

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Static Flame Arrester

with type designation(s)

PROTEGO® BR/TS-80-IIB3, -IIB3-X0, -IIB3-P1,2-X0, PROTEGO® BR/TS-80-IIB-P1,6, -IIB-X3, -IIB-1,6-X5, PROTEGO® LH/AD-...-IIB3, LH/AD-...-IIB3-X3, LH/AD-...-IIC, LH/AD-...-IIC-X3, PROTEGO® BE/HR-E-DN-IIB, PROTEGO® BE/HR-E-DN-IIB3, PROTEGO® FA-CN-...-DN-IIA-P1,2, PROTEGO® FA-I-...-NG/DN-IIA-P(P0)

Issued to

Braunschweiger Flammenfilter GmbH
Braunschweig, Niedersachsen, Germany

is found to comply with

EN ISO 16852:2016 Flame arresters – Performance requirements, test methods and limits for use
IMO MSC/Circ. 677 as amended by MSC/Circ. 1009 and MSC/Circ. 1324

Application :

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

Type:

Sizes:

PROTEGO® BR/TS-80-IIB3, -IIB3-X0, -IIB3-P1,2-X0, PROTEGO® BR/TS-80-IIB-P1,6, -IIB-X3, -

DN80

IIB-1,6-X5

PROTEGO® LH/AD-...-IIB3, LH/AD-...-IIB3-X3, LH/AD-...-IIC, LH/AD-...-IIC-X3

DN50-800

PROTEGO® BE/HR-E-DN-IIB

DN80,

DN100

PROTEGO® BE/HR-E-DN-IIB3

DN80,

DN100

PROTEGO® FA-CN-...-DN-IIA-P1,2

DN25-DN300

PROTEGO® FA-I-...-NG/DN-IIA-P(P0)

NG150-1400

Issued at **Hamburg** on **2022-04-26**

This Certificate is valid until **2027-04-25**.

for **DNV**

DNV local station: **Hamburg – CMC North/East**

Approval Engineer: **Hagen Markus**

.....
Olaf Drews
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.



PROTEGO® Types – Overview¹

Type designation	Application	Operation instruction
BR/TS-80-IIB3	In-line detonation flame arrester Type DET 4 according to EN ISO 16852	000653
BR/TS-80-IIB3-X0		000665
BR/TS-80-IIB3-P1,2-X0		000667
BR/TS-80-IIB-P1,6		000663
BR/TS-IIB-X3		000666
BR/TS-80-IIB-1,6-X5		000668
FA-CN-...DN-IIA-P1,2	In-line deflagration flame arrester	000593
FA-I-...-NG/DN-IIA-P(P0)		000569

BE/HR-E-DN-IIB	End-of-line deflagration and endurance burning proof flame arrester	000622
BE/HR-E-DN-IIB3		000623
LH/AD-...-DN-IIB3 LH/AD-T...DN-IIB3 LH/AD-...DN-IIB3-X3 LH/AD-...-IIC LH/AD-T...DN-IIC LH/AD-...-IIC-X3 LH/AD-S...DN-IIB3	End-of-line deflagration flame arrester	000587
		000021

Note

¹ Reference: Braunschweiger Flammenfilter catalogue "PROTEGO Catalog 2020 / 2021"

PROTEGO® BR/TS

The unit consists of the housing with connection for the attachment to the cargo hold and the connection flange DN 80 for the gas collection line, the hatch cover and the O-ring, as well as housing the PROTEGO® flame arrester unit locking element, clamping element and joints.

Application/Limitation

PROTEGO®	MESG	Explosion group	Max. operating pressure bar (abs.)	Max. operating temperature	Nominal size DN
BR/TS-80-IIB3	0.65 or greater	IIB3	1.55	60°C	80 pipe and 250 tank dome ¹
BR/TS-80-IIB3-X0			1.1	100°C	
BR/TS-80-IIB3-P1,2-X0			1.2	100°C	
BR/TS-80-IIB-P1,6	≥ 0.5	IIB	1.6	60°C	
BR/TS-80-IIB-X3			1.1	200°C	
BR/TS-80-IIB-P1,6-X5			1.6	115°C	

The PROTEGO® BR/TS in-line detonations arrester is not approved for installation on sea going vessels (missing corrosion test acc. to MSC/677 – 3.5.1).

Materials¹

Component	Material designation
Housing, Cover	EN-GJS-400-15 (0.7040), GP240GH (1.0619)
	Stainless steel casting, GX5CrNiMo19-11-2 (1.4408)
O-Ring	PTFE
FLAMEFILTER® cage, FLAMEFILTER® spacer	Stainless steel
Flange connection	EN 1092-1, Form B1, ASME B16.5, 150 lbs RFSF

Note

¹ Refer to Material Check List, Rev. H and parts lists

Tests carried out

- EN ISO 16852 – Type DET 4 – Detonation flame arrester

PROTEGO® FA-CN-...DN-IIA-P1,2 - FA-I-...-NG/DN-IIA-P(P0)

The device consists of the housing with cover and the PROTEGO® flame arrester unit in the center of the housing. The PROTEGO® flame arrester unit consists of 2 FLAMEFILTER® and the spacer between, firmly held in the FLAMEFILTER® cage.

Application/Limitation

FA-CN-...DN-IIA-P1,2

MESG	Explosion group	Max. operating temperature	Max. operating pressure bar (abs.)	Nominal size DN
>0.9	IIA	60°C	1.2	25 – 300

FA-I-...-NG/DN-IIA-P(P0)

The device consists of two housing parts and the PROTEGO® flame arrester unit in the center. The PROTEGO® flame arrester unit consists of several FLAMEFILTER® and spacers firmly held in the FLAMEFILTER® cage.

MESG	Explosion group	Max. operating temperature	Max. operating pressure bar (abs.)	Nominal width of PROTEGO flame arrester unit NG
>0.9	IIA	60°C	1.8	150
			1.5	200, 300, 400, 500, 600
			1.4	700, 800
			1.3	1000, 1200
			1.2	1400

PROTEGO® BE/HR-E-DN-IIB

The unit consists of a housing, a weather hood and the PROTEGO® flame arrester unit. During normal operation, the metal weather hood is closed. In case of a flame burns on the flame arrester element surface, the fusible link, located in the centre position, will melt and release the spring-loaded weather hood to open position.

Application/Limitation

Device for explosion proof venting of cargo tanks. Deflagration and endurance burning proof against gas / air-mixtures of explosion group IIA and IIB (MESG ≥ 0.5) as well as endurance burning proof against alcohol / air mixtures according to EN ISO 16852. Maximum operating temperature 60°C / 140°F. Flow capacities refer to product diagram "Leistung-000462-de.doc", 2016-10-19

Materials¹

Component	Material designation
Housing, Weather hood	Carbon Steel ²
	Stainless Steel
FLAMEFILTER® cage, FLAMEFILTER®, spacer	Stainless steel
	Hastelloy

Note

¹ Refer to Material Check List, Rev. H and parts lists

² With powder coating

Tests carried out

- EN ISO 16852 – Type DEF – End-of-line deflagration flame arrester
- EN ISO 16852 – Endurance burning test (ethene) burn class Bc: a
- DIN EN ISO 9227 - Salt mist test on powder coating

PROTEGO® BE/HR-E-DN-IIB3

The unit consists of a housing, a weather hood and the PROTEGO® flame arrester unit. During normal operation the weather hood is closed. In case of a flame burns on the flame arrester element surface, the fusible link, located in the centre position, will melt and release the spring-loaded weather hood to open position.

Application/Limitation

Device for venting of cargo tanks. "Deflagration-proof" against gas/air-mixtures of explosion group IIB3 (MESG equal or bigger 0.65mm) and "Endurance burn proof" against alcohol/air mixtures according to EN ISO 16852.

Materials

Component	Material designation	Group ¹
Housing, Weather hood	Carbon steel	G1
	Stainless steel	
FLAMEFILTER® cage	Hastelloy	G1
	Stainless steel	
FLAMEFILTER® and intermediate layer	Hastelloy	F1, F2
	Stainless steel	

Note

¹ Reference "Material Check List – IBExU14ATEX2019X". Further materials acc. to parts list P-06-1290-590

Tests carried out

According to EN ISO 16852:2010, IMO MSC/Circ. 677, MSC/Circ. 1009, MSC.1/Circ. 1324.

PROTEGO® LH/AD

The unit consist of the assembly – housing - PROTEGO® flame arrester unit , protective screen and weather hood. The PROTEGO® flame arrester unit and the cover are connected to the housing by threaded bolts, spacer tubes, hexagon nuts and ring nuts.

Application/Limitation

The end of line flame arrester of type PROTEGO® LH/AD on vent lines of cargo tanks carrying flammable products of explosion group IIB3, (MESG ≥ 0.65) and IIC (MESG <0.5) or on vent lines of cofferdams.

Type PROTEGO®	Nominal size DN	MESG (mm)	Explosion group	Max. operating temperature	Max. service pressure
LH/AD-DN-IIB3	50 - 800	0.65 or greater	IIB3	60°C	1 bar ¹
LH/AD-S-DN-IIB3	50 - 500				
LH/AD-T-DN-IIB3	50 - 800				
LH/AD-DN-IIB3-X3	50 - 400	0.65 or greater	IIB3	200°C	
LH/AD-T-DN-IIB3-X3	50 - 400				
LH/AD-DN-IIC	50 - 800	<0.5	IIC	60°C	
LH/AD-T-DN-IIC	50 - 800				
LH/AD-DN-IIC-X3	50 - 400				

Note

¹ relative overpressure at the protected side and atmospheric pressure at the unprotected side

Materials

Component	Material combination variants	
	Design A	Design B
Housing elements	Carbon steel	Stainless steel, Nickel alloy
Connecting elements	Carbon steel	Stainless steel, Nickel alloy, Titan
Gaskets	PTFE, WS 3822	
Weather hood	Stainless steel	Stainless steel
Protection screen	Stainless steel	Stainless steel
Flame arrester unit	A, B	B

Note

¹ Refer to Material Check List, Rev. H and parts lists

Material combinations of flame arrester unit

Component	Material combination variants	
	Design A	Design B
FLAMEFILTER® cage	Carbon steel	Stainless steel
FLAMEFILTER®	Stainless steel	Stainless steel, Nickel alloy, Tantal

Tests carried out

- EN ISO 16852 – Type DEF – End-of-line deflagration flame arrester

Restriction of use applicable to all types

To maintain the explosion protection, materials shall resist under the respective operating condition with respect to mechanical and/or chemical effects and corrosion.

The detonation flame arresters are not tested with respect to flame transmission at a stabilized burn on the flame arrester.

Type Approval documentation

Marking of product

Each product is to be provided with a name plate. The content may vary depending on type.

PROTEGO®			
model	BE/HR-E-80-IIB3		
flange	DN 80 PN 16		
serial no.	020102020-010-001	date built	2020-05
standard	EN ISO 16852		
cert.-no.	IBEXU14ATEX2019X		
class.-no.	DNVGL TAP00000C9		
testpressure	[bar]		
DEF	$L_0/D = n/a$ $T_0 = 60^\circ C$	$BC: c$ $p_0 = 1,1 \text{ bar (abs.)}$	$t_{BT} = -$
WARNING: Flame arresters have installation and application limits  0637  II G IIB3  Braunschweiger Flammenfilter GmbH 38110 Braunschweig, Made in Germany			

Additional marking according to the applicable operating manual.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>

End of certificate