necessary to keep the mean steel temperature rise below 700°C within a specified time period as a function of the Hp/A factor of the I-section when the structure is exposed to a hydrocarbon standard fire as described by the ISO 834-3.

The maximum thickness of protection material up to the required Hp/A [m^{-1}] shall be used.
Hp/A = Ratio between Heat perimeter and cross sectional Area of the section, [m^{-1}]