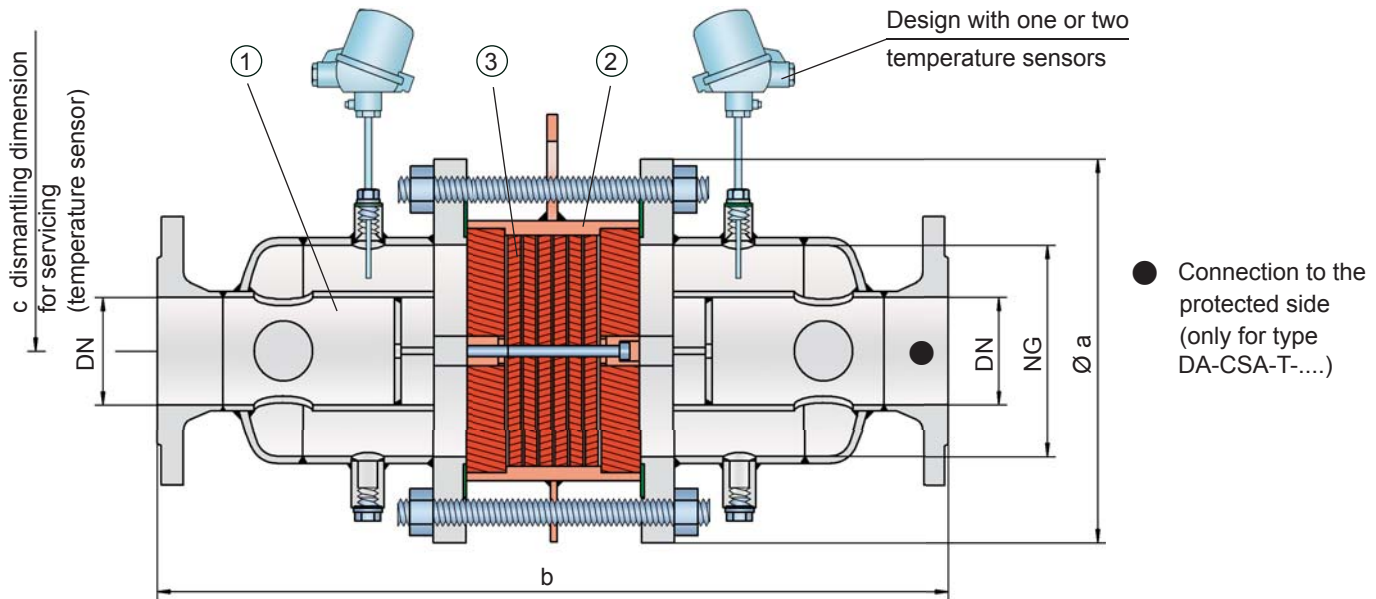


## In-Line Detonation Flame Arrester

for unstable and stable detonations as well as deflagrations in a straight through design with shock absorber, bidirectional

### PROTEGO® DA-CSA



#### Function and Description

The PROTEGO® DA-CSA series of in-line detonation flame arresters was developed especially for the North American market and optimized to meet the demands of the US Coast Guard and **Canadian Standards Association (CSA)**. The devices are symmetrical and offer bidirectional flame arresting for deflagrations, stable and unstable detonations.

The speed of incoming detonations is greatly reduced by the effective shock absorber (1). This improves the flame extinction in the narrow gaps of the original FLAMEFILTER® (3).

The flame arrester essentially consists of two housing parts with an integrated shock absorber and the PROTEGO® flame arrester unit (2) in the center. The PROTEGO® flame arrester unit is modular and consists of several FLAMEFILTER® and spacers firmly held in a FLAMEFILTER® cage. The number of FLAMEFILTER® and their gap size depends on the arrester's conditions of use. By indicating the operating parameters such as the temperature, pressure and explosion group and the composition of the fluid, the optimum in-line detonation flame arrester can be selected from a series of approved devices. The PROTEGO® DA-CSA series of flame arresters is available for explosion groups IIA to IIB3 (NEC group D to C MESH  $\geq 0.65$  mm).

The standard design 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.

The flame arresters have been tested together with FM Approvals according American Standard 33 CFR part 154 and the conditions of the CSA.

#### Special Features and Advantages

- Offers protection against deflagrations, stable and unstable detonations
- Less number of FLAMEFILTER® from the use of the effective shock tube
- The modular design enables individual FLAMEFILTER® to be replaced
- Minimum pressure loss and associated low operating and life-cycle costs
- Cost efficient spare parts
- Service-friendly design
- Also available for large nominal sizes
- Bidirectional operation as well as any direction of flow and installation position
- Possible installation of temperature sensors

#### Design Types and Specifications

There are three different designs available:

Basic in-line detonation flame arrester **DA-CSA - [ - ]**

In-line detonation flame arrester with integrated temperature sensor\* as additional protection against short time burning from one side **DA-CSA - [ T ]**

Detonation arrester with two integrated temperature sensors\* as additional protection against short time burning from both sides **DA-CSA - [ TB ]**

Additional special fittings upon request

\*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) and nominal width (NG), please use the flow capacity charts on the following pages

for explosion group IIA (D)

DN	50/2"	80/3"	100/4"	150/6"	200/8"	250/10"	300/12"	400/16"
NG	150/6"	150/6"	200/8"	300/12"	400/16"	500/20"	600/24"	800/32"
a	285 / 11.22	285 / 11.22	340 / 13.39	460 / 18.11	580 / 22.84	715 / 28.15	840 / 33.07	1025 / 40.35
b	700 / 27.56	700 / 27.56	840 / 33.07	1090 / 42.91	1318 / 51.89	1500 / 59.06	1970 / 77.56	2232 / 87.87
c	370 / 14.57	370 / 14.57	390 / 15.35	450 / 17.72	540 / 21.26	590 / 23.23	640 / 25.20	740 / 29.14

for explosion group IIB3 (C)

DN	50/2"	80/3"	100/4"	150/6"	200/8"	250/10"	300/12"	400/16"
NG	150/6"	150/6"	200/8"	300/12"	400/16"	500/20"	600/24"	800/32"
a	285 / 11.22	285 / 11.22	340 / 13.39	460 / 18.11	580 / 22.84	715 / 28.15	840 / 33.07	1025 / 40.35
b	700 / 27.56	700 / 27.56	850 / 33.47	1100 / 43.31	1318 / 51.89	1537 / 60.51	2007 / 79.02	2307 / 90.83
c	370 / 14.57	370 / 14.57	390 / 15.35	450 / 17.72	540 / 21.26	590 / 23.23	640 / 25.20	740 / 29.14

**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**

Expl. Gr.	DN	50/2"	80/3"	100/4"	150/6"	200/8"	250/10"	300/12"	400/16"
	NG	150/6"	150/6"	200/8"	300/12"	400/16"	500/20"	600/24"	800/32"
	IIA	P <sub>max</sub>	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
	IIB3	P <sub>max</sub>	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<sub>max</sub> = maximum allowable operating pressure in bar / psi (absolute), higher operating pressure upon request**Table 4: Specification of max. operating temperature**

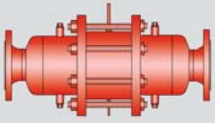
≤ 60°C / 140°F	higher operating temperatures upon request
T60	T <sub>max.</sub> operating temperature

**Table 5: Material selection for housing**

Design	A	B	* for devices exposed to elevated temperatures above 150°C / 302°F (T150), gaskets made of PTFE. Special materials upon request
Housing	Steel	Stainless Steel	
Gasket	WS 3822 *	PTFE	
Flame arrester unit	A	B	



for safety and environment



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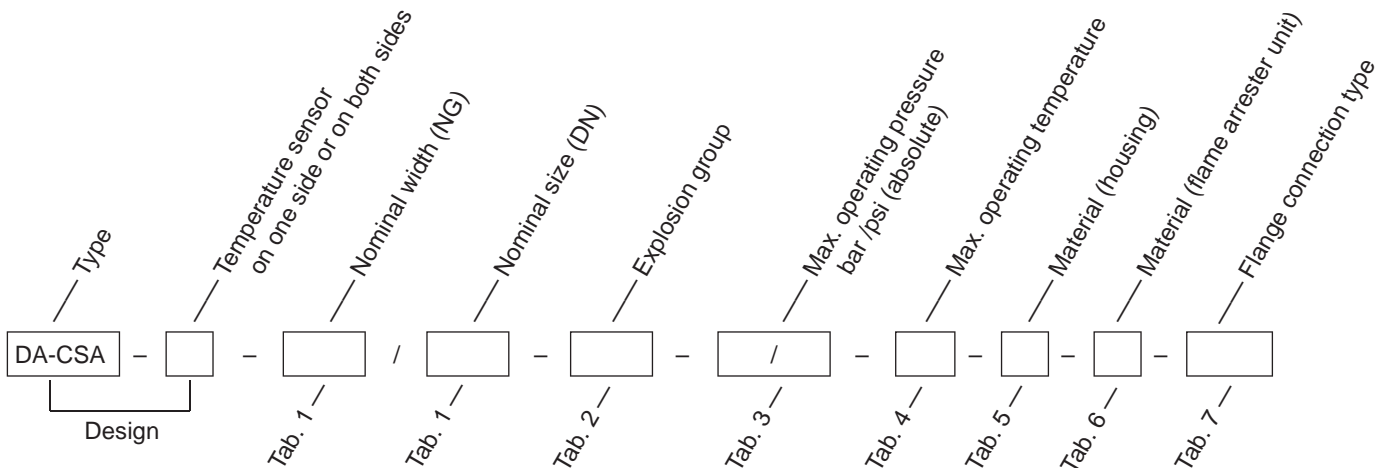
### PROTEGO® DA-CSA

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

Design	A	B	*the FLAMEFILTER® are also available in the materials Tantalum, Inconel, Copper, etc. when the listed housing and cage materials are used. Special materials upon request
FLAMEFILTER® cage	Steel	Stainless Steel	
FLAMEFILTER® *	Stainless Steel	Stainless Steel	
Spacer	Stainless Steel	Stainless Steel	

**Table 7: Flange connection type**

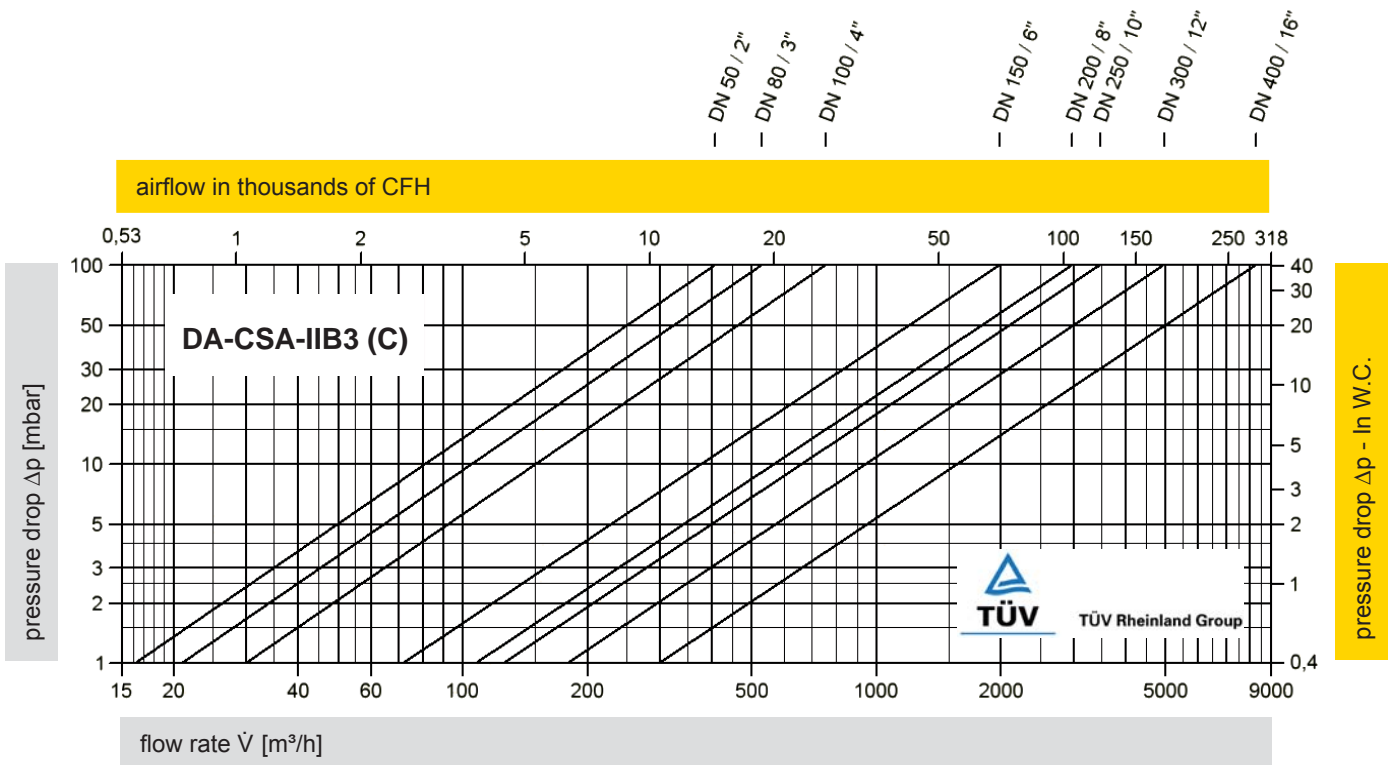
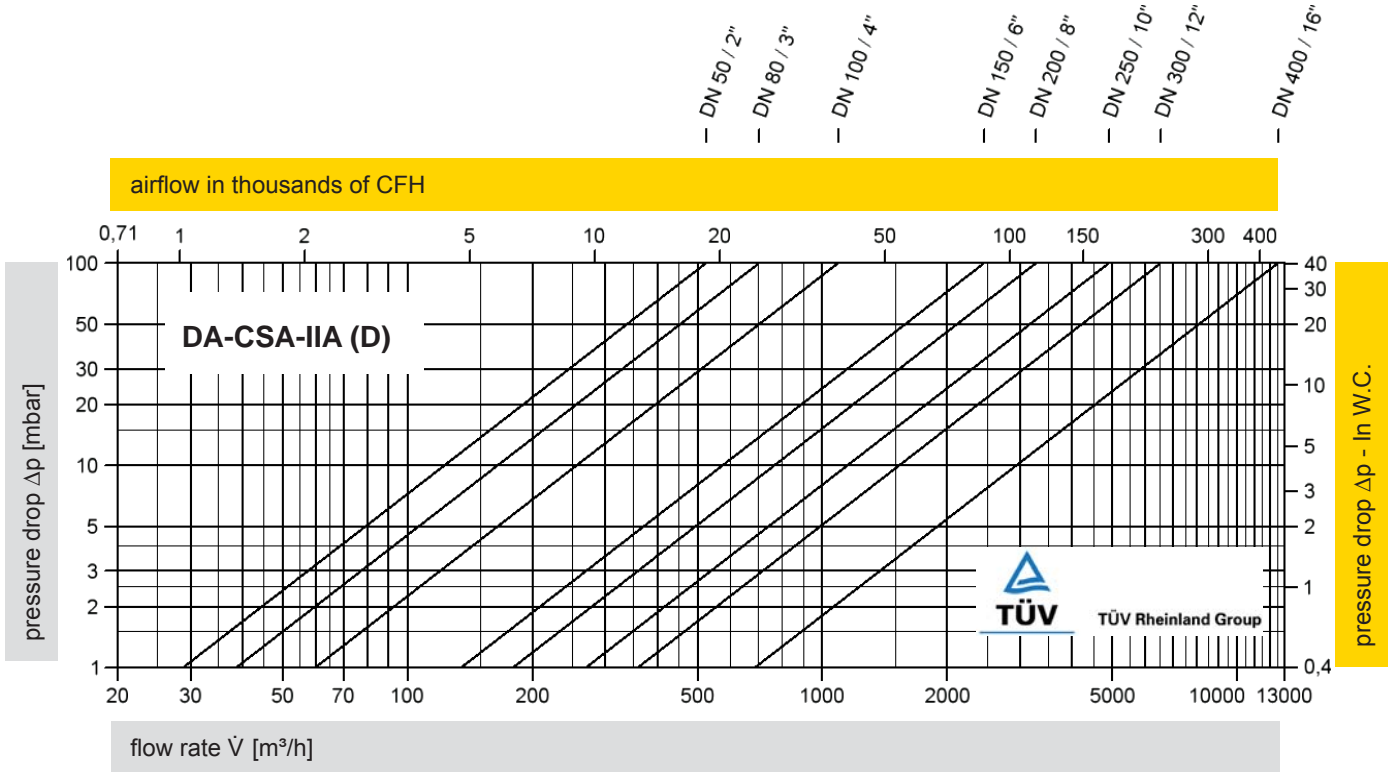
EN 1092-1, Form B1 or DIN 2501, Form C, PN 16; from DN 200 PN 10	EN or DIN	other types upon request
ANSI 150 lbs RFSF	ANSI	



### Order example

DA-CSA - TB - 1200 / 600 - IIB3 - P1.2 / - - T60 - B - B - DIN

Materials and chemical resistance: See Vol. 1 "Technical Fundamentals"



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 CFH refer to the standard reference conditions of air ISO 6358 (20°C, 1bar). Conversion to other densities and temperatures refer to Vol. 1: "Technical Fundamentals".

