

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Insulation Material for Cryogenic Spillage Protection

with type designation(s)
PITT-CHAR® NX

Issued to
PPG Coatings Europe B.V.
Amsterdam, Noord-Holland, Netherlands

is found to comply with
ISO 20088-3:2018 "Determination of the resistance to cryogenic spillage of insulation materials – Part 3: Jet release"

Application :

For use in applications as insulation material resistant to cryogenic spill.

Issued at **Høvik** on **2021-08-03**

This Certificate is valid until **2026-08-02** .

DNV local unit: **London VMC**

Approval Engineer: **Stefan Marion**

for **DNV**

Gustav Heiberg
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

Two-component, 100% solids flexible epoxy intumescent fire protective coating to protect structures against cryogenic spills; **PITT-CHAR® NX** reinforced with PITT-CHAR® CF scrim mesh installed in the mid-film in accordance with the installation procedure.

Manufactured by

PPG Protective and Marine Coatings, Alexander, USA

DNV local station: New Orleans

PPG Coating Indonesia, Jakarta, Indonesia

DNV local station: Singapore

PPG SSC Co., Ltd., Ulsan, Korea

DNV local station: Ulsan

PPG Deco Polska Sp. Z o.o., Ostow Wielkopolski, Poland

DNV local station: Gdansk

PPG Coatings (Kunshan) Co., Ltd, Kunshan, China

DNV local station: Shanghai

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

The product has been tested in accordance with ISO 20088-3:2018.

The minimum thicknesses of PITT-CHAR® NX to be applied to prevent a temperature drop (ΔT , °C) of the protected steel substrate after 5, 10, 15, 20, 25, 30, 45 and 60 min exposure to cryogenic liquid spillage for given H_p/A values of 105 m⁻¹, 160 m⁻¹ and 250 m⁻¹ are presented in the tables in the Appendix. The thicknesses given in the Appendix of this certificate are based on calculations from the results of the tests carried out. The tables in the Appendix are included in place of the optional classification format described in ISO-20088-3: 2018 Annex C to offer more detailed information given the range of thicknesses tested.

The application of the coating is to be performed in strict accordance with the manufacturer's application guideline. This includes especially surface preparation requirements, environmental conditions and curing times given in the application guideline.

It is the responsibility of the end user to verify that the test setup used in ISO 20088-3:2018 is relevant with regards to the cryogenic spill scenario and for the location of the insulation system on the structure for the intended application.

The use of the material for compliance with any requirements for cryogenic protection in the IGF or IGC code or classification rules must be approved for each case.

This Type Approval Certificate is not giving any indication of the material's durability over time.

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

Type Approval documentation

Tests carried out

Tests carried out in accordance with ISO 20088-3:2018 at DNV Test Laboratory Spadeadam, UK.

Tests were done on beams protected with PITT-CHAR® NX and PITT-CHAR® CF scrim mesh installed in its central 1/3rd. Installation of PITT-CHAR was done in accordance with installation procedure.

PITT-CHAR® NX and PITT-CHAR® CF was installed on beams of the following dimension:

- I beam 305x305x137 kg, corresponding to a $H_p/A=105 \text{ m}^{-1}$
- I beam 254x254x73 kg, corresponding to a $H_p/A=160 \text{ m}^{-1}$
- I beam 305x102x33 kg, corresponding to a $H_p/A=250 \text{ m}^{-1}$

Marking of product

Product shall be marked with *manufacturer's name, place of production and type designation*.

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 and Certificate Renewal) shall be performed according to DNVGL-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.dnvgl.com>.

Appendix to TAK0000229 for PPG Coatings Europe B.V.

The following tables list calculated thicknesses of PITT-CHAR® NX in mm to limit steel temperature drop to ΔT in °C from a starting temperature of 23°C for given time in minute for 3 different H_p/A values. The thicknesses in the tables are to be regarded as mean Dry Film Thickness (DFT) values.

Table 1: I-Sections with H_p/A up to and including 105 m^{-1}

T_{ABS} from 23°C	ΔT (°C)	5 min	10 min	15 min	20 min	25 min	30 min	45 min	60 min
22	-1								
21	-2								
20	-3								
19	-4								
18	-5								
17	-6								
16	-7								
15	-8								
14	-9								
13	-10								
12	-11								
11	-12								
10	-13								
9	-14								
8	-15								
7	-16								
6	-17								
5	-18								
4	-19								
3	-20								
2	-21								
1	-22								
0	-23								
-1	-24								
-2	-25								
-3	-26								
-4	-27								



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T _{ABS} from 23°C	ΔT (°C)	5 min	10 min	15 min	20 min	25 min	30 min	45 min	60 min
-5	-28								
-6	-29								
-7	-30								
-8	-31								
-9	-32								
-10	-33								
-11	-34								
-12	-35								
-13	-36								
-14	-37								
-15	-38								
-16	-39								
-17	-40								
-18	-41								
-19	-42								
-20	-43								
-21	-44								
-22	-45								
-23	-46								
-24	-47								
-25	-48								
-26	-49								
-27	-50								
-28	-51								
-29	-52								
-30	-53								
-31	-54								
-32	-55								
-33	-56								
-34	-57								
-35	-58								
-36	-59								
-37	-60								
-38	-61								
-39	-62								
-40	-63								
-41	-64								
-42	-65								
-43	-66								
-44	-67								
-45	-68								
-46	-69								
-47	-70								
-48	-71								
-49	-72								
-50	-73								
-51	-74								
-52	-75								
-53	-76								
-54	-77								
-55	-78								
-56	-79								
-57	-80								
-58	-81								
-59	-82								
-60	-83								
-61	-84								
-62	-85								
-63	-86								

T _{ABS} from 23°C	ΔT (°C)	5 min	10 min	15 min	20 min	25 min	30 min	45 min	60 min
-64	-87								
-65	-88								

Table 2: I-Sections with Hp/A greater than 105 m⁻¹ and up to and including 160 m⁻¹

T _{ABS} from 23°C	ΔT (°C)	5 min	10 min	15 min	20 min	25 min	30 min	45 min	60 min
22	-1								
21	-2								
20	-3								
19	-4								
18	-5								
17	-6								
16	-7								
15	-8								
14	-9								
13	-10								
12	-11								
11	-12								
10	-13								
9	-14								
8	-15								
7	-16								
6	-17								
5	-18								
4	-19								
3	-20								
2	-21								
1	-22								
0	-23								
-1	-24								
-2	-25								
-3	-26								
-4	-27								
-5	-28								
-6	-29								
-7	-30								
-8	-31								
-9	-32								
-10	-33								
-11	-34								
-12	-35								
-13	-36								
-14	-37								
-15	-38								
-16	-39								
-17	-40								
-18	-41								
-19	-42								
-20	-43								
-21	-44								
-22	-45								
-23	-46								
-24	-47								
-25	-48								
-26	-49								
-27	-50								
-28	-51								



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T _{ABS} from 23°C	ΔT (°C)	5 min	10 min	15 min	20 min	25 min	30 min	45 min	60 min
-29	-52								
-30	-53								
-31	-54								
-32	-55								
-33	-56								
-34	-57								
-35	-58								
-36	-59								
-37	-60								
-38	-61								
-39	-62								
-40	-63								
-41	-64								
-42	-65								
-43	-66								
-44	-67								
-45	-68								
-46	-69								
-47	-70								
-48	-71								
-49	-72								
-50	-73								
-51	-74								
-52	-75								
-53	-76								
-54	-77								
-55	-78								
-56	-79								
-57	-80								
-58	-81								
-59	-82								
-60	-83								
-61	-84								
-62	-85								
-63	-86								
-64	-87								
-65	-88								

Table 3: I-Sections with Hp/A greater than 160 m⁻¹ and up to and including 250 m⁻¹

T _{ABS} from 23°C	ΔT (°C)	5 min	10 min	15 min	20 min	25 min	30 min	45 min	60 min
22	-1								
21	-2								
20	-3								
19	-4								
18	-5								
17	-6								
16	-7								
15	-8								
14	-9								
13	-10								
12	-11								
11	-12								
10	-13								
9	-14								
8	-15								
7	-16								



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T _{ABS} from 23°C	ΔT (°C)	5 min	10 min	15 min	20 min	25 min	30 min	45 min	60 min
6	-17								
5	-18								
4	-19								
3	-20								
2	-21								
1	-22								
0	-23								
-1	-24								
-2	-25								
-3	-26								
-4	-27								
-5	-28								
-6	-29								
-7	-30								
-8	-31								
-9	-32								
-10	-33								
-11	-34								
-12	-35								
-13	-36								
-14	-37								
-15	-38								
-16	-39								
-17	-40								
-18	-41								
-19	-42								
-20	-43								
-21	-44								
-22	-45								
-23	-46								
-24	-47								
-25	-48								
-26	-49								
-27	-50								
-28	-51								
-29	-52								
-30	-53								
-31	-54								
-32	-55								
-33	-56								
-34	-57								
-35	-58								
-36	-59								
-37	-60								
-38	-61								
-39	-62								
-40	-63								
-41	-64								
-42	-65								
-43	-66								
-44	-67								
-45	-68								
-46	-69								
-47	-70								
-48	-71								
-49	-72								
-50	-73								
-51	-74								
-52	-75								

T _{ABS} from 23°C	ΔT (°C)	5 min	10 min	15 min	20 min	25 min	30 min	45 min	60 min
-53	-76								
-54	-77								
-55	-78								
-56	-79								
-57	-80								
-58	-81								
-59	-82								
-60	-83								
-61	-84								
-62	-85								
-63	-86								
-64	-87								
-65	-88								

END OF CERTIFICATE