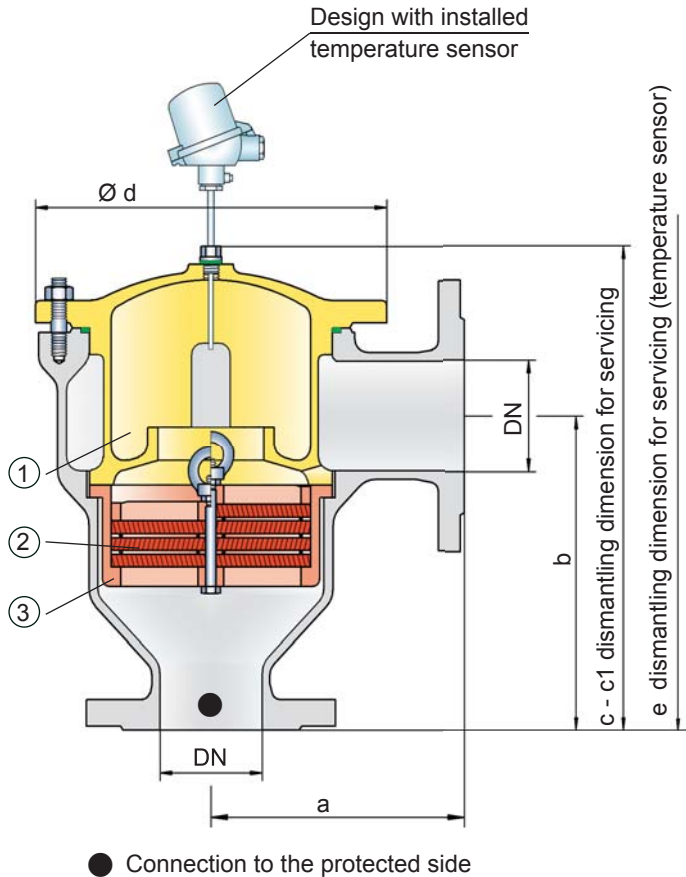


## In-Line Detonation Flame Arrester

for stable detonations and deflagrations in right angle design with shock absorber, unidirectional

**PROTEGO® DR/ES**



### Function and Description

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

Once a detonation enters the device, energy is absorbed from the detonation shock wave by the patented shock absorber (1) before the flame is extinguished in the narrow gaps of the original PROTEGO flamefilter (2).

The flamefilter consists of several flamefilter discs firmly held in the filter cage (3). 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 all explosion groups from IIA to IIB3 (NFPA group D and C  $\geq 0.65$  mm MESG).

The standard design can be used up to an operating temperature of + 60°C / 140°F and an absolute operating pressure up to 1.1 (1.2) bar / 15.9 psi (standard atmospheric conditions according to EN-1127). Numerous special permits can be obtained for higher temperatures and/or higher pressures.

Type-approved according to ATEX Directive 94/9/EC and EN 12874 as well as other international standards.

### Special Features and Advantages

- Minimum number of filters from using the patented shock absorber (1)
- Quick removal of and installation of flame filter package (2) and flame filter discs in the cage (3)
- The flamefilter discs can be individually replaced
- Cost efficient spare parts
- The right angle design saves pipe elbows
- Minimum pressure loss and hence low operating and life-cycle costs
- Extended application range for higher operating temperatures and pressures

### Design Types and Specifications

There are four different designs

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), 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	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	140/5.51	183/7.20	185/7.28	223/8.78	225/8.86	290/11.42	357/14.06	360/14.07	505/19.88
c	205/8.07	205/8.07	285/11.22	285/11.22	350/13.78	350/13.78	440/17.32	535/21.06	535/21.06	800/31.50
c1	280/11.02	280/11.02	390/15.35	390/15.35	500/19.69	500/19.69	620/24.41	760/29.92	760/29.92	1230/48.43
d	150/5.91	150/5.91	210/8.27	210/8.27	275/10.83	275/10.83	325/12.80	460/18.11	460/18.11	620/24.41
e	520/20.47	520/20.47	600/23.62	600/23.62	690/27.17	690/27.17	780/30.71	940/37.01	940/37.01	1440/56.69

**Table 2: Selection of the explosion group**

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

**Table 3: Selection of max. operating pressure (bar / psi)**

		DN 25 / 1"	32 / 1 ¼"	40 / 1 ½"	50 / 2"	65 / 2 ½"	80 / 3"	100 / 4"	125 / 5"	150 / 6"	200 / 8"
Expl. Gr.	IIA	P	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4
		P	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2
	IIB3	P	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4	1.2/17.4
		P	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2	1.6/23.2	1.5/21.7	1.4/20.3	1.4/20.3

P = maximum allowable operating pressure in bar / psi (absolute), higher operating pressure upon request

**Table 4: Selection of max. operating temperature (°C / °F)**

≤ 60 / 140	≤ 100 / 212	≤ 150 / 302	≤ 180 / 356	≤ 200 / 392	≤ 250 / 482	*upon request
(Standard)	X0 *	X1 *	X2 *	X3 *	X4 *	

**Table 5: Material selection for housing**

Design	A	B	C	D
Housing	Ductile Iron	Carbon Steel	Stainless Steel	Hastelloy
Heating jacket (DR/ES-H-(T)-...)		Carbon Steel	Stainless Steel	Stainless Steel
Cover with shock absorber	Ductile Iron	Carbon Steel	Stainless Steel	Hastelloy
O-Ring	FPM *	FPM *	PTFE	PTFE
Flame arrester	A	B	C, D	E

\*\* for devices exposed to elevated temperatures above 150°C / 302°F (X2), gaskets made of PTFE. The housing and cover with the shock absorber can also be delivered in steel with an ECTFE coating. Special materials upon request.

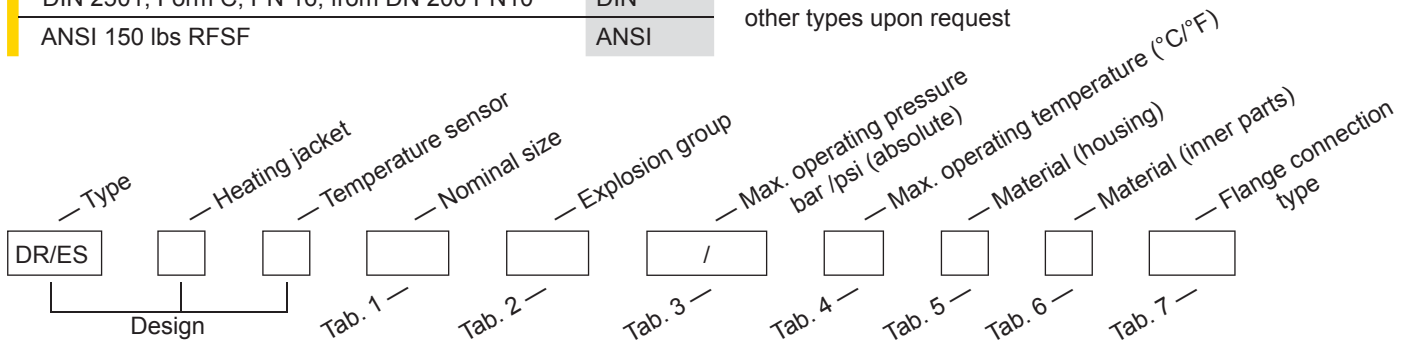
**Table 6: Material combinations of the flame arrester**

Design	A	B	C	D	E
Flamefilter cage	Carbon Steel	Carbon Steel	Stainless Steel	Stainless Steel	Hastelloy
Flamefilter *	Stainless Steel	Stainless Steel	Stainless Steel	Hastelloy	Hastelloy
Spacer	Stainless Steel	Stainless Steel	Stainless Steel	Hastelloy	Hastelloy

\* the flamefilters are also available in the materials Tantalum, Inconel, Copper, etc. when the listed housing and cage materials are used. Special materials upon request.

**Table 7: Flange connection type**

DIN 2501, Form C, PN 16; from DN 200 PN10	DIN	other types upon request
ANSI 150 lbs RFSF	ANSI	

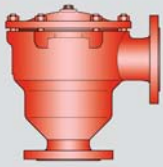


**Order example**

DR/ES - H - T - 150 - IIB3 - P1.4/ - (std) - A - A - DIN

Materials and chemical resistance: Technical Information upon request

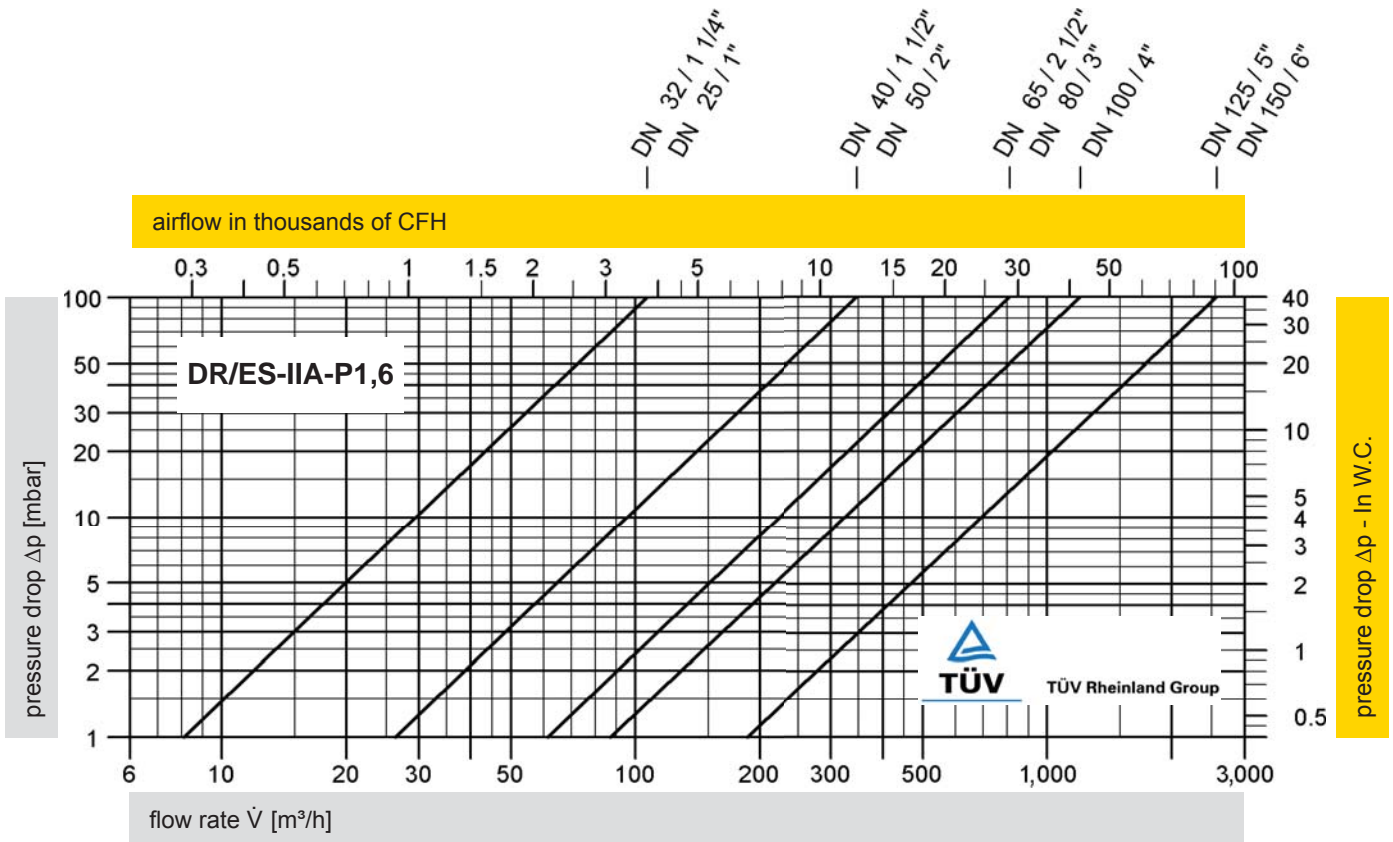
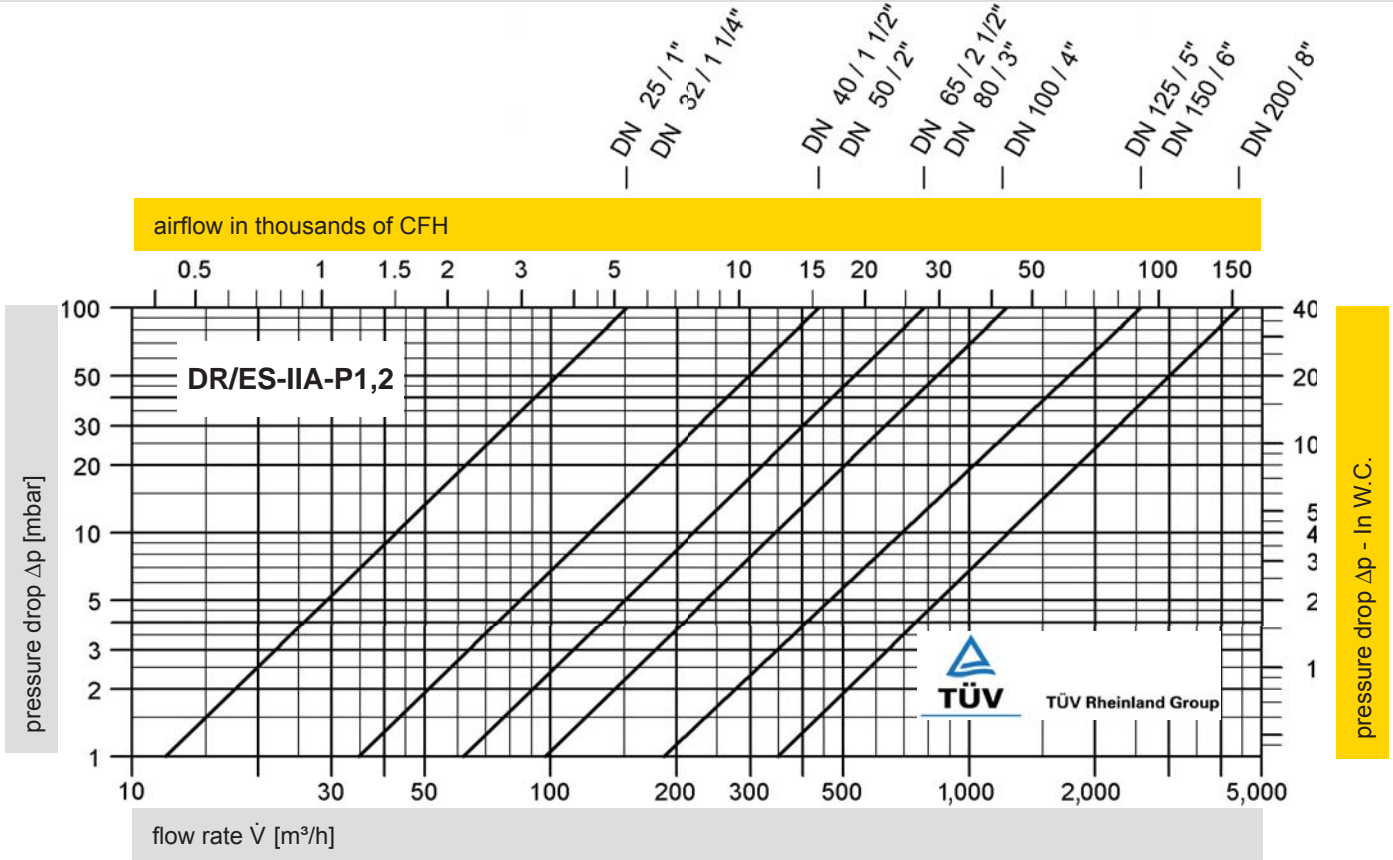




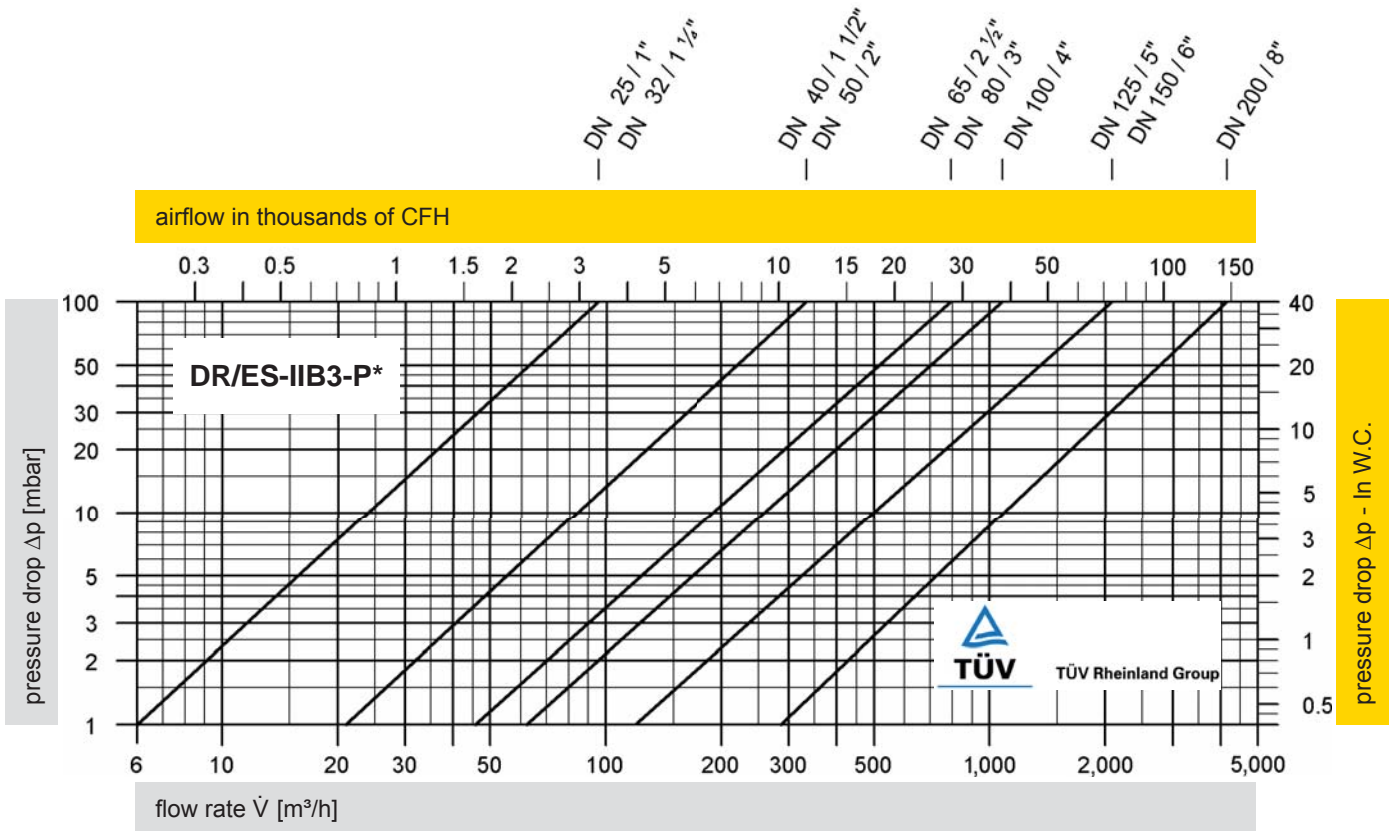
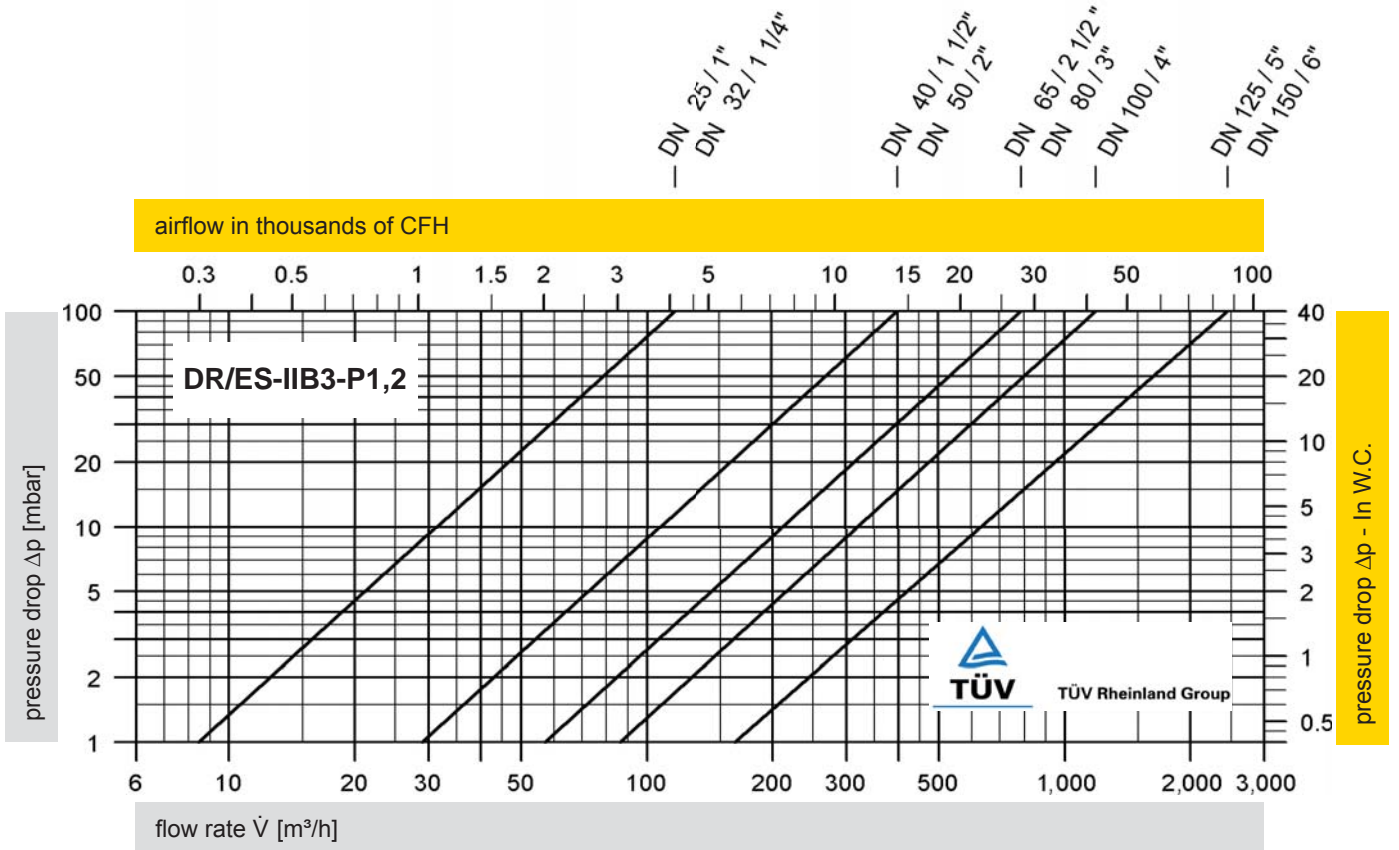
# In-Line Detonation Flame Arrester

## Flow Capacity Chart

### PROTEGO® DR/ES

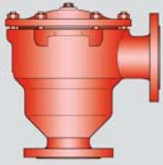


The flow capacity charts have been determined with a calibrated and TÜV certified flow capacity test rig. Volume flow  $\dot{V}$  in [m³/h] and SCFH refer to the Technical Standard ISO 6358 (20°C, 1bar). Conversion to other densities and temperatures refer to Technical Fundamentals.



P\* see table 3

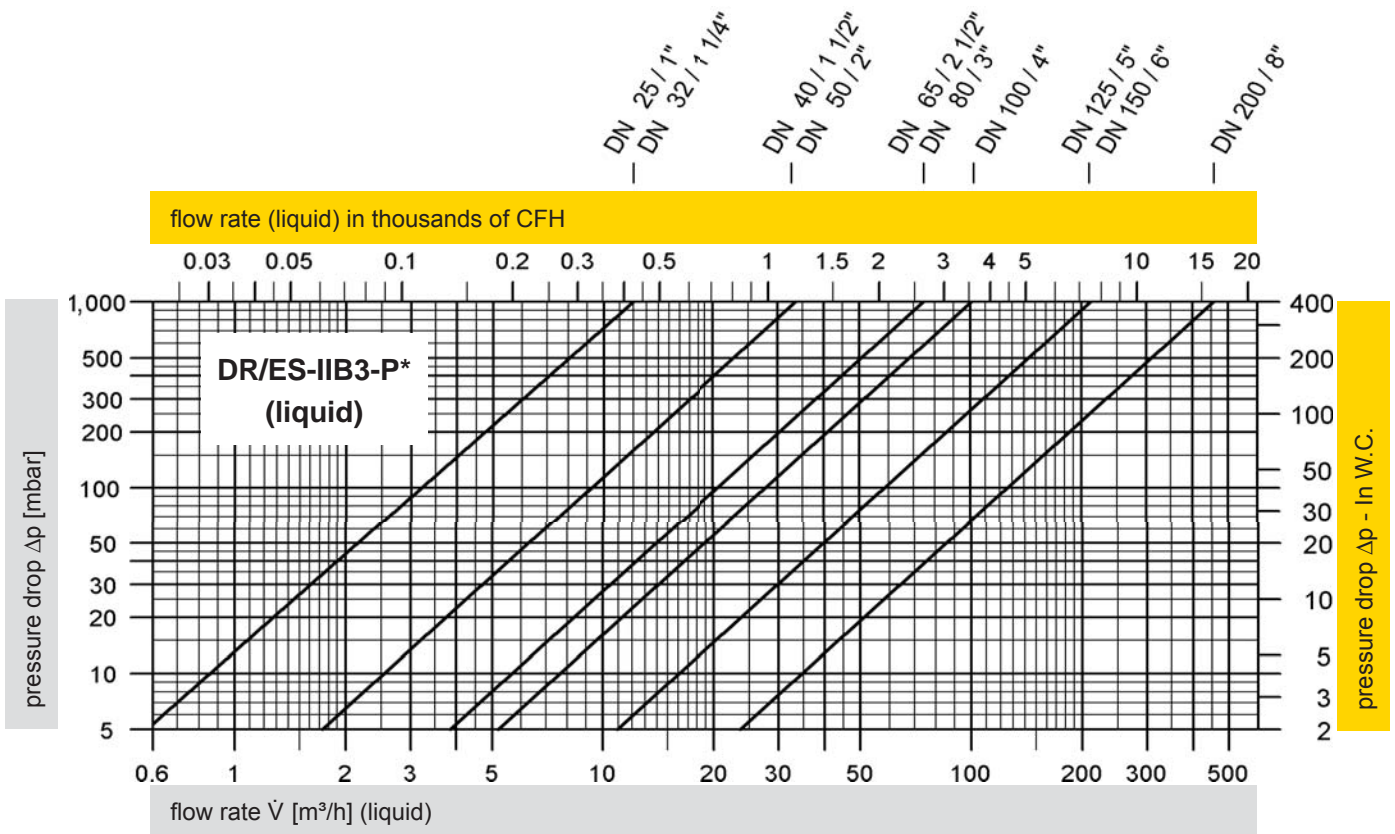
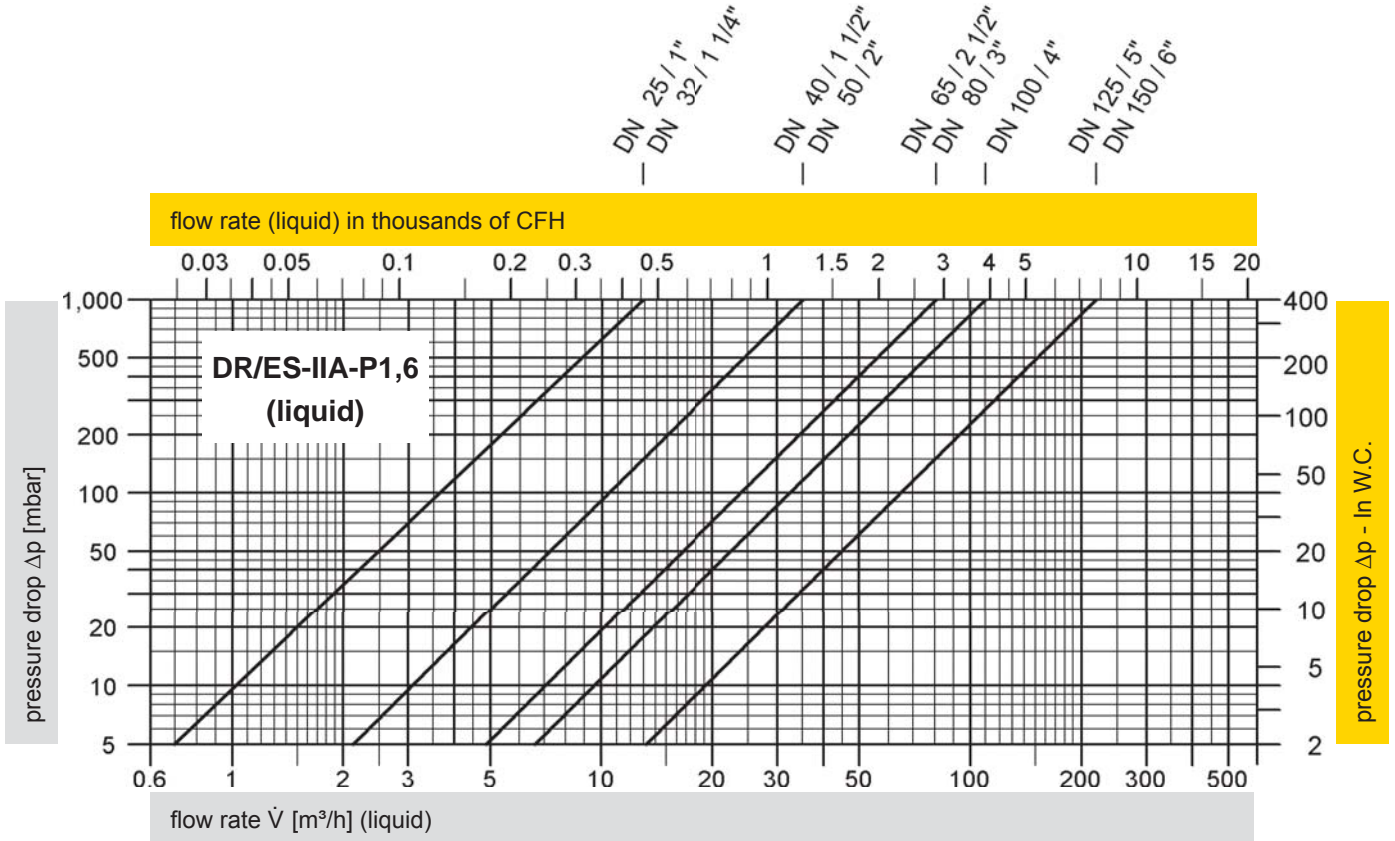




# In-Line Detonation Flame Arrester

## Flow Capacity Chart (liquid)

### PROTEGO® DR/ES



**P\*** see table 3

The volume flow  $\dot{V}$  in m<sup>3</sup>/h was determined with water according to DIN EN 60534 at a temperature  $T_n = 15^\circ\text{C}$  and an atmospheric pressure  $p_n = 1,013$  bar, kinetic viscosity  $\nu = 10^{-6}$  m<sup>2</sup>/s