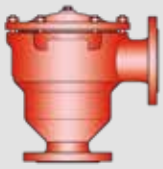
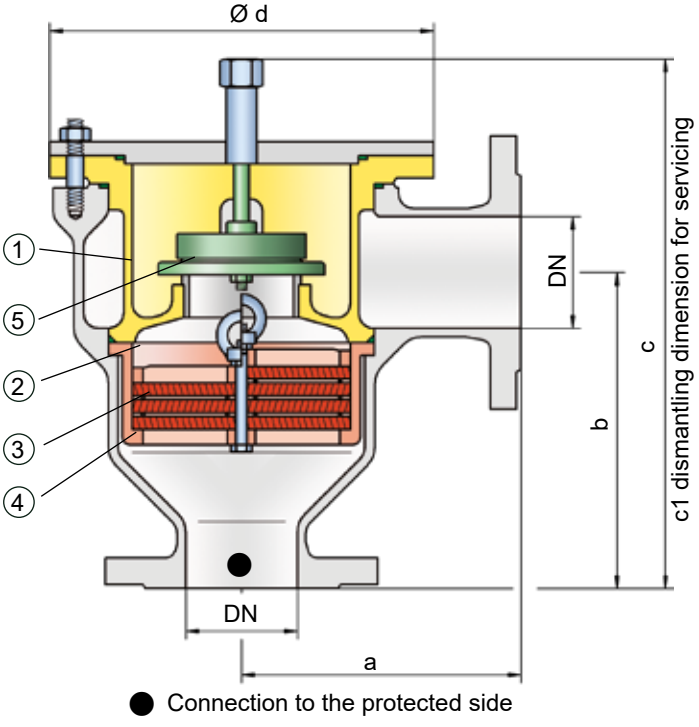


In-Line Detonation Flame Arrester

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

PROTEGO® DR/ES-V



Set pressure: from +2.0 mbar up to +35 mbar
from +0.8 inch W.C. up to +14 inch W.C.

Higher or lower settings upon request.

Function and Description

PROTEGO® DR/ES-V series uniquely combines the function of an in-line detonation flame arrester with the function of a pressure relief valve in one device. The device protects against deflagration and stable detonation. The weight-loaded pallet type valve (5) integrated in the shock absorber (1) of the in-line detonation flame arrester is designed as a pressure relief valve. The set pressure of the valve is adjusted in the factory and can range from 2 to 35 mbar (0.8 to 14 inch W.C.). After the pressure increases 40% from its set pressure, the valve completely opens to yield the maximum volumetric flow. If installed in vent headers connected to storage tanks, the valve pallet works as a check valve. This means that the product cannot flow back from the suction line into the tank. Although several functions are integrated in a single housing, the device is extremely easy to service, which is primarily due to the right-angle design.

Once a detonation enters the flame arrester, energy is absorbed from the detonation shock wave by the integrated shock absorber, before the flame is extinguished in the narrow gaps of the FLAMEFILTER® (3). The flame suppression is guaranteed, regardless of the valve pallet position.

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

The standard design is approved for an operating temperature of up to +60°C / 140°F and absolute operating pressure up to 1.2 bar / 17.4 psi. **Devices with special approval for higher pressures and 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

- integration of in-line detonation flame arrester and pressure relief valve in one device
- excellent tightness of the valve
- can be used as a detonation-proof valve in suction lines of storage tanks
- optimal use as an overflow valve in venting and gas supply lines
- low number of FLAMEFILTER® discs due to shock absorber technology
- quick removal and installation of the complete PROTEGO® flame arrester unit and the individual FLAMEFILTER® in the casing
- provides protection against deflagration and stable detonation
- advanced design for higher operating temperatures and pressures
- cost-effective spare parts

Design Types and Specifications

There are two different designs available:

Basic version of the detonation arrester with check valve **DR/ES- V - –**

Detonation arrester with check valve and **DR/ES- V - H**

Table 1: Dimensions Dimensions in mm / inches

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

DN	25 / 1 / 32 / 1 ¼"	40 / 1 ½"	50 / 2"	65 / 2 ½"	80 / 3"	100 / 4"	125 / 5"	150 / 6"	200 / 8"
a	125 / 4.92	153 / 6.02	155 / 6.10	198 / 7.80	200 / 7.87	250 / 9.84	332 / 13.07	335 / 13.19	425 / 16.73
b	140 / 5.51	183 / 7.20	185 / 7.28	223 / 8.78	225 / 8.86	290 / 11.42	357 / 14.06	360 / 14.17	505 / 19.88
c	237 / 9.33	305 / 12.01	305 / 12.01	395 / 15.55	395 / 15.55	460 / 18.11	575 / 22.64	575 / 22.64	863 / 33.98
c1	345 / 13.58	410 / 16.14	410 / 16.14	530 / 20.87	530 / 20.87	615 / 24.21	790 / 31.10	790 / 31.10	1295 / 50.98
d	149 / 5.87	210 / 8.27	210 / 8.27	275 / 10.83	275 / 10.83	325 / 12.80	460 / 18.11	460 / 18.11	620 / 24.41

Stabilized FLAMEFILTER® Discs (Flyer pdf)

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

Expl. Gr.	DN	25 / 1	32 / 1 ¼"	40 / 1 ½"	50 / 2"	65 / 2 ½"	80 / 3"	100 / 4"	125 / 5"	150 / 6"	200 / 8“
IIA	P_{max}	4.0/58.0	4.0/58.0	4.0/58.0	4.0/58.0	2.9/42.1	2.9/42.1	2.0/29.0	2.0/29.0	2.0/29.0	1.2/17.4
IIB3	P_{max}	3.0/43.5	3.0/43.5	2.0/29.0	2.0/29.0	2.0/29.0	2.0/29.0	1.5/21.7	1.4/20.3	1.4/20.3	1.1/15.9

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	B	C	D	
Design Heating jacket (DR/ES-V-H-...)	Steel Steel	Stainless Steel Stainless Steel	Hastelloy 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	Hastelloy	
Gaskets	PTFE	PTFE	PTFE	
Valve seat	Stainless Steel	Stainless Steel	Stainless Steel	
Flame arrester unit	A	C, D	E	

Special materials upon request.

Table 6: Material combinations of the flame arrester unit

Design	A	C	D	E	
FLAMEFILTER® casing	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	

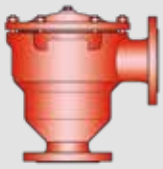
Special materials upon request.

Table 7: Material selection for valve pallet

Design	A	B	C
Pressure range	I	II	III
Set pressure (mbar) [inch W.C.]	+2.0 up to +3.5 +0.8 up to +1.4	>+3.5 up to +14 >+1.4 up to +5.6	>+14 up to 35 >+5.6 up to 14
Valve pallet	Aluminum	Stainless Steel	Stainless Steel
Sealing	FEP	FEP	Metal to Metal

Table 8: Flange connection type

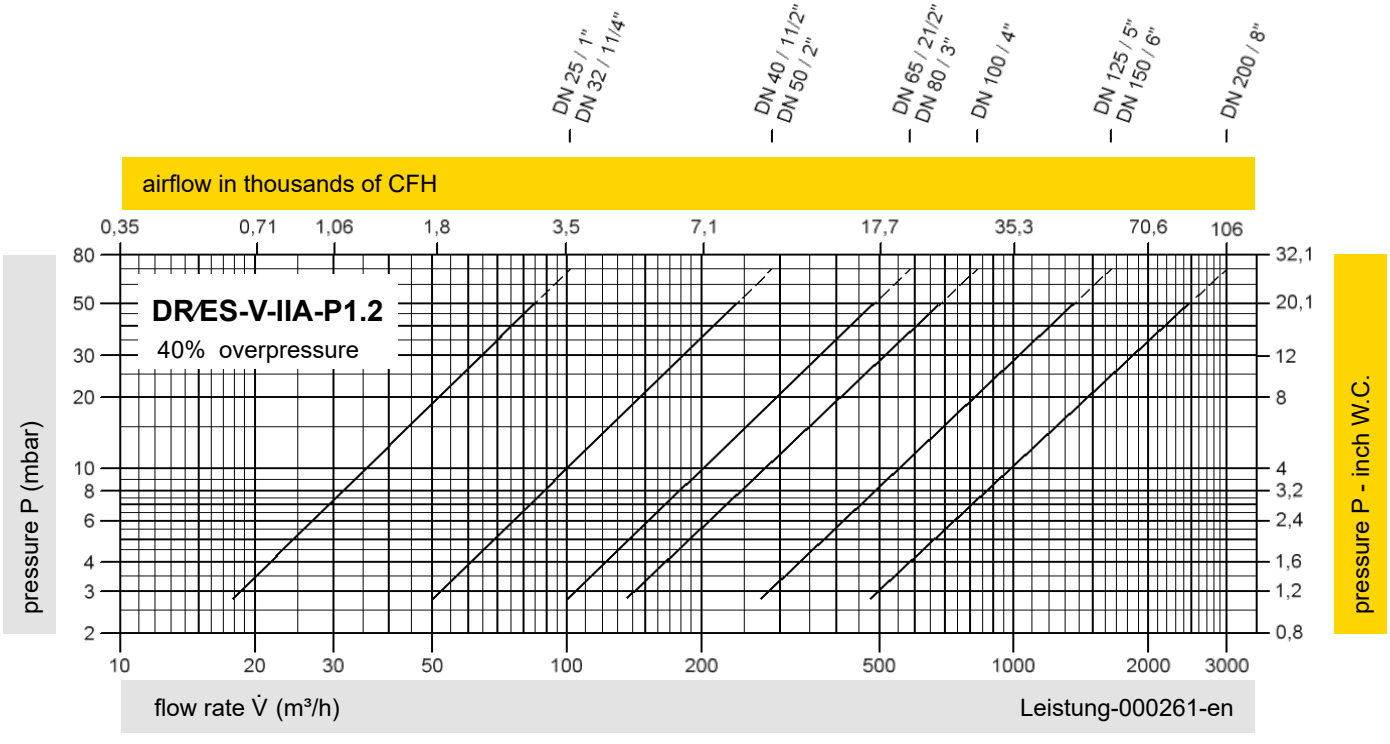
EN 1092-1; Form B1	Other types upon request.
ASME B16.5 CL 150 R.F.	

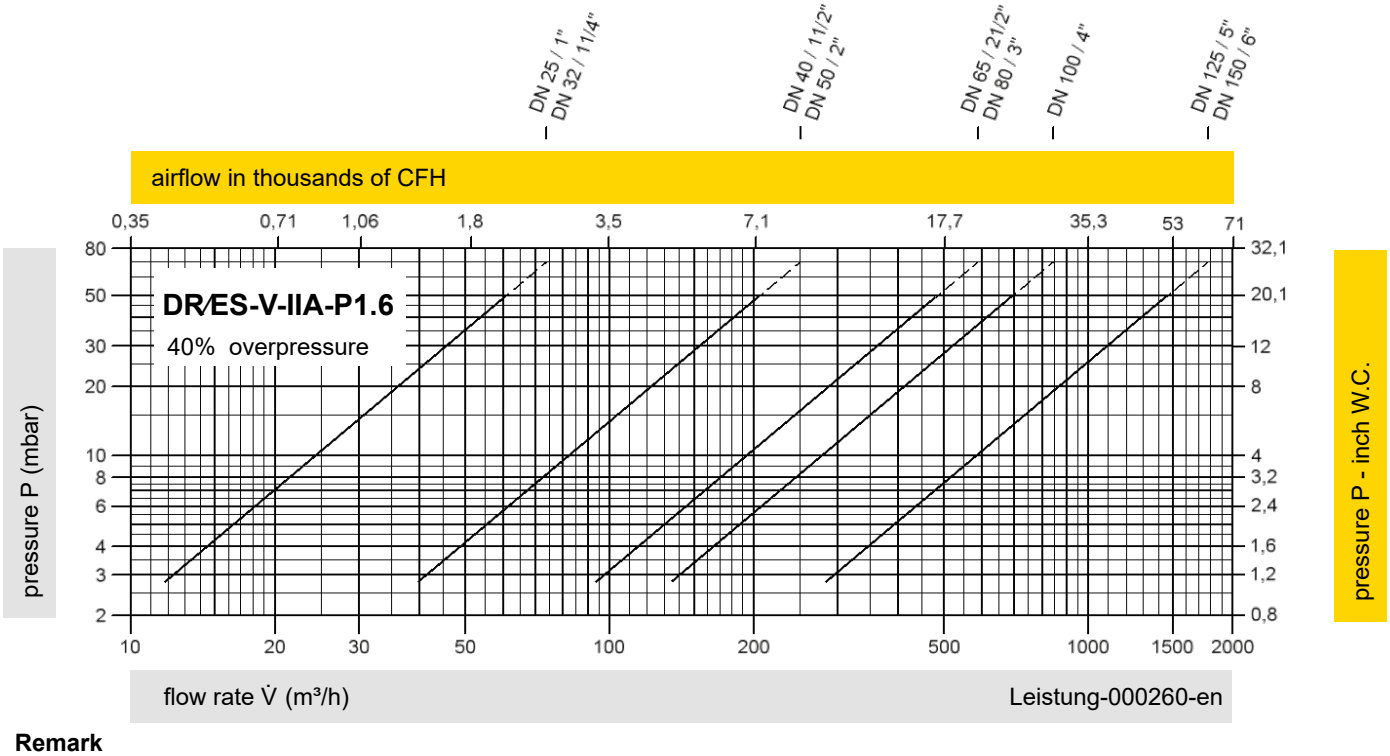


In-Line Detonation Flame Arrester

Flow Capacity Charts

PROTEGO® DR/ES-V





Remark

$$\text{set pressure} = \frac{\text{opening pressure resp. tank design pressure}}{1{,}4}$$

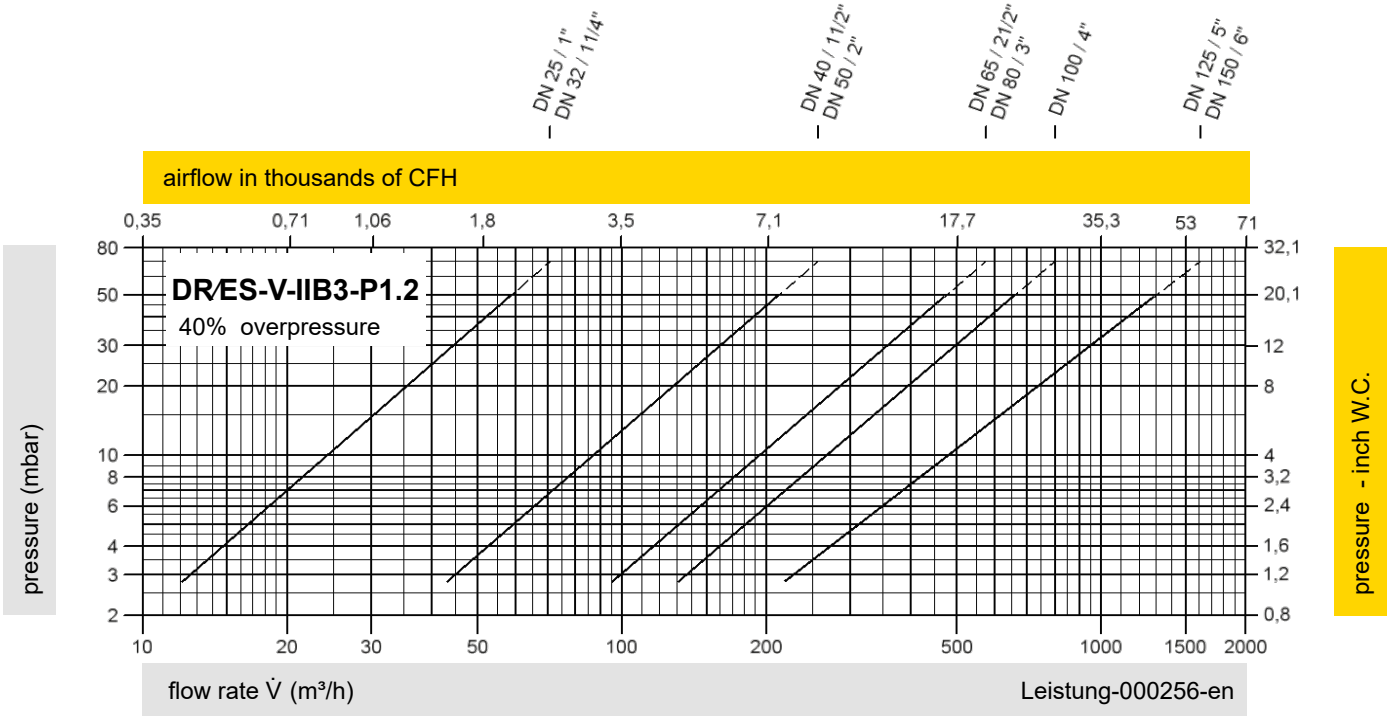
Set pressure = the valve starts to open

Opening pressure = set pressure plus overpressure

Overpressure = pressure increase over the set pressure

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.”



* DN 25 - DN 80; P1.6
DN 100; P1.5
DN 125, DN 150; P1.4
DN 200; P1.1