



ISO Registered Company

# Model 6A00

## Inline Deflagration Flame Arrestor

### SECTION I

#### I. DESCRIPTION AND APPLICATION

As autonomous safety systems for intended use in hazardous areas, the listed types comply with the requirements of the European Regulations 94/9/EC (ATEX95) and the harmonized standard for flame arrestors EN ISO 16852.

This document applies to the following Types according to the Charts 1-3. The limit values of the maximum operating pressure  $P_0$ , the maximum operating temperature  $T_0$  and the maximum distance to the ignition source  $L_U$  must be kept!

Ex- Gr.	Pipe size	Type	$P_0$ [kPa(abs.)]	$T_0$ [°C]	$L_U$ [m]	EC-type examination certificate
IIA1	DN20 (3/4")	6A0B1	110	60	1.00	IBExU13ATEX2122 X
	DN25 (1")	6A0C1	110	60	1.25	
	DN32 (1-1/4")	6A0K1	110	60	1.60	
	DN40 (1-1/2")	6A0U1	110	60	2.00	
	DN50 (2")	6A0V1	110	60	2.50	
	DN65 (2-1/2")	6A131	110	60	3.25	
	DN80 (3")	6A1B1	110	60	4.00	
	DN100 (4")	6A1K1	110	60	5.00	
	DN125 (5")	6A1T1	110	60	6.25	
DN150 (6")	6A1U1	110	60	7.50		

Chart 1: Types of explosion group IIA1 (MESG > 1.14 mm) protect against deflagration and endurance burning.

Ex- Gr.	Pipe size	Type	$P_0$ [kPa(abs.)]	$T_0$ [°C]	$L_U$ [m]	EC-type examination certificate
IIA1	DN20 (3/4")	6A0B6	160	60	1.00	IBExU13ATEX2148 X
	DN25 (1")	6A0C6	160	60	1.25	
	DN32 (1-1/4")	6A0K6	160	60	1.60	
	DN40 (1-1/2")	6A0U6	160	60	2.00	
	DN50 (2")	6A0V6	160	60	2.50	
	DN65 (2-1/2")	6A136	160	60	3.25	
	DN80 (3")	6A1B6	160	60	4.00	
	DN100 (4")	6A1K6	160	60	5.00	
	DN125 (5")	6A1T6	160	60	6.25	
	DN150 (6")	6A1U6	160	60	7.50	
	DN200 (8")	6A226	160	60	10.0	
	DN250 (10")	6A2A6	160	60	12.5	
DN300 (12")	6A2H6	160	60	15.0		

Chart 2: Types of explosion group IIA1 (MESG > 1.14 mm) protect against deflagration and short time burning, maximum time of stabilized burning = 1 minute.

Ex- Gr.	Pipe size	Type	P <sub>0</sub> [kPa(abs.)]	T <sub>0</sub> [°C]	L <sub>U</sub> [m]	EC-type examination certificate
IIA1	DN20 (3/4")	6A3Y6	160	60	1.00	IBExU13ATEX2123 X
	DN25 (1")	6A3Z6	160	60	1.25	
	DN32 (1-1/4")	6A462	120	60	1.60	
	DN40 (1-1/2")	6A4E2	120	60	2.00	
	DN50 (2")	6A4F2	120	60	2.50	
	DN65 (2-1/2")	6A4P2	120	60	3.25	
	DN80 (3")	6A4Y2	120	60	4.00	
	DN100 (4")	6A562	120	60	5.00	
	DN125 (5")	6A5D2	120	60	6.25	
	DN150 (6")	6A5E2	120	60	7.50	
	DN200 (8")	6A5N2	120	60	10.0	
	DN250 (10")	6A5X2	120	60	12.5	
	DN300 (12")	6A642	120	60	15.0	

Chart 3: Types of explosion group IIA1 (MESG > 0.9 mm) protect against deflagration and short time burning, maximum time of stabilized burning is 1 minute.

The suitability for the application in gas/air mixtures and in vapor/air mixtures of inflammable liquids of the explosion group IIA1 and IIA, has been confirmed by the successful testing at IBExU in Freiberg (stated location No. 0637) according to article 9 of the Regulation 94/9/EG with the respective EC-type examination certificate. Under atmospheric conditions (pressure: 80 to 110 kPa(abs.), temperature: -20 to +60°C), the flame arrestors according to the Charts 1-3 are suitable for protection against deflagration.

In case of a stabilized burning situation not limited by time and an operating pressure (P<sub>0</sub>) ≤ 110 kPa(abs.), the flame arrestors according to Chart 1 are protected against endurance burning. **Attention!** The protection against endurance burning refers exclusively to the existence of pure hydrocarbons. Any application extended to other chemicals requires additional testing for these specific chemicals.

In case of a stabilized burning situation not limited by time and an operating pressure (P<sub>0</sub>) > 110 kPa(abs.), the installation of at least one integrated temperature sensor on the unprotected side of the flame arrestor in connection with activating an emergency function (e.g. interrupting or inerting a gas mixture) with exceeding the operating temperature of ≥ 20K is required. The maximum acceptable time of stabilized burning is 1 minute.

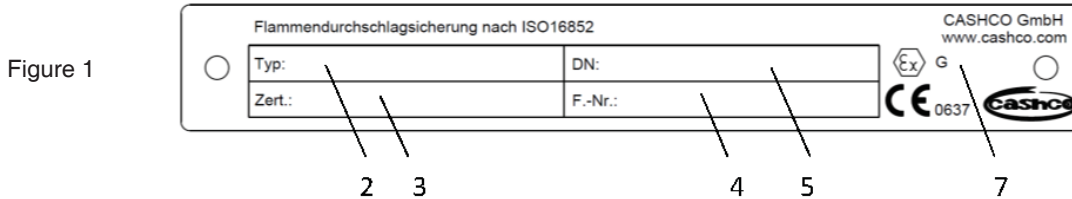
The appropriate valid application limits are documented at delivery referring to the relevant EC-type examination certificate in the respective inspection certificate according to EN10204. The CE marking of the flame arrestor, documents the compliance with the safety and health requirements stated in the regulation 94/9/EC "Devices and Safety Systems in Hazardous Areas" by the respective declaration of compliance.

The flame arrestors shall only be used when their material is resistant to mechanical and/or chemical influences or corrosion under respective operating conditions so that the explosion prevention and protection are not set aside. This is especially applicable to the crimped metal ribbon of the flame arrestors whose safety against flame propagation may be put at risk by corrosion.

## SECTION II

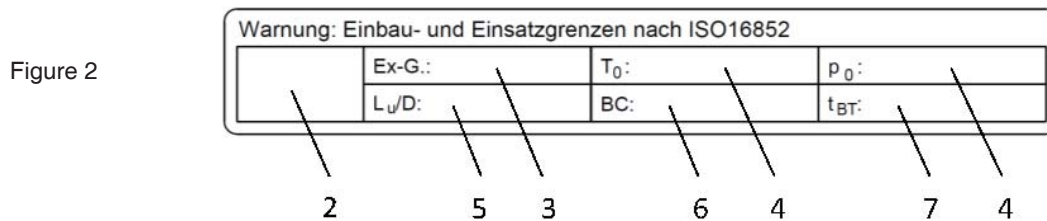
### II. SAFETY INSTRUCTIONS

The marking of the flame arrester is carried out according to EN ISO 16852 respective their application. Each flame arrester is marked with a nameplate and a warning sign. The nameplate as shown in Figure 1 contains the following information:



1. Name and address of the manufacturer.
2. Type designation.
3. Number of the EC-type examination certificate.
4. Serial number / year of manufacture.
5. Pipe size.
6. Marking hazardous area “G” for gas and vapor.
7. Explosion group.
8. Standard for flame arrester.
9. CE-marking with details of the named location.

The warning sign as shown in Figure 2 contains the following information:



1. “Warning” with the supplement “Installation and Application Limits according to ISO16852”.
2. Marking according to ISO16853: DEF.
3. Explosion group EX-G: according to Charts 1-3.
4. Maximum operating temperature and maximum operating pressure according to Charts 1-3.
5. Ratio  $L_j/D$  (maximum distance to ignition source / connection-Ø of the flame arrester).
6. Classification of burn rating a, b or c.
7. Burn time  $t_{BT}$  (information only in connection with flammability classification b): 1 minute.

The marking with the warning notice (Figure. 3) is only given for flame arrestors which are classified as protected against short burning “b” or endurance burning “c”. The marking “protected side” (Figure. 4) is only given for flame arrestors functioning only to one side.

Figure 3

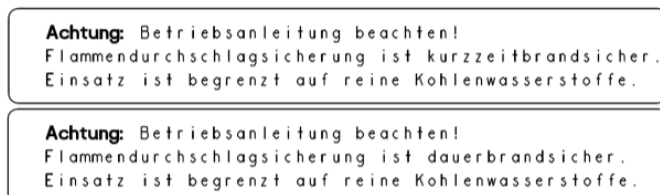


Figure 4



## SECTION III

### III. TRANSPORTATION AND STORAGE

The flame arrestor shall be packed carefully in order to prevent damages or impurity during the transport or storage.

## SECTION IV

### IV. INSTALLATION AND ASSEMBLY

Basically, the installation and assembly of the flame arrestor is carried out considering the respective application limits and regulations for the scope, especially the appropriate instruction for accident prevention by the customer.

The installation starts by removing the plug connection/flange cover at the inlet and outlet of the flame arrestor. The threads respectively and facing of the flanges shall be checked for damages, foreign material or dirt. The flame arrestor may be installed horizontally or vertically. A tensionless fitting shall be guaranteed. Additionally, the flame arrestor is not to be used as a load bearing device. If the flame arrestor is marked with a sticker "Protected side", this side has to be installed opposing the potential ignition source. With bidirectional flame arrestors, position consideration of the potential ignition source is not required.

For inline flame arrestors the pipe size on the protected side shall not be smaller than the pipe size on the unprotected side. For inline flame arrestors the pipe size on the unprotected side shall not be bigger than the connection size of the flame arrestor. The distance ( $L_U$ ) between the potential ignition source and the deflagration inline flame arrestor shall not exceed the data given in the Charts 1-3.

If the flame arrestor is marked as "Protected against endurance burning" (BC: a), it must not be insulated or encased. With a marking "Protected against short burning" (BC: b) at least one screw plug including the used seal ring has to be removed after assembling the flame arrestor. It shall be replaced by the included resistance thermometer (PT100) + seal ring. If stabilized burning is possible on both sides, at least one temperature sensing device shall be installed on each side. The installation guidelines by the manufacturer of the resistance thermometer and requirements of compliance shall be fulfilled. Then the installed temperature sensing device or devices will have to be integrated into the complete system in order to activate an emergency function. The circuit must permit a clearing of the ominous state within 50% of the burn time stated on the warning sign. Other brands of resistance thermometers may be used if their measurement features are identical with the measurement features of the resistance thermometers used in testing, and if the electrical explosion protection meets the respective application conditions of the flame arrestor.

In order to guarantee that no gap to the atmosphere has developed a leakage test should be carried out before initial operation. **Attention! Do Not** exceed the test pressures stated in the inspection certificate (EN10204).


## SECTION V

### V. MAINTENANCE

**Attention!** Maintenance shall only be carried out by instructed qualified staff! All parts of the Maintenance Kit A (See Section VI) must be kept at hand.

As operational conditions do fluctuate, there is no temporal maintenance interval suggested.

We recommend the operational state of the flame arrester be checked every 6 month. Not only the external housing of the flame arrester but also the crimped metal ribbons shall be checked for buildup of impurities, corrosion and deformation. The function of the resistance thermometer, if present, should also be checked periodically.

 <b>WARNING</b>
<b>SYSTEM UNDER PRESSURE. Prior to performing any maintenance, isolate the regulator from the system and relieve all pressure. Failure to do so could result in personal injury.</b>

Maintenance procedures hereinafter are based upon removal of the unit from the pipeline where installed.

For planned maintenance and cleaning, the flame arrester can be easily dismantled. Rotate threaded bolt nuts (7) counter clockwise and remove. Separate the two housings and remove the element (3).

For minimum residue buildup - the flame arrester element is to be blown out with compressed air or superheated steam opposite the normal operating flow direction.

For major residue buildup on the crimped metal ribbons, the flame arrester element may be rinsed with a cleaning compound compatible to the application fluid and in accordance with owner's procedures.

Mechanical damages to the beading must be prevented! If the crimped metal ribbon within the element has been damaged mechanically or chemically (corrosion), or if more than 20% of the cross-section area is plugged after cleaning, replace the element (3). The element must be completely dry before reinstalling it between the housing covers. Install new round ring(s) (5) each time the flame arrester is dismantled. Insert threaded bolts (6) through the two housing covers and with a alternating, crossing pattern secure nuts (7) finger tight. Use a torque wrench and complete the tightening per the value as listed below. Finally, recheck the torque value of the center bolt / nut (8) per the value as listed below.

Bolts / nuts shall be tightened to the torque values as listed below.

Item No.	Mat.	Torque [Nm]							
		DN20-DN32 (3/4"-1-1/4")	DN40/DN50 (1-1/2"/2")	DN65/DN80 (2-1/2"/3")	DN100 (4")	DN125/DN150 (5"/6")	DN200 (8")	DN250 (10")	DN300 (12")
6, 7	CS	27	54		93	230	465	800	
	SST	25	45		80	185	400	680	
8	SST	12	12	25	45	185		400	680

CS - Carbon Steel, SST = Stainless Steel

Should there be an explosion without or with stabilized burning at the flame arrester, the flame arrester must be removed and checked by an instructed qualified staff member. Depending on the explosion or degree of combustion, exchange of the crimped metal ribbon and the other spare parts may be sufficient to rebuild and re-install. However, when considering the year of manufacture, replacement with a new flame arrester may often be the cheaper way. Flame arrestors with resistance thermometers shall be inspected to check the functioning of the resistance thermometer after every maintenance / cleaning. The reinstallation into the complete system is carried out according to Section IV.

Only use Cashco manufactured parts when it is necessary to replace single component parts.

## SECTION VI

### VI. INFORMATION FOR ORDERING SPARE PARTS

For ordering spare parts, the 18-digit serial number on the nameplate must be identified. Specify your demand for spare parts by means of the item number and the maintenance instruction (Section V). Contact your local Cashco sales representative and state the serial number and the item number. Then the sales representative can quote a price for each of the required parts.

Item No.	Description	Maintenance Kit A
1	Housing 1	
2	Housing 2	
3	Crimped Metal Ribbon	X
4	Star	
5	Round Ring	X
6	Bolts	
8	Center Bolt & Nut	
9	Resistance Thermometer	
10	Threaded Plug	X
11	Seal Ring	X

Item Nos. for Figure 5.1 and 5.2

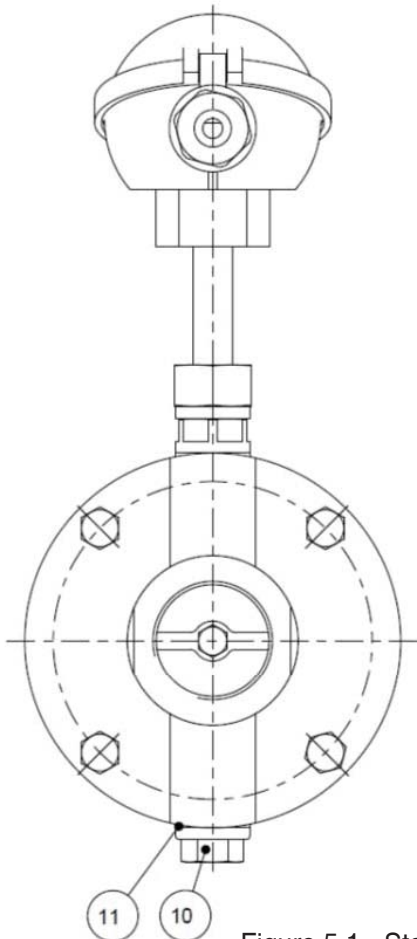
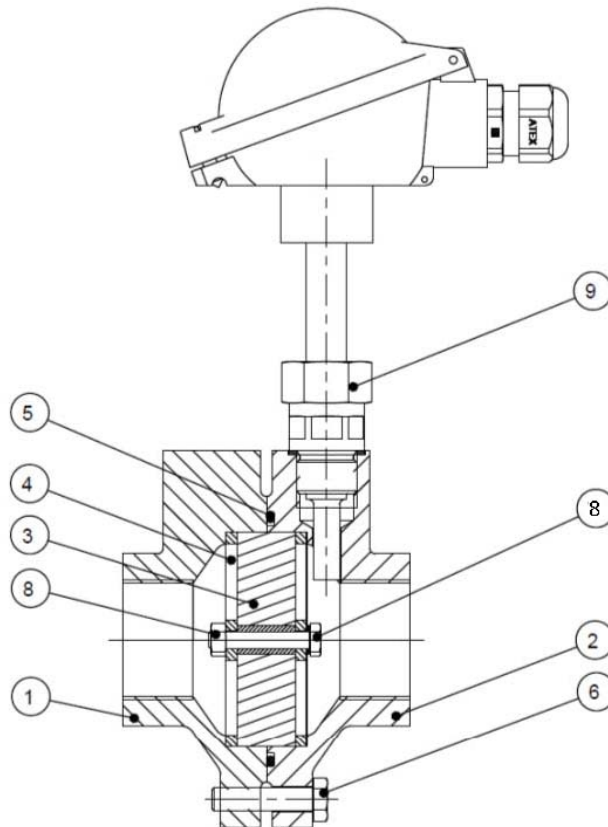


Figure 5.1 - Standard Threaded Connections

Item No.	Description	Maintenance Kit A
1	Housing 1	
2	Housing 2	
3	Flame Arrester Element	X
5	Round Ring	X
6,7	Bolts & Nuts	
8	Center Bolt	
9	Resistance Thermometer	
10	Threaded Plug	X
11	Seal Ring	X

Item Nos. for Figure 6



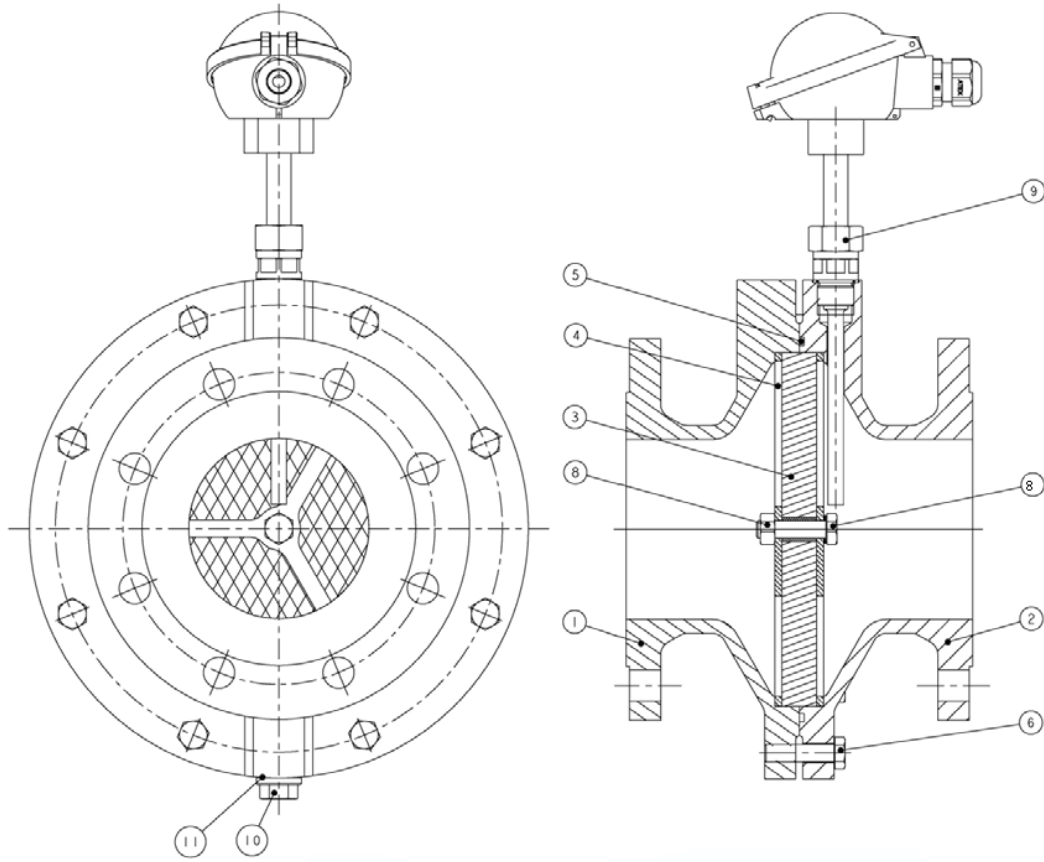


Figure 5.2 - Standard Flanged Connections

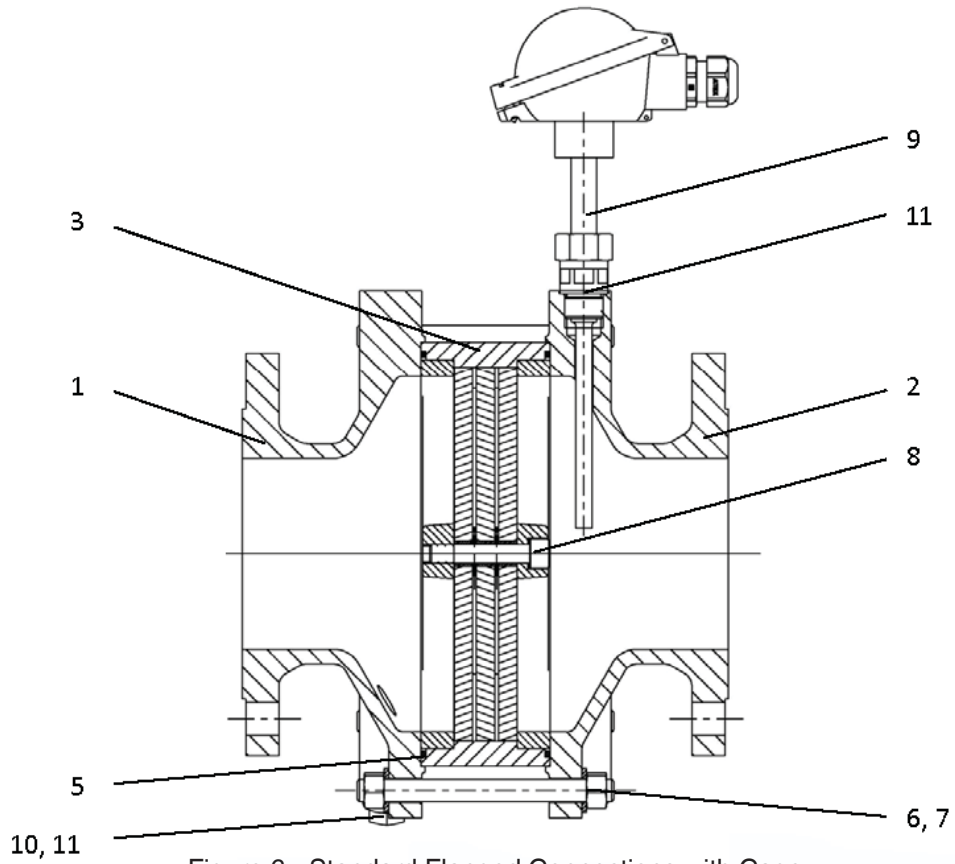


Figure 6 - Standard Flanged Connections with Cage

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