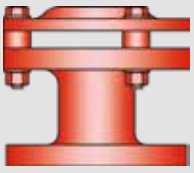
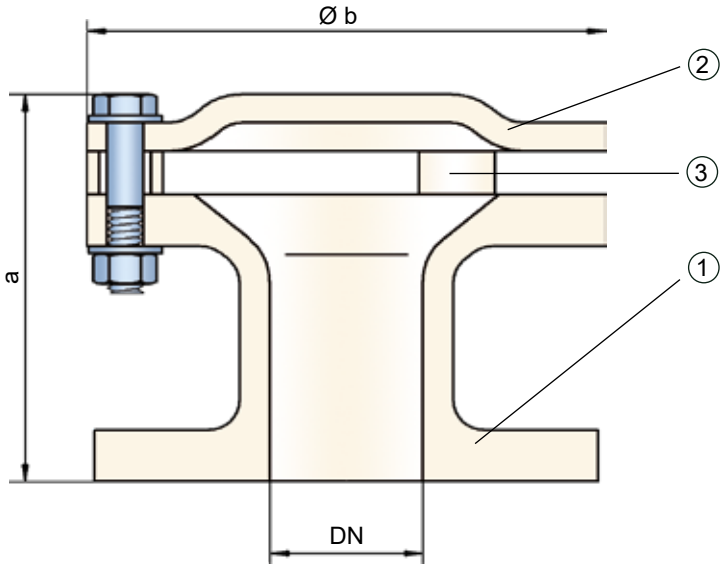


Vent Cap, End-of-Line

PROTEGO® E/KS



Function and Description

The E/KS vent cap allows vessels which are not pressurize to vent. The vent cap is made out of plastic and is the best solution in applications with aggressive media. This E/KS vent cap prevents rain and dirt from entering the vent line. The device is not flame transmission proof. It is often used in combination with detonation flame arresters, when those are used in vent lines, installed at a position which creates a long run up distance from the end of the vent line to prevent endurance burning. The E/KS vent cap will then be installed at the end of that vent line to prevent particles or rain from entering the line.

The vent caps main components are a housing (1), a weather hood (2) and spacers (3).

Special Features and Advantages

- vent cap provides protection against environmental impact (harsh weather conditions, bird nests, etc.)
- cost effective device
- almost maintenance free
- certified flow performance curves

Design Types and Specification

Vent cap, basic design **E/KS**

Special designs available upon request.

Table 1: Dimensions Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity chart on the following page.

DN	50 / 2"	80 / 3"	100 / 4"	150 / 6"	200 / 8"
a	135 / 5.31	140 / 5.51	145 / 5.71	195 / 7.68	200 / 7.87
b	170 / 6.69	230 / 9.06	300 / 11.81	375 / 14.76	450 / 17.72

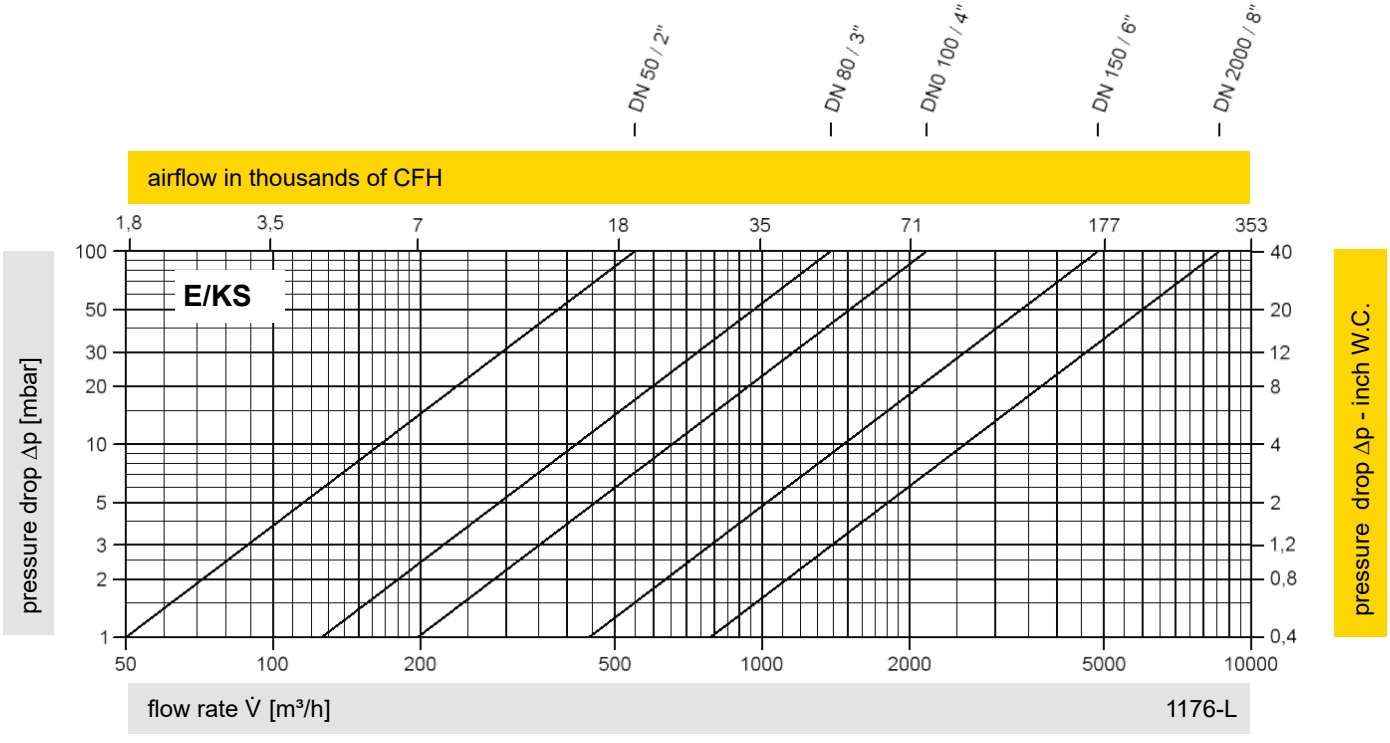
Table 2: Material selection

Design	A	B	C	
Housing	PE	PP	PVDF	Special materials upon request.
Weather hood	PE	PP	PVDF	

Table 3: Flange connection type

EN 1092-1, Form B1 or DIN 2501, Form C, PN 16; from DN 200 PN 10	Other types upon request.
ASME B16.5 CL 150 F.F.	

PROTEGO® E/KS



The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.
Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”

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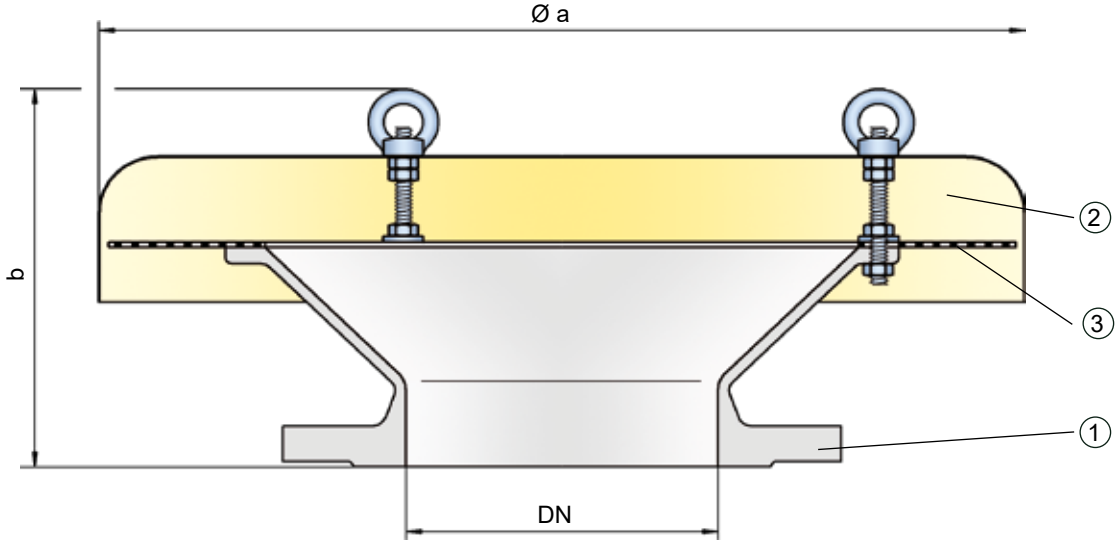
Vent Cap, End-of-Line

PROTEGO® EH/0S



Function and Description

The PROTEGO® EH/0S vent cap allows vessels which are not pressurized to vent. This device prevents rain and dirt entering the vent line. The PROTEGO® EH/0S vent cap is not flame transmission proof. It is often used in combination with detonation flame arresters, when those are used in vent lines, installed at a position which creates a long run up distance from the end of the vent line to prevent endurance burning. The PROTEGO® EH/0S will then be installed at the end of that vent line to prevent particles or rain from entering the line.

The vent cap PROTEGO® EH/0S main components are a housing (1), a weather hood (2) and a protection screen (3). The device is equipped with a fixed weather hood out of metal. The protection screen prevents particles or rain from entering the line.

Special Features and Advantages

- vent cap provides protection against environmental impact (harsh weather conditions, bird nests, etc.)
- cost effective device
- almost maintenance free
- certified flow performance curves

Design Types and Specification

Vent cap, basic design **EH/0S**

Special designs available upon request.

Table 1: Dimensions Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity chart on the following page.

DN	100 / 4"	150 / 6"	200 / 8"	250 / 10"	300 / 12"	350 / 14"	400 / 16"	500 / 20"	600 / 24"
a	295 / 11.61	550 / 21.65	550 / 21.65	600 / 23.62	600 / 23.62	600 / 23.62	650 / 25.59	800 / 31.50	1000 / 39.37
b	230 / 9.06	240 / 9.45	240 / 9.45	325 / 12.80	320 / 12.60	335 / 13.19	370 / 14.57	385 / 15.16	520 / 20.47

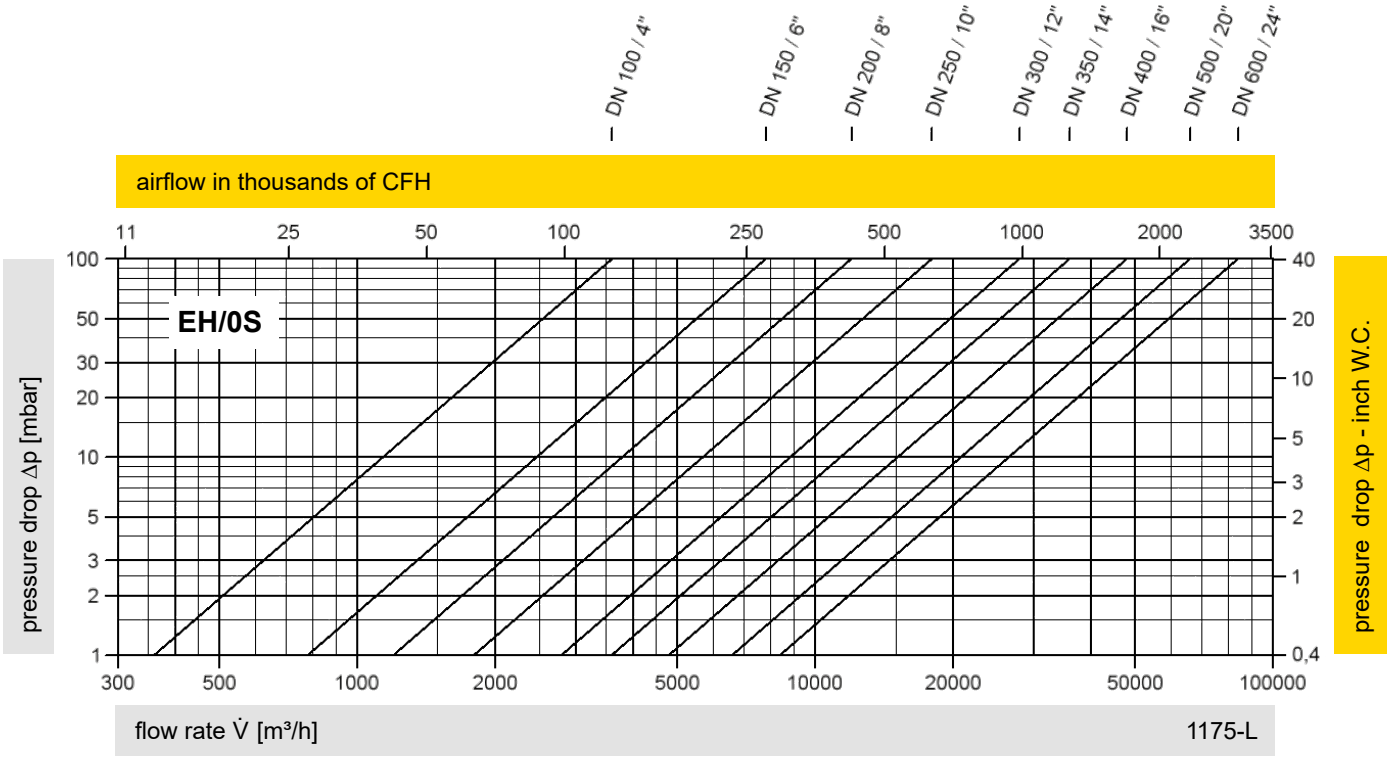
Table 2: Material selection

Design	A	B	Special materials upon request.
Housing	Steel	Stainless Steel	
Weather hood	Stainless Steel	Stainless Steel	

Table 3: Flange connection type

EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	

PROTEGO® EH/0S



The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.
Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”

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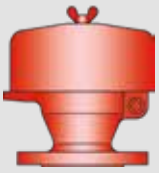
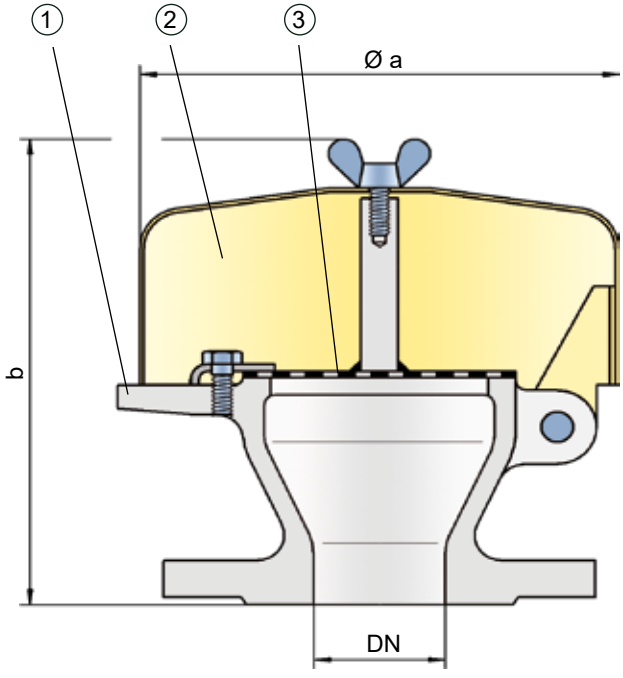


Vent Cap, End-of-Line

PROTEGO® EH/0



The vent cap PROTEGO® EH/0 main components are a housing (1), a weather hood (2) and a protection screen (3). The device is equipped with a fixed weather hood out of metal. The protection screen prevents particles or rain from entering the line.

Special Features and Advantages

- vent cap provides protection against environmental impact (harsh weather conditions, bird nests, etc.)
- cost effective device
- almost maintenance free
- certified flow performance curves

Function and Description

The PROTEGO® E/H0 vent cap allows vessels which are not pressurized to vent. This device prevents rain and dirt from entering the vent line. The EH/0 vent cap is not flame transmission proof. It is often used in combination with detonation flame arresters, when those are used in vent lines, installed at a position which creates a long run up distance from the end of the vent line to prevent endurance burning. The PROTEGO® EH/0 vent cap will then be installed at the end of that vent line to prevent particles or rain from entering the line.

Design Type and Speci ication

Vent cap, basic design	**EH/0**

Special designs available upon request.

Table 1: Dimensions — Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity chart on the following page.

DN	20 / ¾"	25 / 1"	32 / 1¼"	40 / 1½"	50 / 2"	65 / 2½"	80 / 3"
a	163 / 6.42	163 / 6.42	163 / 6.42	183 / 7.20	183 / 7.20	218 / 8.58	218 / 8.58
b	175 / 6.89	175 / 6.89	175 / 6.89	190 / 7.48	190 / 7.48	200 / 7.87	200 / 7.87

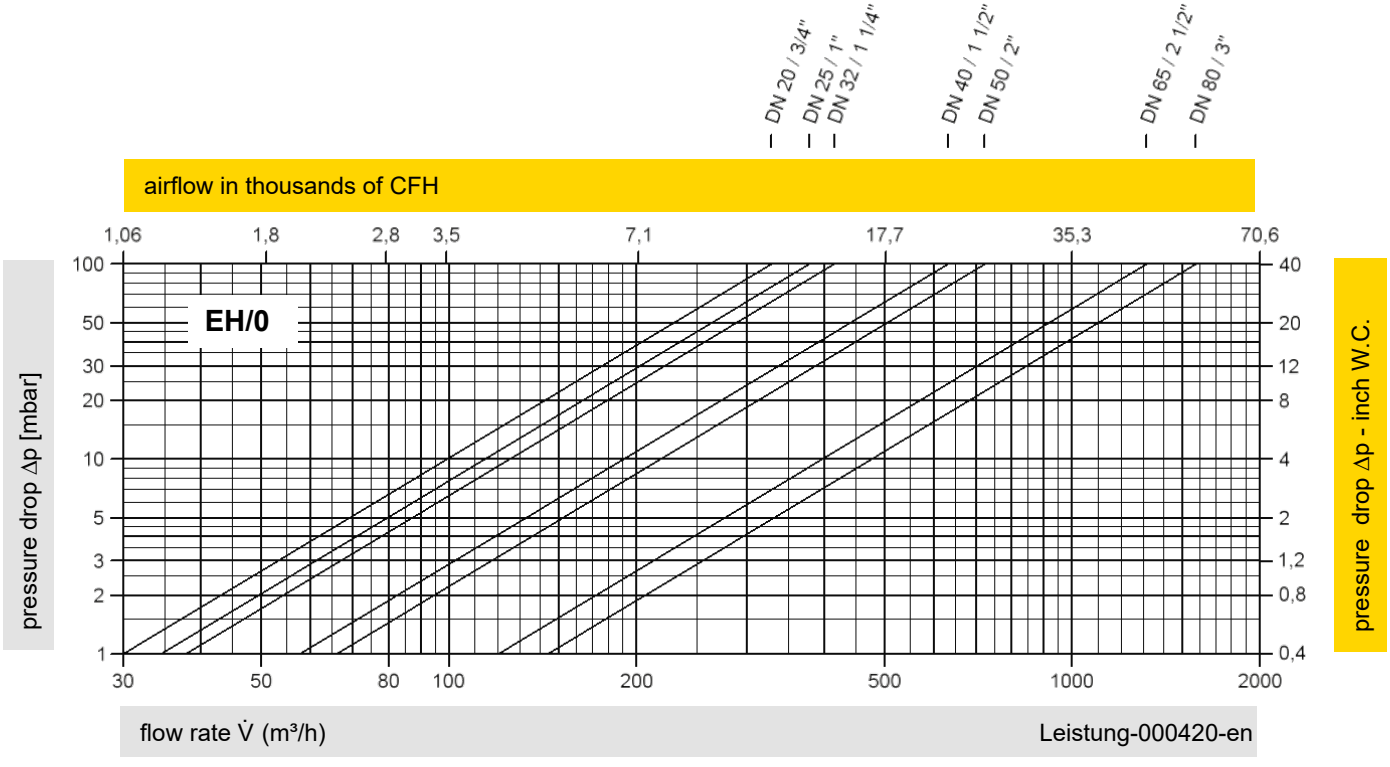
Table 2: Material selection

Design	A	B	
Housing	Steel	Stainless Steel	Special materials upon request.
Weather hood	Steel	Stainless Steel	

Table 3: Flange connection type

EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	

PROTEGO® EH/0



The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.
Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”

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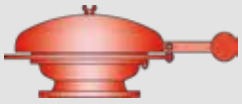
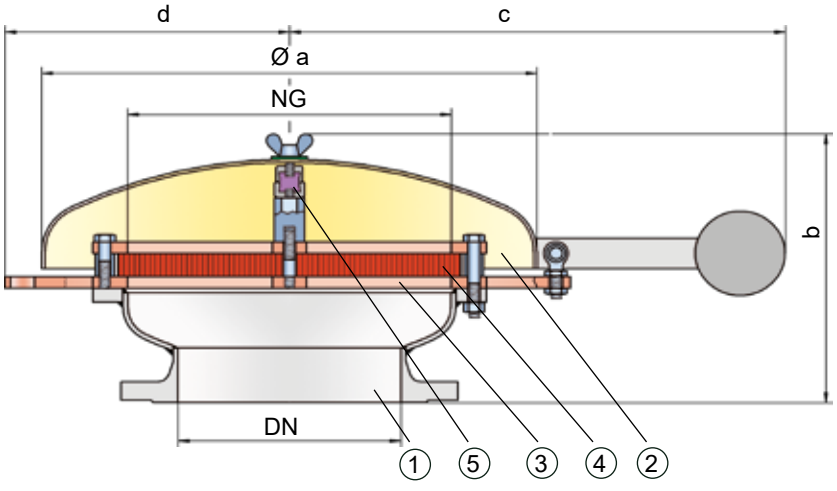


Deflagration Flame Arrester- Endurance burning-proof, End-of-Line

PROTEGO® LH/EB



Function and Description

The PROTEGO® LH/EB end-of-line deflagration flame arrester is used to protect process engineering apparatus and vessels which are not pressurized and process Methane/Air mixtures. The device provides protection against flame transmission through atmospheric deflagration and stabilized flames which can burn for a very long time. This device is specifically applied to vent lines of decommissioned underground mines. Other areas of application are biogas, landfill gas and sewage gas. The device is installed on suction and vent lines, with the goal to prevent flame transmission caused by endurance burning or atmospheric deflagration propagating into the vessel or plant.

The PROTEGO® LH/EB consists of a housing (1), a weather hood (2) and the PROTEGO® flame arrester unit (3). During normal operation, the metal weather hood is in a closed position. If a flame burns on the flame arrester element surface, the fusible link (5), located in a center position, will melt and an externally located weight will move the weather hood into the open position. The PROTEGO® flame arrester unit consists of a FLAMEFILTER® (4), which is installed in a FLAMEFILTER® casing.

The PROTEGO® LH/EB series end-of-line deflagration flame arrester is available for substances for explosion group IIA1 - methane (former designation Expl.gr. I).

The standard design can be used with operating temperature of up to +60°C / 140°F.

Special certificates for mining are available and the device is type-approved according to ATEX Directive and EN ISO 16852 as well as other international standards.

Special Features and Advantages

- most efficient deflagration flame arrester for methane/air mixtures
- certificates for mining are available
- protection against atmospheric deflagration and endurance burning
- weather hood protects against environmental impact (i.e. weather, bird nests, etc.)
- weather hood will open and signals the impact of a flame
- fusible link is resistant against chemicals
- maintenance friendly design

Design Type and Specification

End-of-line deflagration flame arrester, basic design	**LH/EB**

Special designs available upon request.

Table 1: Dimensions Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity chart on the following pages

DN	150 / 6"	200 / 8"	250 / 10"	300 / 12"	350 / 14"	400 / 16"
NG	400 / 16"	400 / 16"	400 / 16"	400 / 16"	400 / 16"	400 / 16"
a	600 / 23.62	600 / 23.62	600 / 23.62	600 / 23.62	600 / 23.62	600 / 23.62
b	340 / 13.39	340 /13.39	340 / 13.39	340 / 13.39	340 / 13.39	340 / 13.39
c	600 / 23.62	600 / 23.62	600 / 23.62	600 / 23.62	600 / 23.62	600 / 23.62
d	350 / 13.78	350 / 13.78	350 / 13.78	350 / 13.78	350 / 13.78	350 / 13.78

Table 2: Selection of explosion group

MESG	Expl. Gr. (IEC/CEN)	Gas Group (NEC)	Special approvals upon request.
> 1,14 mm	IIA1 (I)*	-	

* former designation Expl.gr. I

Table 3: Material selection for housing

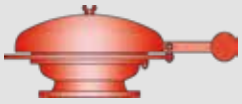
Design	A	B	Special materials upon request.
Housing	Steel	Stainless Steel	
Weather hood	Steel	Stainless Steel	
Flame arrester unit	A, B	B	

Table 4: Material combinations of flame arrester unit

Design	A	B	Special materials upon request.
FLAMEFILTER® casing	Steel	Stainless Steel	
FLAMEFILTER®	Stainless Steel	Stainless Steel	

Table 5: Flange connection type

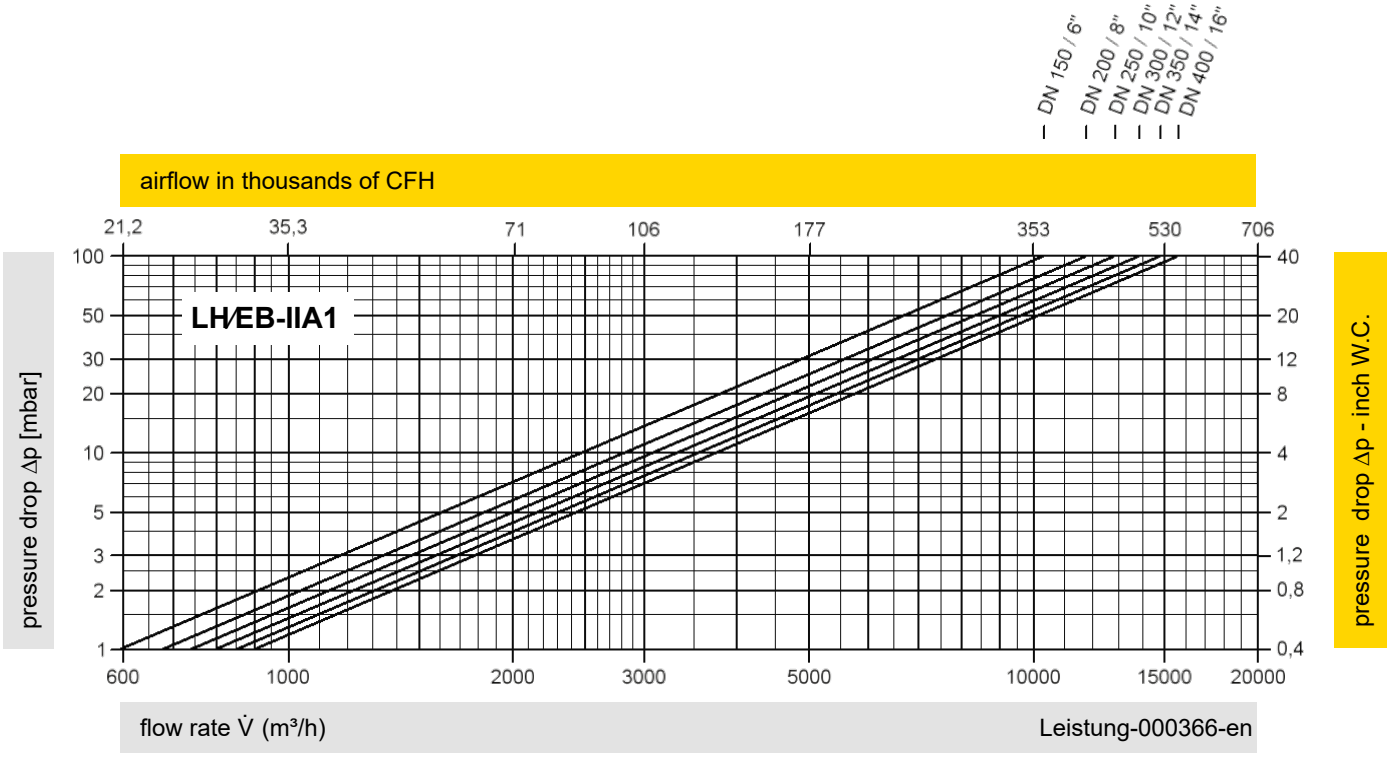
EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	



Deflagration Flame Arrester- Endurance burning-proof, End-of-Line

Flow Capacity Chart

PROTEGO® LH/EB

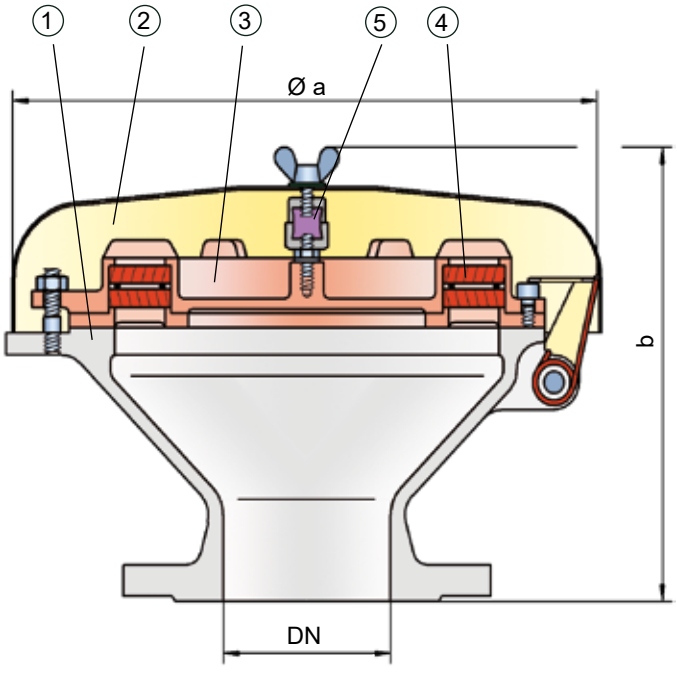


The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.

Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”

Deflagration Flame Arrester, endurance burning-proof, End-of-Line

PROTEGO® BE/HR



Function and Description

For many years the PROTEGO® BE/HR end-of-line deflagration flame arrester has been successfully used to protect vessels and process engineering apparatus which are not pressurized. The device provides protection against flame transmission through atmospheric deflagration and stabilized flames which can burn for very long time on the flame arrester element surface, so called endurance burning. Main application area is on in - and out-breathing and vent lines, with the goal to prevent flame transmission caused by endurance burning or atmospheric deflagration from propagating into the vessel or plant.

The PROTEGO® BE/HR consists of a housing (1), a weather hood (2) and the PROTEGO® flame arrester unit (3). During normal operation the metal weather hood is in a closed position. If a flame burns on the flame arrester element surface, the fusible link (5), located in a center position, will melt and let the spring loaded weather hood move into the open position. The PROTEGO® flame arrester unit consists of two FLAMEFILTER® discs (4), which are installed in a FLAMEFILTER® casing. The FLAMEFILTER® gap size will depend on the devices intended use. Detailing the operating conditions such as the temperature, explosion group and the composition of the fluid, enables PROTEGO® to select the best end-of-line deflagration flame arrester for your application. The PROTEGO® BE/HR series end-of-line deflagration flame arrester is available for substances from explosion groups IIA to IIB3 (NEC groups D to C MESG ≥ 0.65 mm). In a modified design, this device is also available for Ethanol applications.

The standard design can be used with operating temperature of up to +60°C / 140°F.

Type-approved according to ATEX Directive as well as other international standards.

Special Features and Advantages

- protection against atmospheric deflagration and endurance burning
- endurance burning protection for IIB3 and IIA vapour (NEC groups C and D)
- weather hood protects against environmental impact (i.e. weather, bird nests, etc.)
- weather hood opens and signals the impact of a flame
- fusible link is resistant against chemicals
- modular design allows replacement of single FLAMEFILTER®
- modular design results in low spare part cost

Design Types and Specifications

There are two different designs:

End-of-line deflagration flame arrester, basic design	**BE/HR - –**
End-of-line deflagration flame arrester with heating jacket	**BE/HR - H**

Special designs available upon request.

Table 1: Dimensions — Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity charts on the following pages.

DN	80 / 3"	100 / 4"
a	353 / 13.90	353 / 13.90
b	250 / 9.84	250 / 9.84

Dimensions for deflagration flame arrester with heating jacket upon request.

Table 2: Selection of explosion group

MESG	Expl. Gr. (IEC/CEN)	Gas Group (NEC)
> 0,90 mm	IIA	D
≥ 0,65 mm	IIB3	C

Special approvals upon request.

Table 3: Material selection for housing

Design	B	C
Housing	Steel	Stainless Steel
Weather hood	Steel	Stainless Steel
Flame arrester unit	A	A, C

Special materials upon request.

Table 4: Material combinations of flame arrester unit

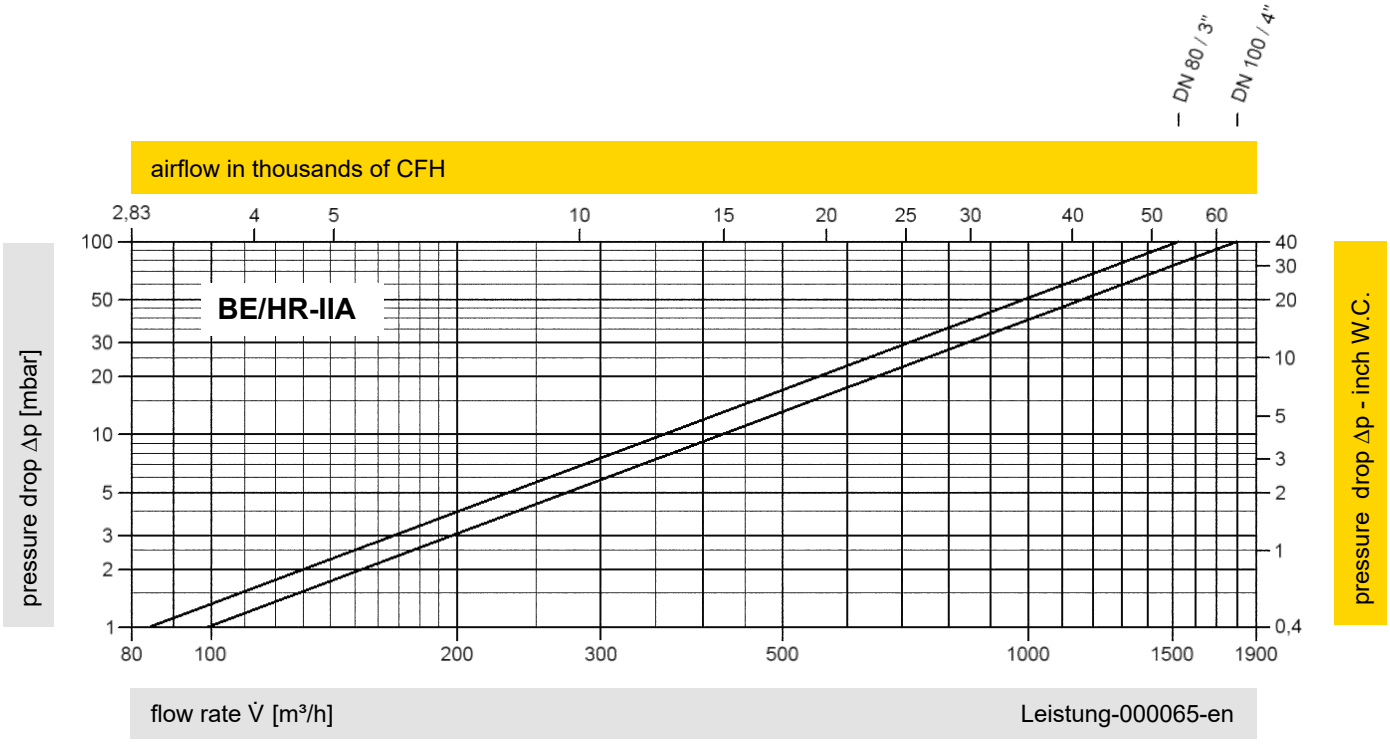
Design	A	C
FLAMEFILTER® casing	Stainless Steel	Stainless Steel
FLAMEFILTER®	Stainless Steel	Hastelloy
Spacer	Stainless Steel	Hastelloy

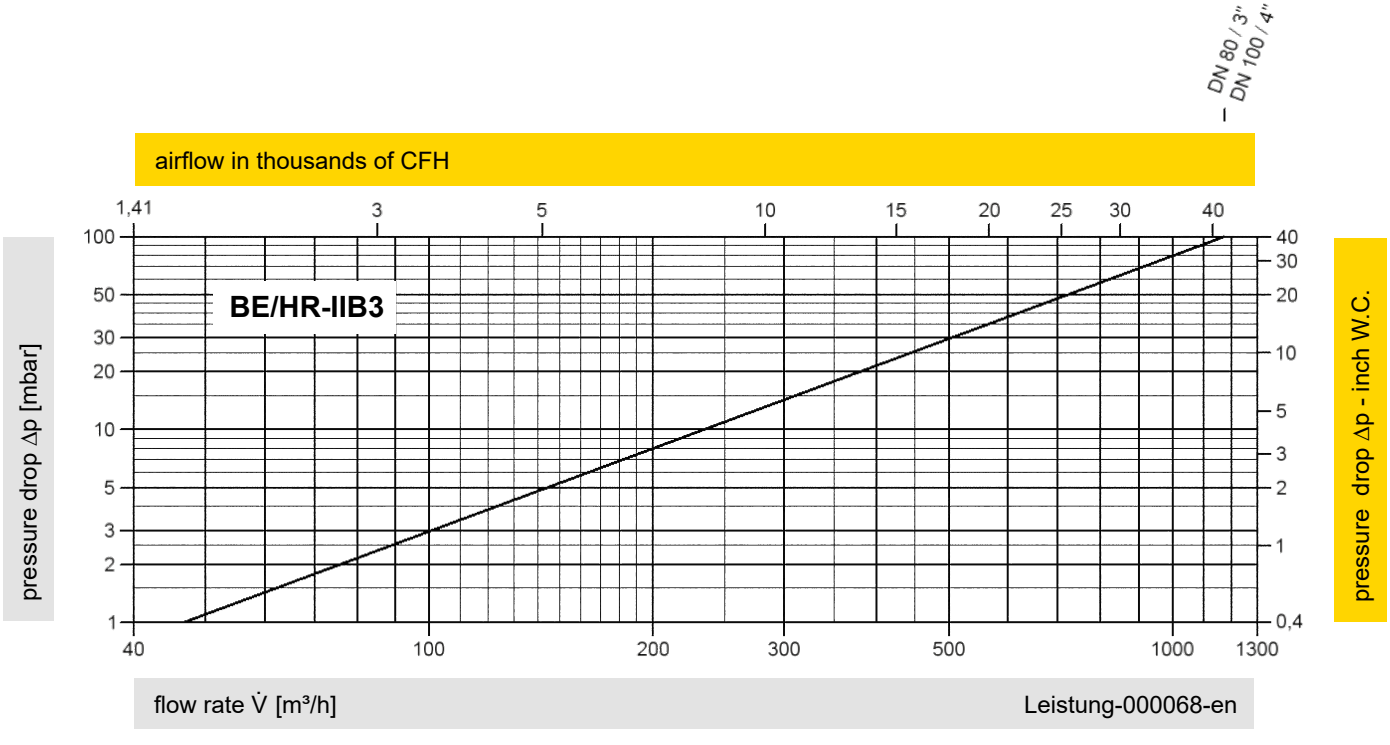
Special materials upon request.

Table 5: Flange connection type

EN 1092-1; Form B1
ASME B16.5 CL 150 R.F.

Other types upon request.



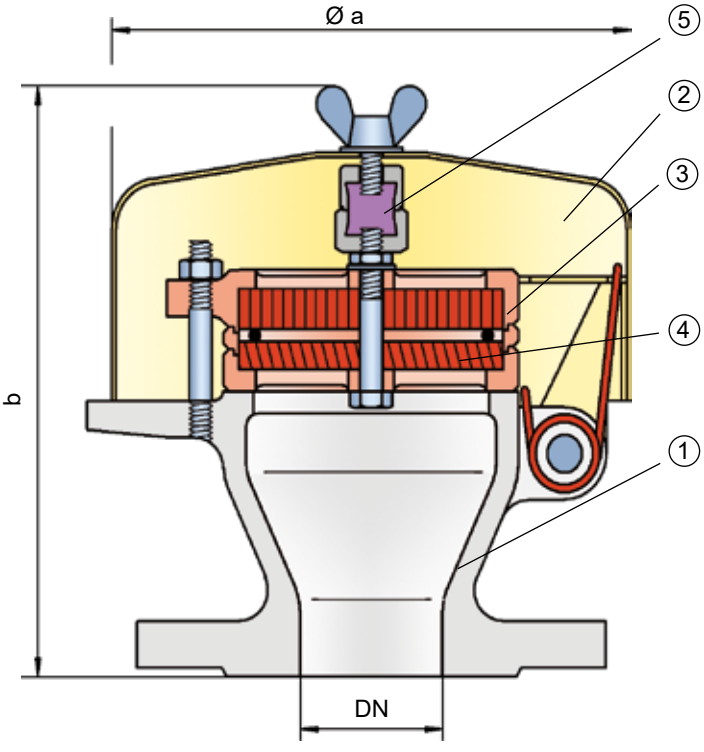


The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.

Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”

Deflagration Flame Arrester- Endurance burning-proof, End-of-Line

PROTEGO® BE/HK-E



Function and Description

The PROTEGO® BE/HK-E end-of-line deflagration flame arrester was specifically developed for vessels which are not pressurized and store Ethanol or other alcohols. The combustion of alcohol requires a modified flame arrester element design to provide protection against endurance burning. In addition, the device provides protection against atmospheric deflagration. It is typically installed on in - breathing and out-breathing vent lines to prevent flame transmission into the vessel or plant caused by endurance burning or atmospheric deflagration.

The PROTEGO® BE/HK-E consists of the housing (1), a weather hood (2), and the PROTEGO® flame arrester unit (3). During normal operation, the metal weather hood is in a closed position. If a stabilized flame burns on the flame arrester element surface, the melting element (5), located in a center position, will melt, and the spring-loaded weather hood will open. The PROTEGO® flame arrester unit consists of two FLAMEFILTER® discs (4) which are installed in a FLAMEFILTER® casing. The PROTEGO® BE/HK-E end-of-line deflagration flame arrester is available for alcohols and other substances with MESG ≥ 0,85mm.

The standard design can be used for operating temperatures up to +60°C / 140°F.

Type-approved in accordance with the current ATEX Directive and EN ISO 16852, as well as other international standards.

Special Features and Advantages

- endurance burning protection for alcohols and hydrocarbons with MESG ≥ 0,85mm
- weather hood protects the PROTEGO® flame arrester unit against environmental impact, such as nesting animals and weather conditions
- in case of fire, the weather hood opens, allowing the flame to be seen from a far distance
- centrally aligned melting element is resistant to chemicals
- modular design enables replacement of individual FLAME-FILTER® discs
- trouble-free maintenance
- provides protection against atmospheric deflagrations and endurance burning
- cost-effective spare parts

Design Types and Specifications

There are two different designs:

End-of-line deflagration flame arrester, basic design	**BE/HK-E - –**
End-of-line deflagration flame arrester with heating jacket	**BE/HK-E - H**

Special designs available upon request.

Table 1: Dimensions Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity charts on the following pages.

DN	20 / ¾"	25 / 1"	32 / 1¼"	40 / 1½"	50 / 2"	65 / 2½"	80 / 3"
a	163 / 6.42	163 / 6.42	163 / 6.42	183 / 7.20	183 / 7.20	218 / 8.58	218 / 8.58
b	180 / 7.09	177 / 6.97	177 / 6.97	190 / 7.48	190 / 7.48	200 / 7.87	200 / 7.87

Dimensions for deflagration flame arrester with heating jacket upon request.

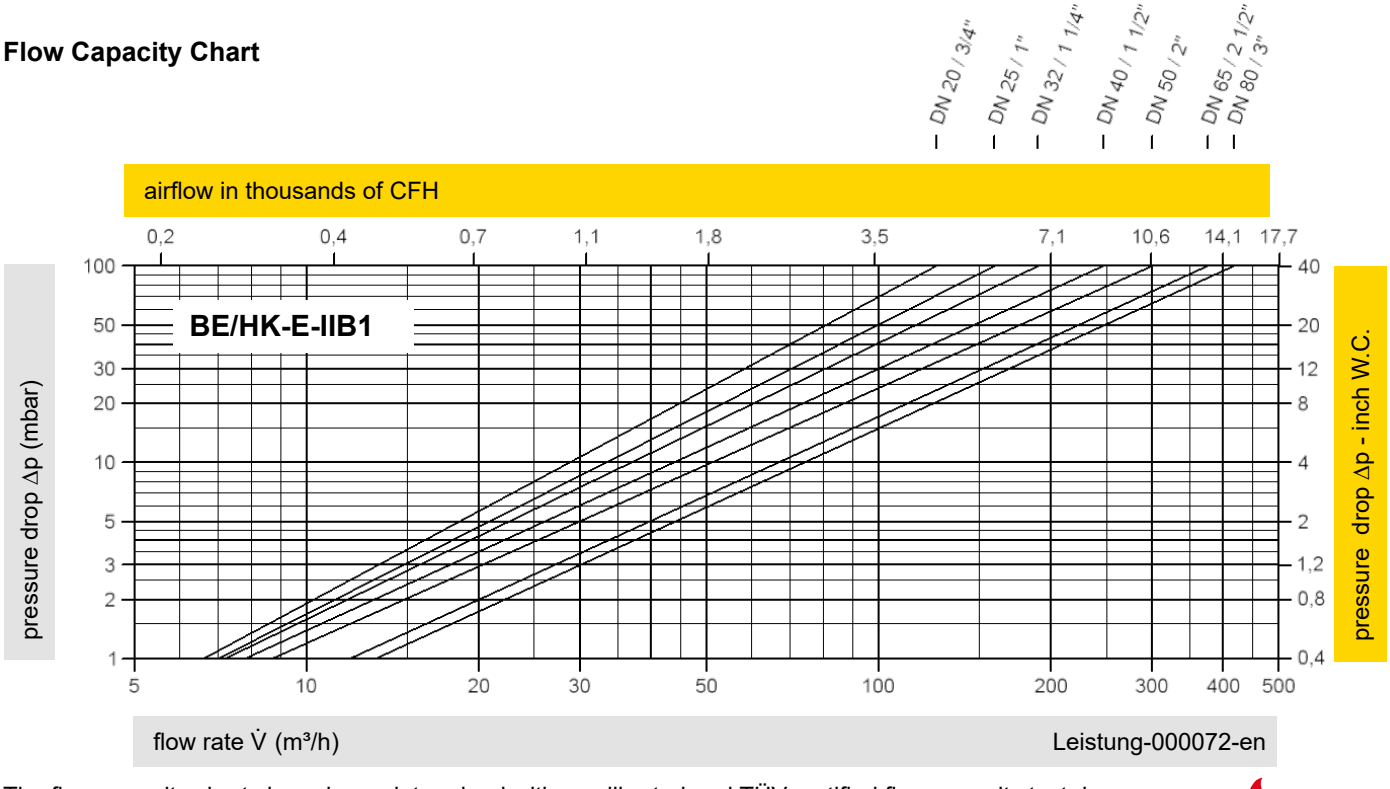
Table 2: Selection of explosion group			
MESG	Expl. Gr. (IEC/CEN)	Gas Group (NEC)	Special approvals upon request.
≥ 0,85 mm	IIB1	–	

Table 3: Material selection for housing			
Design	B	C	Special materials upon request.
Housing	Steel	Stainless Steel	
Weather hood	Steel	Stainless Steel	
Flame arrester unit	A	A, B	

Table 4: Material combinations of flame arrester unit			
Design	A	B	Special materials upon request.
FLAMEFILTER® casing	Stainless Steel	Stainless Steel	
FLAMEFILTER®	Stainless Steel	Hastelloy	
Spacer	Stainless Steel	Hastelloy	

Table 5: Flange connection type	
EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	

Flow Capacity Chart



The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.
Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”

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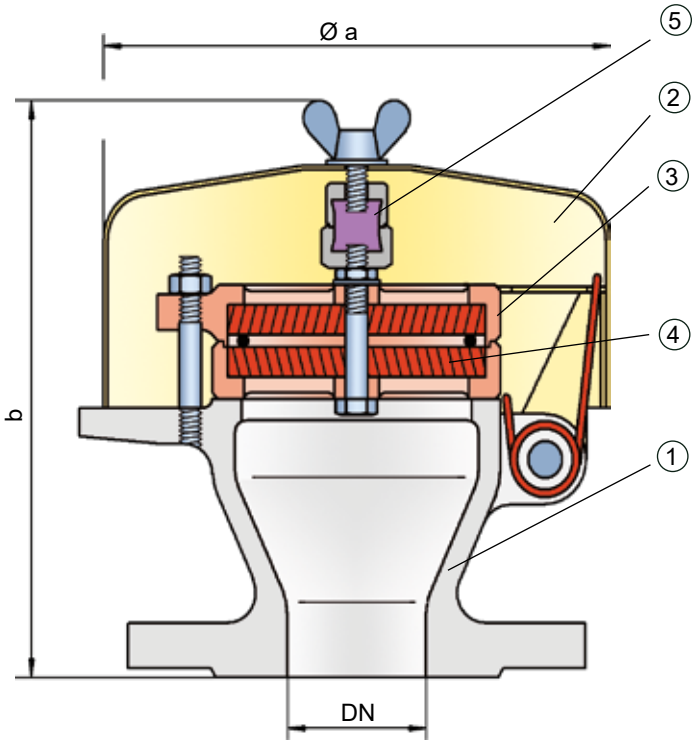
Deflagration Flame Arrester, endurance burning-proof, End-of-Line

PROTEGO® BE/HK



Function and Description

For many years the PROTEGO® BE/HK end-of-line deflagration flame arrester has been successfully used to protect vessels and process engineering apparatus which are not pressurized. The device provides protection against flame transmission through atmospheric deflagration and stabilized flames which can burn for very long time on the flame arrester element surface, so called endurance burning. Main application area is on in - and out-breathing and vent lines, with the goal to prevent flame transmission caused by endurance burning or atmospheric deflagration from propagating into the vessel or plant.

The PROTEGO® BE/HK consists of a housing (1), a weather hood (2) and the PROTEGO® flame arrester unit (3). During normal operation the metal weather hood is in a closed position. If a stabilized flame burns on the flame arrester element surface, the fusible link (5), located in a center position, will melt and let the spring loaded weather hood move into the open position. The PROTEGO® flame arrester unit consists of two FLAMEFILTER® discs (4), which are installed in a FLAMEFILTER® casing. The FLAMEFILTER® gap size depends on the devices intended use.

Detailing the operating conditions such as the temperature, explosion group and the composition of the fluid, enables PROTEGO® to select the best end-of-line deflagration flame arrester for your application. The PROTEGO® BE/HK series end-of-line deflagration flame arrester is available for substances from explosion groups IIA to IIB3 (NEC groups D to C MESG ≥ 0.65 mm). In a modified design, this device is also available for Ethanol applications.
The standard design can be used with operating temperature of up to +60°C / 140°F.

Type-approved according to ATEX Directive as well as other international standards.

Special Features and Advantages

- weather hood protects against environmental impact (i.e. weather, bird nests, etc.)
- weather hood will open and signal the impact of a flame
- endurance burning protection for IIB3 and IIA vapour (NEC group C and D); only for PROTEGO® BE/HK and BE/HK-H
- fusible link is resistant against chemicals
- modular design allows replacement of single FLAMEFILTER® discs
- easy maintenance
- modular design results in low spare part costs
- protection against atmospheric deflagration and endurance burning

Design Types and Specifications

There are two different designs:

End-of-line deflagration flame arrester, **BE/HK - –**
basic design

End-of-line deflagration flame arrester **BE/HK - H**
with heating jacket

Special designs available upon request.

Table 1: Dimensions Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity charts on the following pages.

	DN	20 / ¾"	25 / 1"	32 / 1¼"	40 / 1½"	50 / 2"	65 / 2½"	80 / 3"
	a	163 / 6.42	163 / 6.42	163 / 6.42	183 / 7.20	183 / 7.20	218 / 8.58	218 / 8.58
BE/HK-IIA	b	180 / 7.09	177 / 6.97	177 / 6.97	190 / 7.48	190 / 7.48	200 / 7.87	200 / 7.87
BE/HK-IIB3	b	180 / 7.09	177 / 6.97	177 / 6.97	-	-	-	-

Dimensions for deflagration flame arrester with heating jacket upon request.

Table 2: Selection of explosion group

MESG	Expl. Gr. (IEC/CEN)	Gas Group (NEC)	
> 0,90 mm	IIA	D	Special approvals upon request.
≥ 0,65 mm	IIB3	C	

Table 3: Material selection for housing

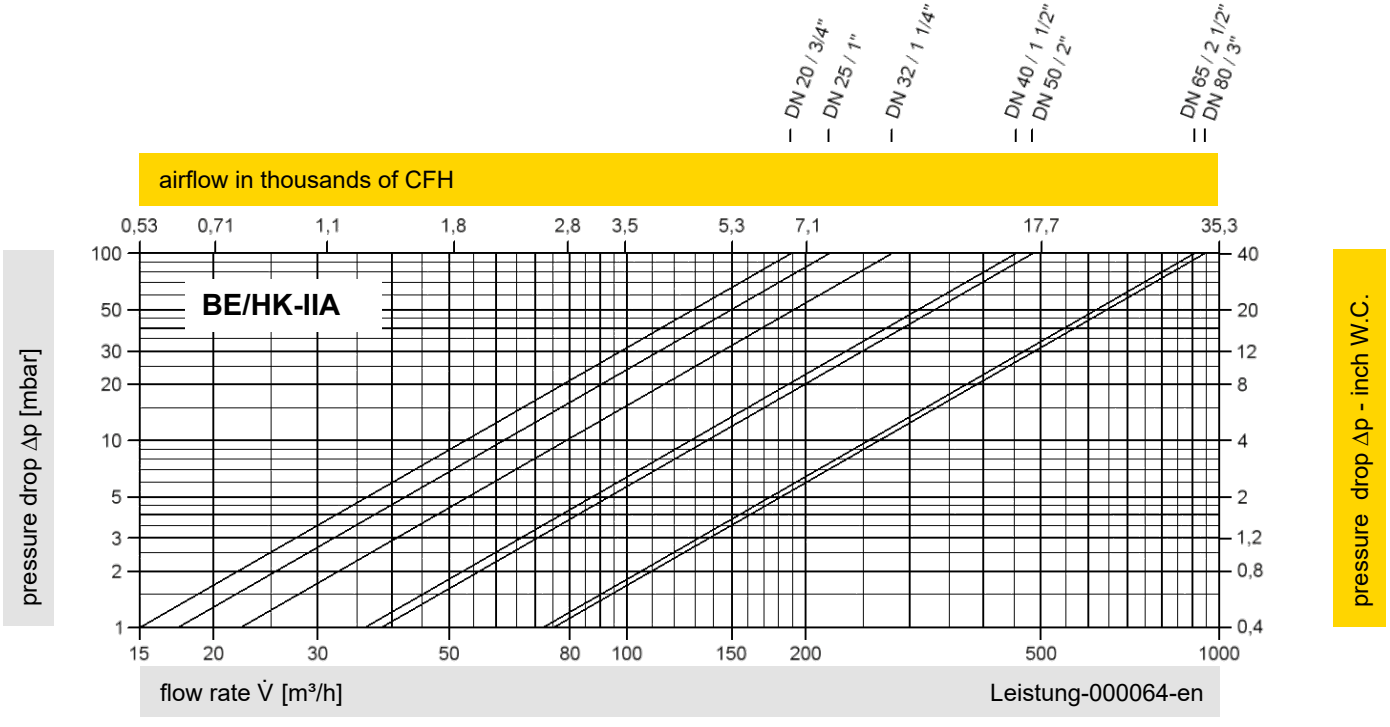
Design	B	C	Special materials upon request.
Housing	Steel	Stainless Steel	
Weather hood	Steel	Stainless Steel	
Flame arrester unit	A	A, C	

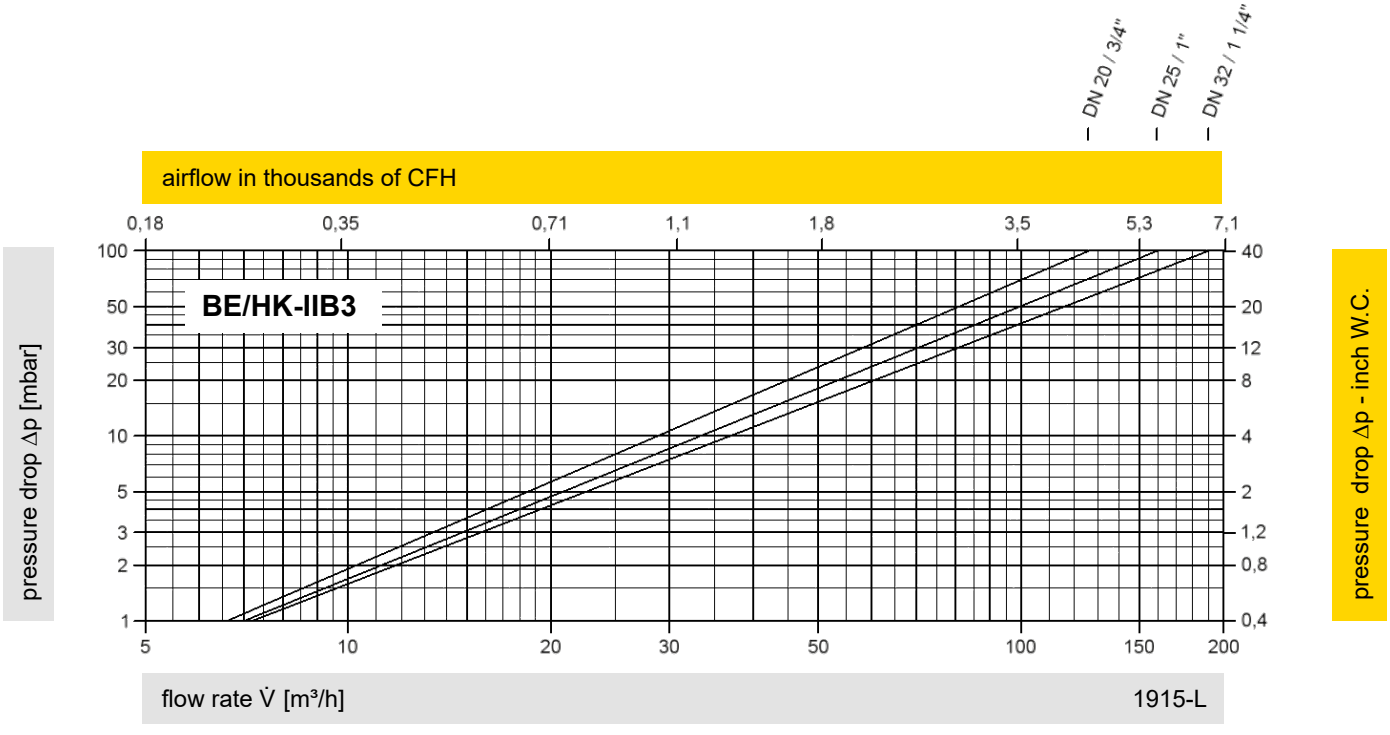
Table 4: Material combinations of flame arrester unit

Design	A	C	Special materials upon request.
FLAMEFILTER® casing	Stainless Steel	Stainless Steel	
FLAMEFILTER®	Stainless Steel	Hastelloy	
Spacer	Stainless Steel	Hastelloy	

Table 5: Flange connection type

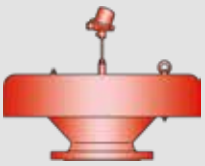
EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	





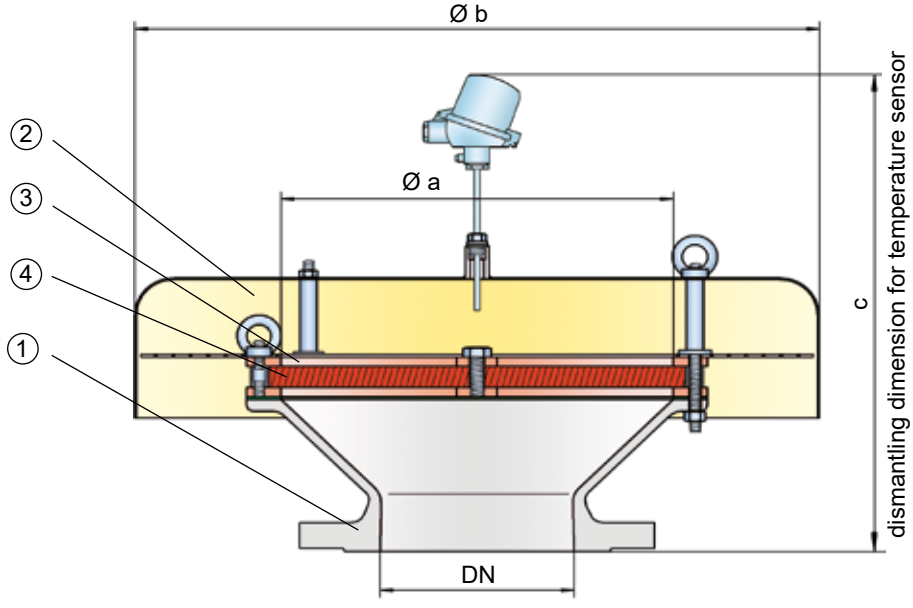
The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.

Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”



Deflagration Flame Arrester- Short-time burning-proof, End-of-Line

PROTEGO® LH/AD-T



Function and Description

The PROTEGO® LH/AD-T end-of-line deflagration flame arrester provides protection against flame transmission through atmospheric deflagration and short time burning on the flame arrester element. The device is typically installed on vent lines of vessels and plant equipment which are not pressurized. The device is equipped with a temperature sensor which immediately detects a flame on the FLAMEFILTER® sur- face. After the flame is detected, a secondary measure, such as inerting or closing of a shut-off valve to block the vapor flow to the device, should activate within 60 seconds and extinguish the flame so that the system can operate safely. The device prevents flame transmission from short time burning and atmospheric deflagration into the vessel or plant.

The PROTEGO® LH/AD-T consists of the housing (1), a weather hood (2), and the PROTEGO® flame arrester unit (3). The device is equipped with a metal weather hood. The FLAMEFILTER® (4) gap size depends on the device's intended use. Specifying the operating conditions, such as the temperature, explosion group, and the composition of the fluid, enables PROTEGO® to select the best end-of-line deflagration flame arrester for your application. The PROTEGO® LH/AD-T series end-of-line deflagration flame arrester is available for substances from explosion groups IIA to IIC (NEC groups D to B).

The standard design can be used with an operating temperature of up to +60°C / 140°F. Devices with special approval for higher temperatures are available upon request.

Type-approved in accordance with the current ATEX Directive and EN ISO 16852, as well as other international standards.

Special Features and Advantages

- weather hood with protection screen protects the PROTEGO® flame arrester unit against environmental impact, such as nesting animals and weather conditions
- available for DN 50/2"- bis DN 800/32"- pipes
- trouble-free maintenance
- advanced design for higher operating temperatures
- provides protection against atmospheric deflagrations and short-time burning
- low operating and lifecycle costs
- cost-effective Flame arrester
- cost effective spare parts

Design Type and Specification

End-of-line deflagration flame arrester, basic design **LH/AD-T**

Special designs available upon request.

Table 1: Dimensions Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity charts on the following pages.

DN	a	b	IIB3	IIC
			c*	c*
50 / 2"	100 / 3.94	240 / 9.45	530 / 20.87	550 / 21.65
80 / 3"	150 / 5.91	295 / 11.61	560 / 22.05	580 / 22.83
100 / 4"	200 / 7.87	350 / 13.78	585 / 23.03	605 / 23.82
150 / 6"	300 / 11.81	600 / 23.62	630 / 24.80	655 / 25.79
200 / 8"	300 / 11.81	600 / 23.62	630 / 24.80	655 / 25.79
250 / 10"	400 / 15.75	800 / 31.50	750 / 29.53	770 / 30.31
300 / 12"	400 / 15.75	800 / 31.50	740 / 29.13	760 / 29.92
350 / 14"	600 / 23.62	1000 / 39.37	800 / 31.50	820 / 32.28
400 / 16"	600 / 23.62	1000 / 39.37	790 / 31.10	815 / 32.09
500 / 20"	700 / 27.56	1200 / 47.24	810 / 31.89	835 / 32.87
600 / 24"	800 / 31.50	1200 / 47.24	935 / 36.81	960 / 37.80
700 / 28"	1000 / 39.37	1500 / 59.06	975 / 38.39	995 / 39.17
800 / 32"	1200 / 47.24	1700 / 66.93	1015 / 39.96	1035 / 40.75

* 'c' is reference values. Exact measures depend on the flange connection.

Table 2: Selection of explosion group

MESG	Expl. Gr. (IEC/CEN)	Gas Group (NEC)	
≥ 0,65 mm	IIB3	C	Special approvals upon request.
< 0,5 mm	IIC	B	

Table 3: Specification of max. operating temperature

≤ 60°C / 140°F	Tmaximum allowable operating temperature in °C	Higher operating temperatures upon request.
-	Classification	

Table 4: Material selection for housing

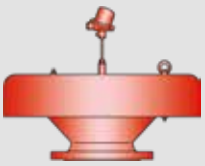
Design	A	B	
Housing	Steel	Stainless Steel	
Weather hood	Stainless Steel	Stainless Steel	Special materials upon request.
Protection screen	Stainless Steel	Stainless Steel	
Flame arrester unit	A, B	B	

Table 5: Material combinations of flame arrester unit

Design	A	B	
FLAMEFILTER® casing	Steel	Stainless Steel	Special materials upon request.
FLAMEFILTER®	Stainless Steel	Stainless Steel	

Table 6: Flange connection type

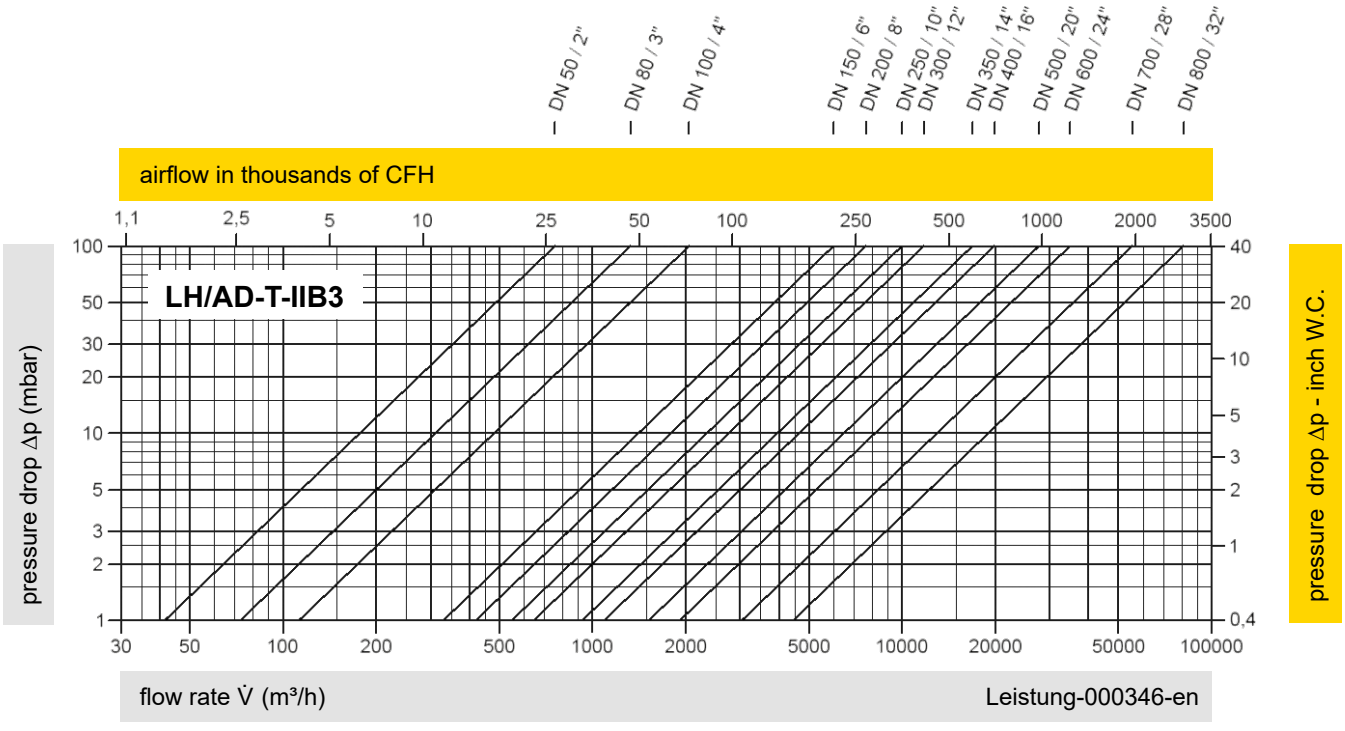
EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	

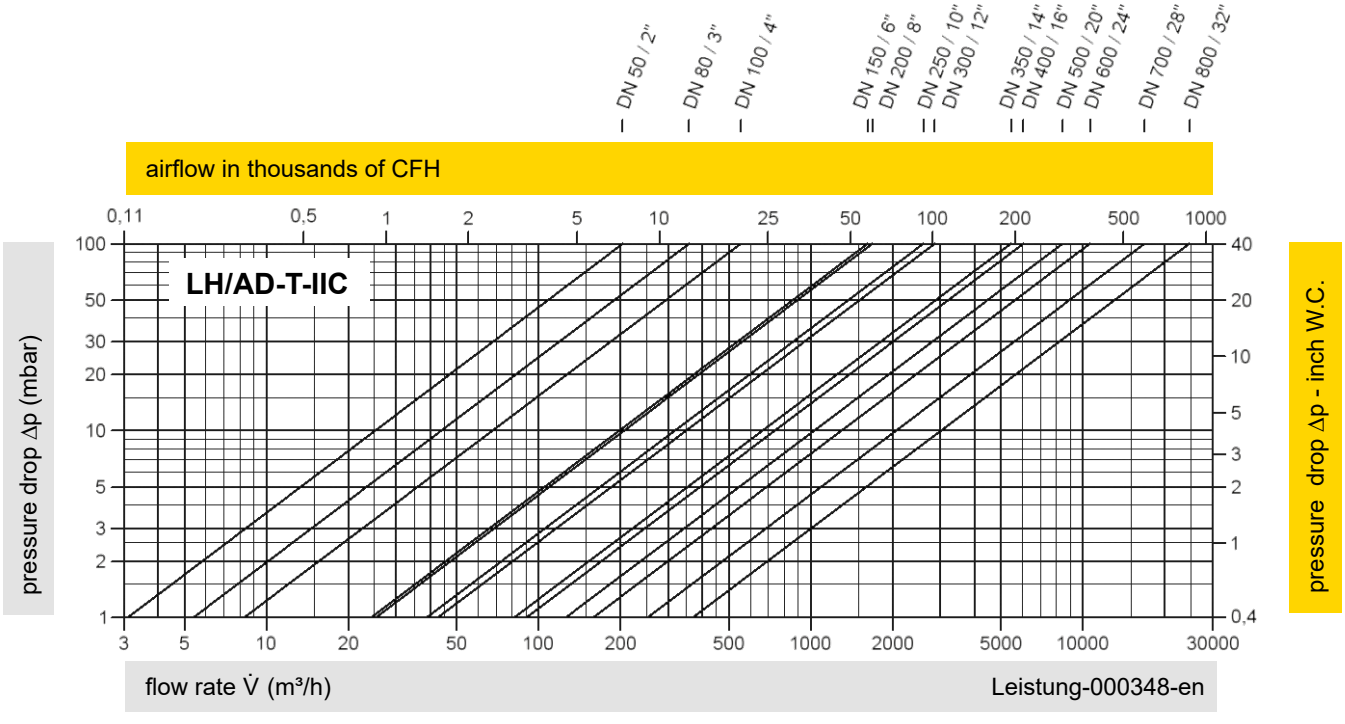


Deflagration Flame Arrester- Short-time burning-proof, End-of-Line

Flow Capacity Charts

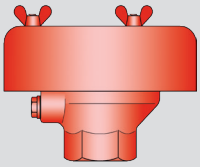
PROTEGO® LH/AD-T





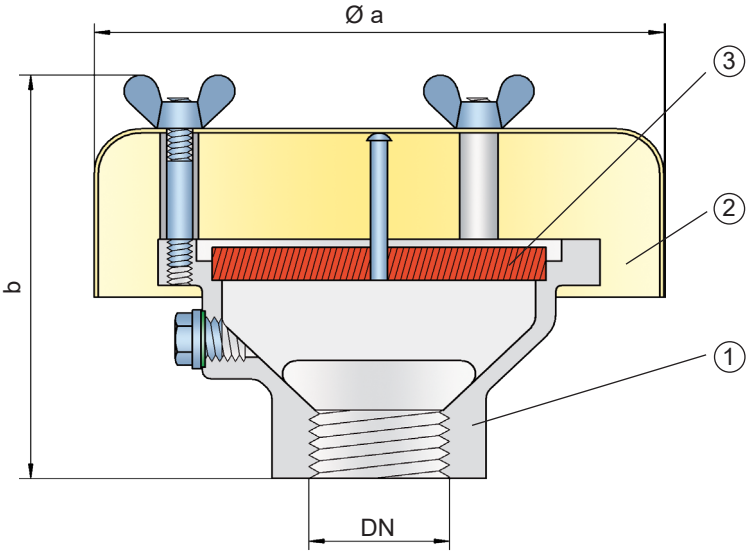
The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.

Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”



Deflagration Flame Arrester, End-of-Line

PROTEGO® BE/AD



Function and Description

The PROTEGO® BE/AD end-of-line deflagration flame arrester provides protection against atmospheric deflagrations. The device is usually installed on vent lines of small vessels and plant equipment which are not pressurized. For safe application, it is important that an endurance burning situation can be excluded. So typically, it is installed on vents lines which discharge vapor for a short time period. The device is the ideal solution for preventing flame transmission from atmospheric deflagration into the vessel or plant.

The PROTEGO® BE/AD consists of the housing (1), a weather hood (2), and the PROTEGO® flame arrester unit (3). The device is equipped with a metal weather hood. The FLAMEFILTER® gap size will depend on the device's intended use. Specifying the operating conditions, such as the temperature, pressure, explosion group, and the composition of the fluid, enables PROTEGO® to select the best end-of-line deflagration flame arrester for your application. The PROTEGO® BE/AD series end-of-line deflagration flame arrester is available for substances from explosion groups IIA to IIC (NEC groups D to B).

The standard design can be used with an operating temperature of up to +60°C / 140°F.

Type-approved in accordance with the current ATEX Directive and EN ISO 16852, as well as other international standards.

Special Features and Advantages

- Weather hood provides protection against environmental impact (harsh weather conditions, foreign bodies, and nesting animals.)
- easy maintenance
- quick removal and installation of FLAMEFILTER®
- threaded connection
- provides protection against atmospheric deflagrations
- low operating and lifecycle costs
- cost-effective Flame arrester
- cost-effective spare parts

Design Type and Specification

Deflagration flame arrester, end-of-line, basic design **BE/AD**

Special designs available upon request.

Table 1: Dimensions Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity charts on the following pages.

DN	15 / G ½"	20 / G ¾"	25 / G 1"	32 / G 1¼"	40 / G 1½"	50 / G 2"
a	116 / 4.57	116 / 4.57	116 / 4.57	116 / 4.57	200 / 7.87	200 / 7.87
b	80 / 3.15	80 / 3.15	85 / 3.35	85 / 3.35	150 / 5.91	150 / 5.91

Table 2: Selection of explosion group

MESG	Expl. Gr. (IEC/CEN)	Gas Group (NEC)	
≥ 0,65 mm	IIB3	C	Special approvals upon request.
< 0,5 mm	IIC	B	

Table 3: Specification of max. operating temperature

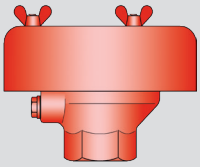
≤ 60°C / 140°F	Tmaximum allowable operating temperature in °C	Higher operating temperatures upon request.
-	Designation	

Table 4: Material selection

Design	B	C	
Housing	Stainless Steel	Hastelloy	Special materials upon request.
Weather hood	Stainless Steel	Stainless Steel	
FLAMEFILTER®	Stainless Steel	Hastelloy	

Table 5: Type of connection

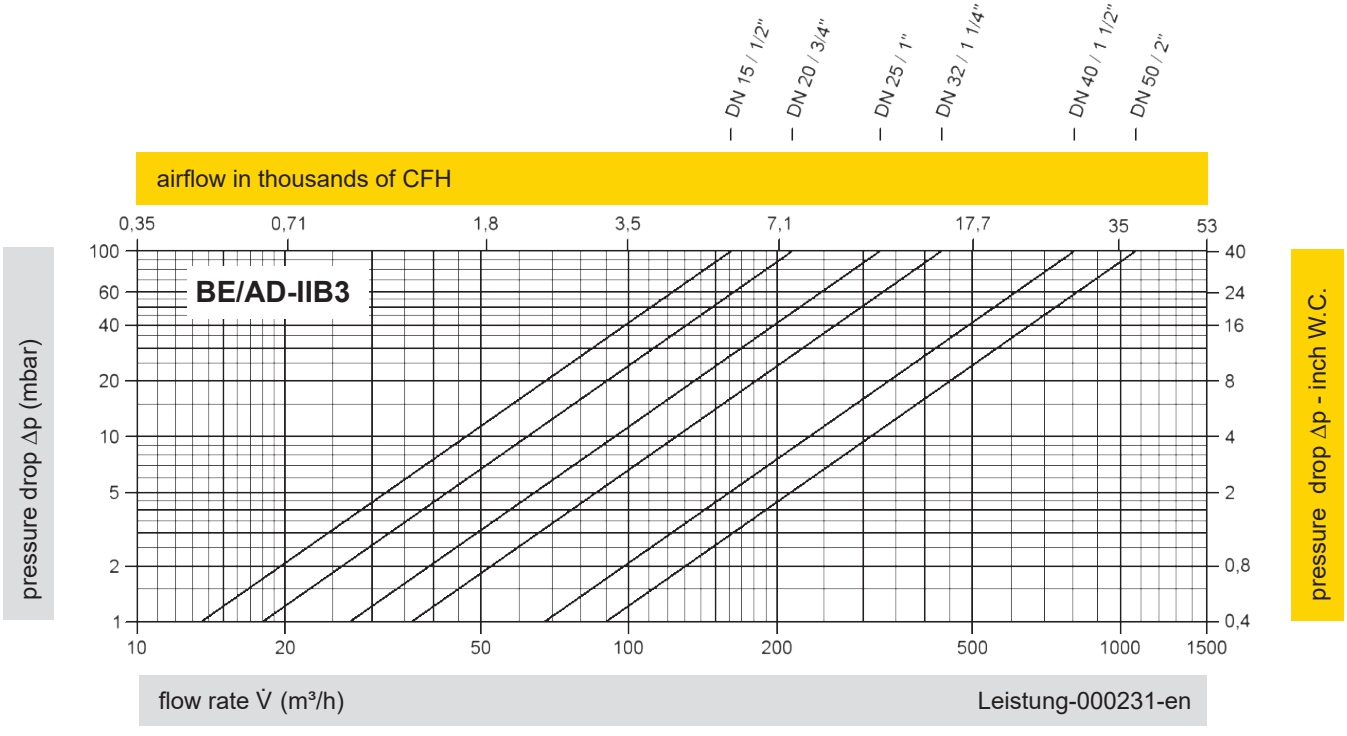
Pipe thread DIN ISO 228-1	DIN	Other types of thread upon request.

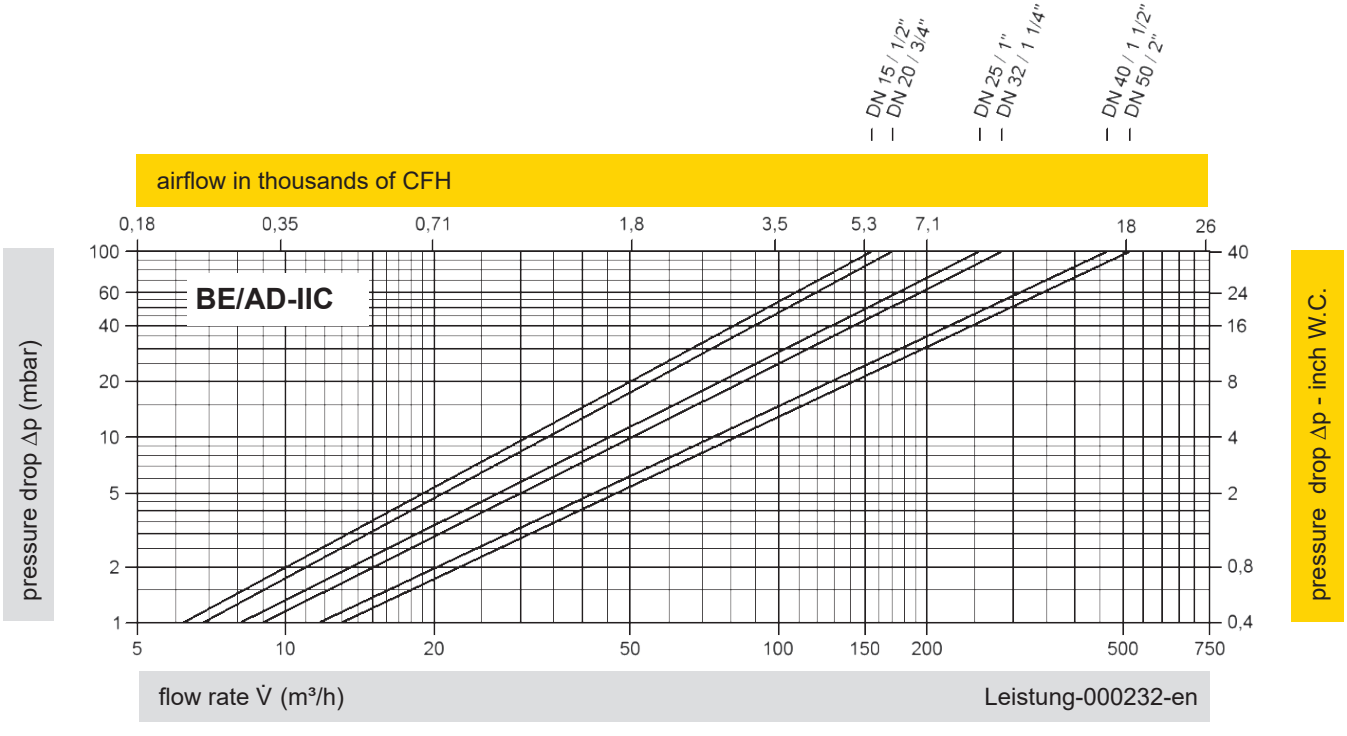


Deflagration Flame Arrester, End-of-Line

Flow Capacity Charts

PROTEGO® BE/AD



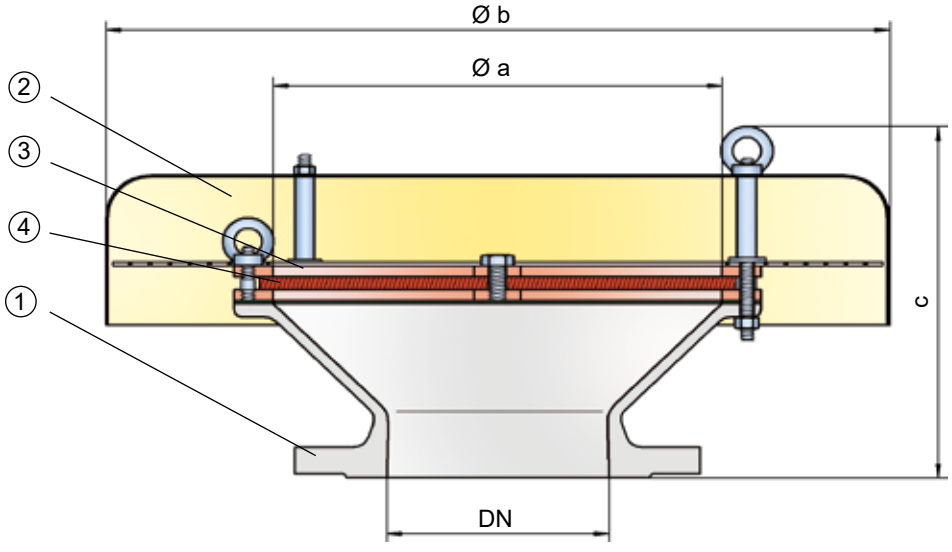


The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.

Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”

Deflagration Flame Arrester, End-of-Line

PROTEGO® LH/AD



Function and Description

The PROTEGO® LH/AD end-of-line deflagration flame arrester provides protection against flame transmission through atmospheric deflagration. The device is typically installed on vent lines of vessels and plant equipment which are not pressurized. For safe application, it is important that an endurance burning situation can be excluded. So typically, it is installed on vent lines which discharge vapor for a short time period. The device prevents flame transmission from atmospheric deflagration into the vessel or plant.

The PROTEGO® LH/AD consists of the housing (1), a weather hood (2), and the PROTEGO® flame arrester unit (3). The device is equipped with a metal weather hood. A protection screen is installed between the weather hood and the housing to keep out animals and foreign bodies. The FLAMEFILTER® (4) gap size depends on the device's intended use. Specifying the operating conditions, such as the temperature, explosion group and the composition of the fluid, enables PROTEGO® to select the best end-of-line deflagration flame arrester for your application.

The PROTEGO® LH/AD series end-of-line deflagration flame arrester is available for substances from explosion groups IIA to IIC (NEC groups D to B). Special certifications for carbon disulfide are available.

The standard design can be used with an operating temperature of up to +60°C / 140°F. Devices with special approval for higher temperatures are available upon request.

Type-approved in accordance with the current ATEX Directive and EN ISO 16852, as well as other international standards.

Special Features and Advantages

- weather hood with protection screen protects the PROTEGO® flame arrester unit against environmental impact, such as nesting animals and weather conditions
- available for DN 50/2"- bis DN 800/32"- pipes
- trouble-free maintenance
- advanced design for higher operating temperatures
- provides protection against atmospheric deflagrations
- low operating and lifecycle costs
- cost-effective Flame arrester
- cost-effective spare parts

Design Type and Specification

End-of-line deflagration flame arrester, basic design	**LH/AD**
End-of-line deflagration flame arrester for carbon disulfide	**LH/AD-CS2**

Special designs available upon request.

Table 1: Dimensions Dimensions in mm / inches

To select the nominal size (DN), please use the flow capacity charts on the following pages.

DN	a	b	IIB3	IIC
			c*	c*
50 / 2"	100 / 3.94	200 / 7.87	175 / 6.89	185 / 7.28
80 / 3"	150 / 5.91	240 / 9.45	180 / 7.09	195 / 7.68
100 / 4"	200 / 7.87	295 / 11.61	220 / 8.66	235 / 9.25
125 / 5"	250 / 9.84	350 / 13.78	240 / 9.45	-
150 / 6"	300 / 11.81	550 / 21.65	260 / 10.24	270 / 10.63
200 / 8"	300 / 11.81	550 / 21.65	260 / 10.24	270 / 10.63
250 / 10"	400 / 15.75	600 / 23.62	355 / 13.98	365 / 14.37
300 / 12"	400 / 15.75	600 / 23.62	340 / 13.39	350 / 13.78
350 / 14"	600 / 23.62	800 / 31.50	390 / 15.35	400 / 15.75
400 / 16"	600 / 23.62	800 / 31.50	380 / 14.96	390 / 15.35
500 / 20"	700 / 27.56	1000 / 39.37	400 / 15.75	410 / 16.14
600 / 24"	800 / 31.50	1200 / 47.24	475 / 18.70	485 / 19.09
700 / 28"	1000 / 39.37	1400 / 55.12	505 / 19.88	515 / 20.28
800 / 32"	1200 / 47.24	1600 / 62.99	550 / 21.65	560 / 22.05

* “c” is reference values. Exact measures depend on the flange connection.

Table 2: Selection of explosion group

MESG	Expl. Gr. (IEC/CEN)	Gas Group (NEC)	
≥ 0,65 mm	IIB3	C	Special approvals upon request.
< 0,5 mm	IIC	B	

Table 3: Specification of max. operating temperature

≤ 60°C / 140°F	Tmaximum allowable operating temperature in °C	Higher operating temperatures upon request.
-	Classification	

Table 4: Material selection for housing

Design	A	B	
Housing	Steel	Stainless Steel	
Weather hood	Stainless Steel	Stainless Steel	Special materials upon request.
Protection screen	Stainless Steel	Stainless Steel	
Flame arrester unit	A, B	B	

Table 5: Material combinations of flame arrester unit

Design	A	B	
FLAMEFILTER® casing	Steel	Stainless Steel	Special materials upon request.
FLAMEFILTER®	Stainless Steel	Stainless Steel	

Table 6: Flange connection type

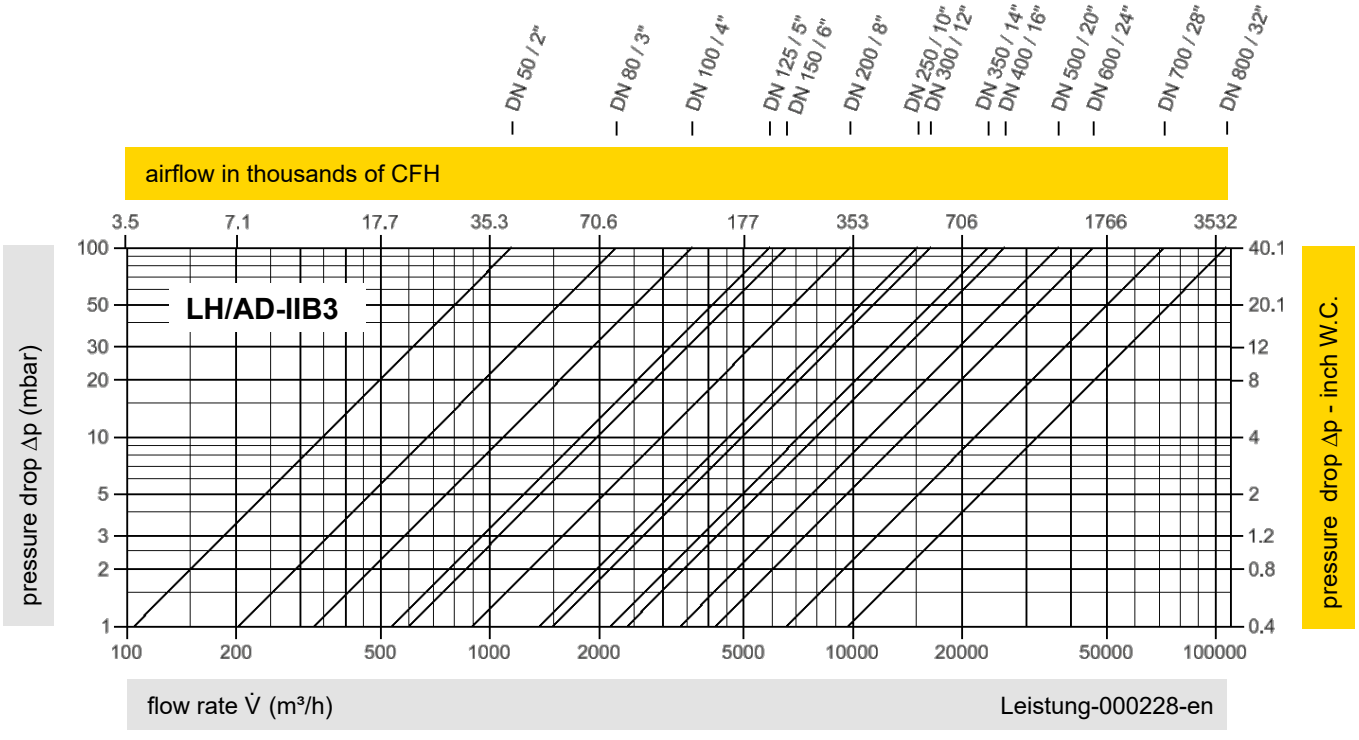
EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	

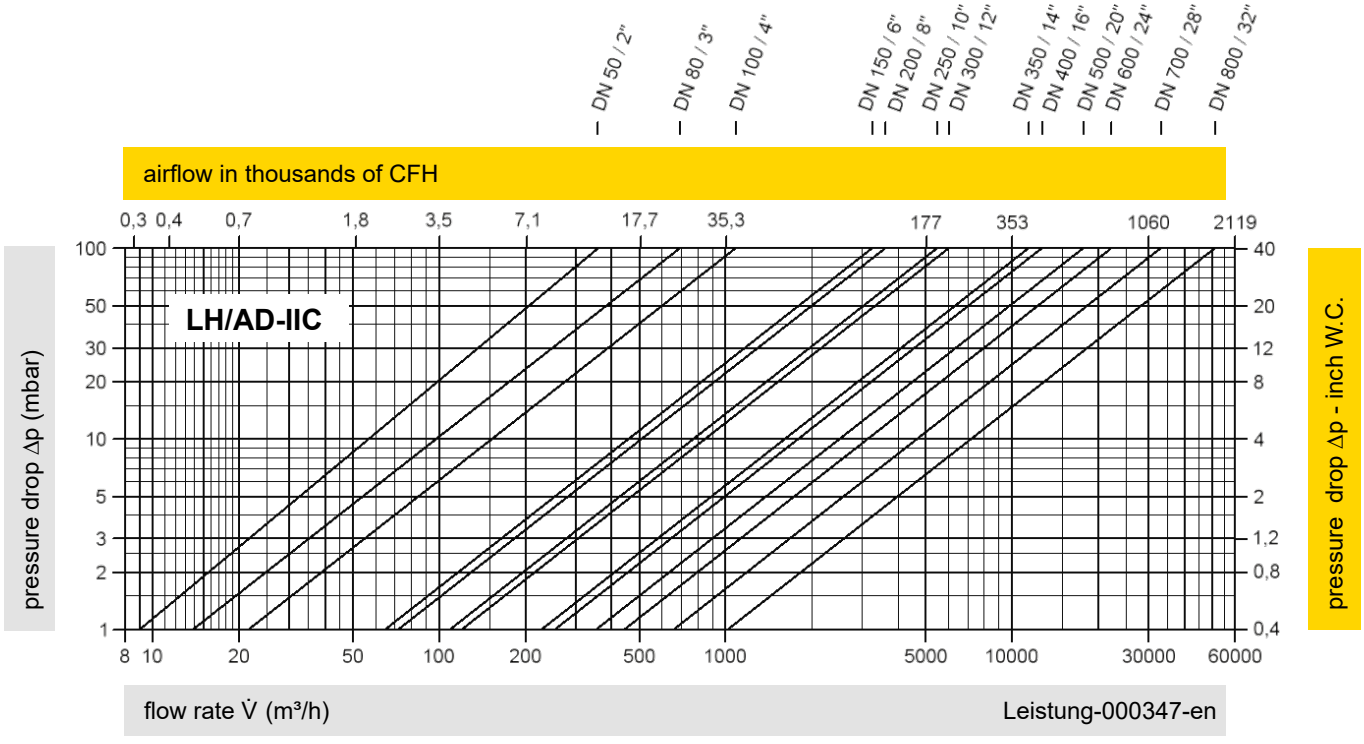
PROTEGO
for safety and environment

Deflagration Flame Arrester, End-of-Line

Flow Capacity Charts

PROTEGO® LH/AD





The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.

Volume flow V̇ in (m³/h) and CFH refer to the standard reference conditions of air in ISO 6358 (20°C, 1bar).
For conversion to other densities and temperatures, refer to Sec. 1: “Technical Fundamentals.”