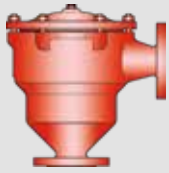
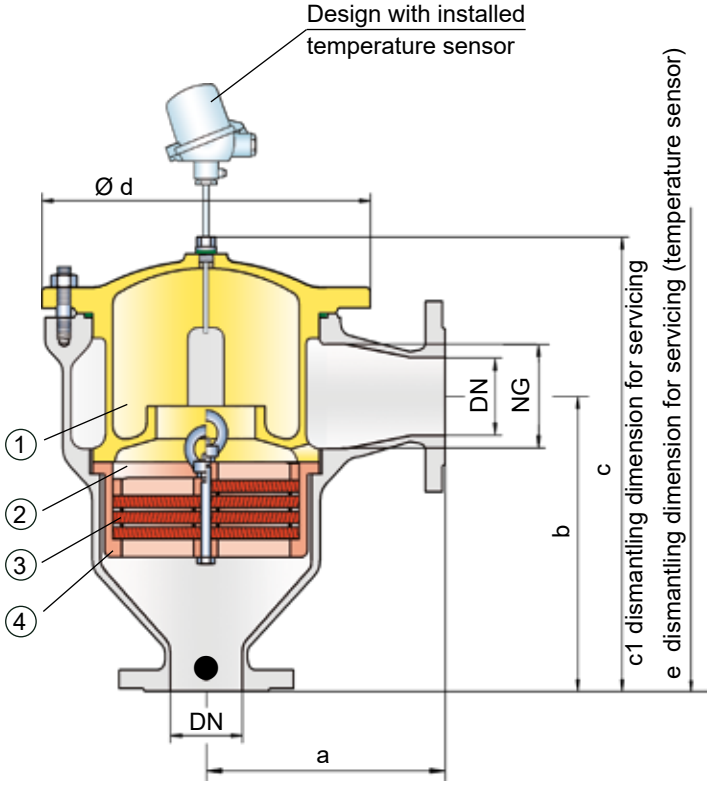


In-Line Detonation Flame Arrester

for stable detonations and deflagrations in right angle design with shock absorber, uni-directional

PROTEGO® DR/ES (series 2)



The PROTEGO® DR/ES series 2 was developed for higher flow performance at small flange connection. It is approved at an operating temperature up to +60°C / 140°F and an absolute operating pressure up to 1.2 bar / 17.4 psi. Devices with special approvals can be obtained for higher pressures and higher temperatures upon request.

Type-approved according to ATEX Directive and EN ISO 16852 as well as other international standards.

Special Features and Advantages

- minimum number of FLAMEFILTER® discs due to the effective shock absorber
- quick removal and installation of the complete PROTEGO® flame arrester unit and FLAMEFILTER® discs in the cage
- due to modular design the FLAMEFILTER® discs can be individually replaced
- the right angle design saves pipe elbows
- extended application range for higher operating temperatures and pressures
- high flow performance at small flange connection
- minimum pressure loss and hence low operating and life-cycle cost
- cost efficient spare parts

Function and Description

The PROTEGO® DR/ES in-line detonation flame arrester has been used for decades in industrial plant construction because its right angle design offers advantages towards maintenance and costs in comparison to most straight designs.

Once a detonation enters the device, energy is absorbed from the detonation shock wave by the integrated shock absorber (1) before the flame is extinguished in the narrow gaps of the FLAMEFILTER® (3).

The PROTEGO® flame arrester unit (2) consists of several FLAMEFILTER® discs and spacers firmly held in the FLAMEFILTER® cage (4). The gap size and number of FLAMEFILTER® discs are determined by the operating data of the mixture flowing in the line (explosion group, pressure, temperature). This device is approved for explosion groups from IIA to IIB3 (NEC group D to C MESG ≥ 0.65 mm).

Design Types and Specifications

There are four different designs available:

Basic in-line detonation flame arrester	**DR/ES- [–] - [–]**
In-line detonation flame arrester with integrated temperature sensor* as additional protection against short time burning	**DR/ES- [T] - [–]**
In-line detonation flame arrester with heating jacket	**DR/ES- [H] - [–]**
In-line detonation flame arrester with integrated temperature sensor* against short time burning and heating jacket	**DR/ES- [H] - [T]**

*Resistance thermometer for device group II, category (1) 2 (GII cat. (1) 2)

Table 1: Dimensions Dimensions in mm / inches

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

NG	80 / 3"	100 / 4"	150 / 6"
DN	50 / 2“	80 / 3“	100 / 4“
a	200/7.87	250/9.84	335/13.19
b	225/8.86	290/11.42	360/14.07
c	365/14.37	440/17.32	535/21.06
c1	500/19.69	595/23.43	750/29.53
d	275/10.83	325/12.80	460/18.11
e	705/27.76	795/31.30	950/37.40

Table 2: Selection of the 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: Selection of max. operating pressure

	NG		80 / 3"	100 / 4"	150 / 6"
	DN		50 / 2”	80 / 3”	100 / 4”
Expl. Gr.	IIA	P_{max}	1.6 / 23.2	1.6 / 23.2	1.6 / 23.2
	IIB3	P_{max}	1.6 / 23.2	1.5 / 21.7	1.4 / 20.3

P_{max} = maximum allowable operating pressure in bar / psi (absolute), higher operating pressure upon request.

Table 4: Specification of max. operating temperature

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

Table 5: Material selection for housing

Design	A	B	
Housing Heating jacket (DR/ES-H-(T)-...)	Steel Steel	Stainless Steel Stainless Steel	The housing and the cover with shock absorber can also be delivered in steel with an ECTFE coating.
Cover with shock absorber	Steel	Stainless Steel	
O-Ring	PTFE	PTFE	
Flame arrester unit	A	B, C, D	

Special materials upon request.

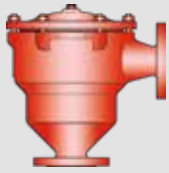
Table 6: Material combinations of the flame arrester unit

Design	A	B	C	D	
FLAMEFILTER® cage	Steel	Stainless Steel	Stainless Steel	Hastelloy	*The FLAMEFILTER® is also available in Tantalum, Inconel, Copper, etc., when the listed housing and casing materials are used.
FLAMEFILTER® *	Stainless Steel	Stainless Steel	Hastelloy	Hastelloy	
Spacer	Stainless Steel	Stainless Steel	Hastelloy	Hastelloy	

Special materials upon request

Table 7: Flange connection type

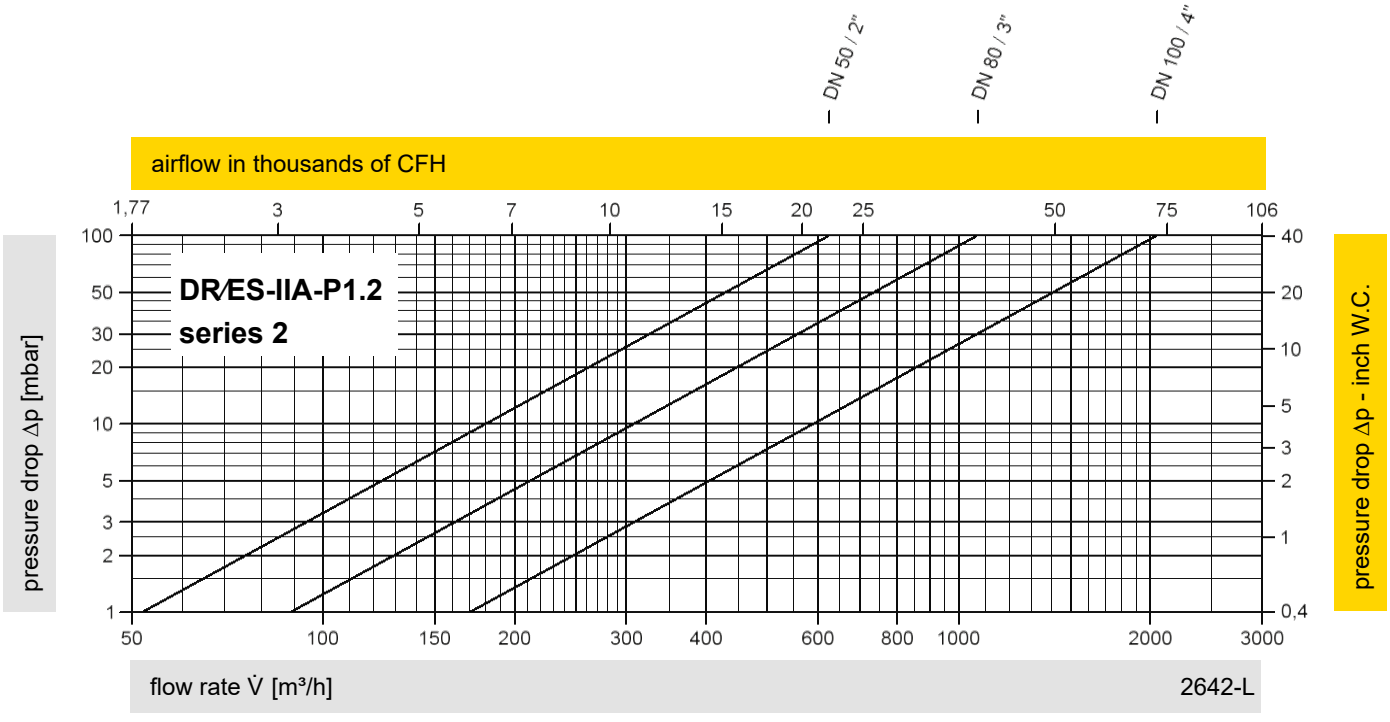
EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	

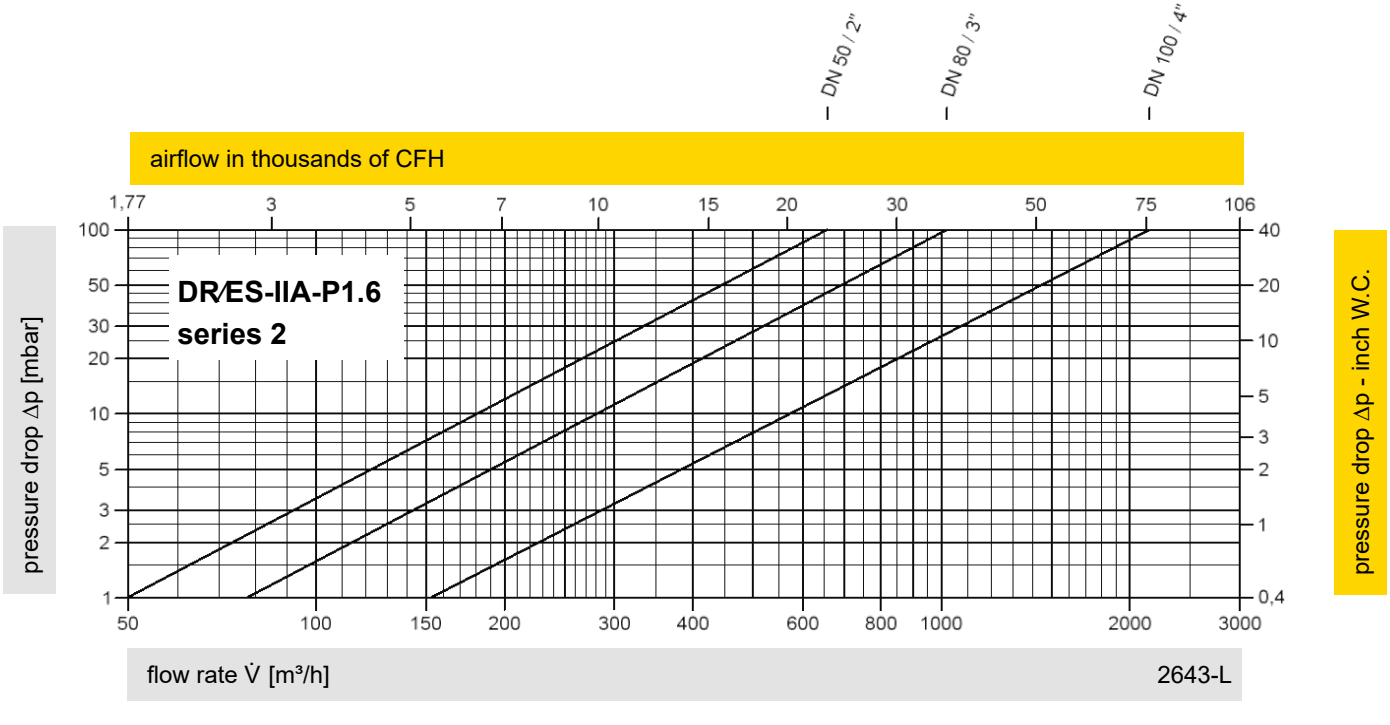


In-Line Detonation Flame Arrester

Flow Capacity Charts

PROTEGO® DR/ES (series 2)

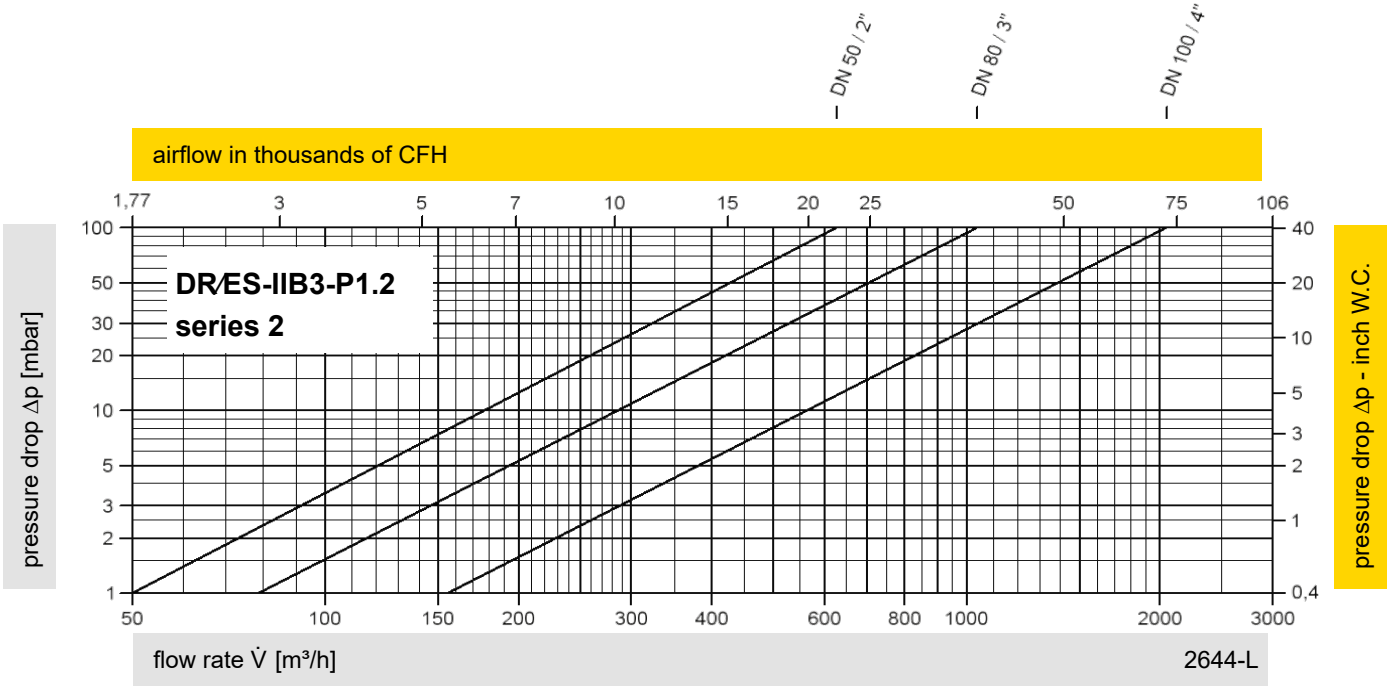




The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig.

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.”

PROTEGO® DR/ES (series 2)



P* see table 3