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SAFETY WARNINGS

DO NOT PIPE DRAINAGE, INSTRUMENTATION, AND/OR CLEANOUT CONNECTIONS TO A COMMON LINE AS THIS CAN PROVIDE A PASSAGE FOR A FLAME TO BY-PASS THE FLAME ARRESTER ELEMENT. IF THE FLAME WERE TO BE ABLE TO BY-PASS THE FLAME ARRESTER ELEMENT A FLAME FRONT COULD POTENTIALLY HARM BOTH PROCESS EQUIPMENT AND SITE PERSONNEL.

THE MODEL 7698 FLAME ARRESTER WILL NOT BE EFFECTIVE IN STOPPING FLAME PROPAGATION IN SYSTEMS WHICH CONTAIN VAPORS WITH A MAXIMUM EXPERIMENTAL SAFE GAP (MESG) LESS THAN 0.036" (.90 MM), IEC GAS GROUP IIA, OR WHEN ANY OF THE OPERATING CONDITIONS STATED HEREIN ARE EXCEEDED.

THE LIFTING HANDLES ON THE ELEMENT HOUSING ARE TO BE USED FOR HANDLING THE HOUSING ONLY DURING INSPECTION AND MAINTENANCE. DO NOT USE THESE HANDLES TO LIFT THE ENTIRE FLAME ARRESTER. THESE LIFTING HANDLES ARE NOT DESIGNED TO HANDLE THE WEIGHT OF THE ENTIRE ARRESTER.

BEFORE INSPECTING AND CLEANING THE ARRESTER, THE CONNECTING PIPELINE MUST BE FREE OF ALL HAZARDOUS OR FLAMMABLE VAPORS. BEFORE DISASSEMBLING ARRESTER, CONSULT MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL PRODUCTS THAT THE ARRESTER WAS EXPOSED TO IN SERVICE. THE COMPONENTS SHOULD BE CLEANED ACCORDING TO MSDS PROCEDURE. TAKE APPROPRIATE SAFETY PRECAUTIONS REGARDING EYE PROTECTION, SKIN CONTACT & RESPIRATION.

FLAME SENSING EQUIPMENT IS SUGGESTED FOR VERIFICATION OF A FLAME FRONT. IF A FLAME FRONT IS DETECTED THE GAS SUPPLY NEEDS TO BE STOPPED OR ISOLATED FROM THE ARRESTER TO PREVENT A FLAME FRONT FROM CONTINUOUSLY BURNING AT THE FLAME ARRESTER ELEMENT. IF THE FLAME FRONT IS ALLOWED TO BURN AT THE FLAME ARRESTER ELEMENT, THE FLAME ARRESTER COULD ALLOW THE FLAME FRONT TO PASS THROUGH THE ELEMENT AND DAMAGE EQUIPMENT AND/OR PERSONNEL ON THE PROTECTED SIDE OF THE ARRESTER.

THE MODEL 7698 FLAME ARRESTER MAY BE EXPOSED TO INSTANTANEOUS PRESSURE SPIKES. ANY INSTRUMENTATION ATTACHED TO THE ARRESTER MUST BE CAPABLE OF CONTINUED OPERATION IN THIS ENVIRONMENT.

FAILURE TO REPLACE A DAMAGED FLAME ELEMENT CAN RENDER THE FLAME ARRESTER INEFFECTIVE. IT IS SUGGESTED THAT A FLAME FRONT DETECTION SYSTEM BE USED TO MONITOR PIPELINE STATUS. IF A FLAME FRONT IS SENSED, IT IS SUGGESTED THAT THE FLAME ARRESTER ELEMENT BE CHECKED FOR ANY DAMAGE CAUSED BY THE FLAME FRONT.

NEVER STRIKE A FLAME ARRESTER IN AN ATTEMPT TO BREAK LOOSE BOLTING OR THE FLAME ELEMENT. THIS COULD CREATE A SPARK WHICH COULD CREATE A POTENTIAL IGNITION SOURCE.

SAFE USE OF FLAME ARRESTERS IS LIMITED TO HYDROCARBONS. USE OF FLAME ARRESTERS WITH ANY OTHER CHEMICALS MAY REQUIRE FURTHER TESTING.

AFTER INSTALLATION, ALL CONNECTIONS MUST BE INSPECTED FOR VAPOR LEAKAGE. THIS MAY BE ACCOMPLISHED BY STATIC TEST, GAS DETECTOR, OR "BUBBLE" TEST USING LEAK DETECTION SOLUTION.

INTRODUCTION

This manual is intended to provide recommended procedures and practices for installation, operation and maintenance of the Groth Model 7698 in-line deflagration flame arrester. Any standard procedures and practices developed for a specific plant or process should supersede this manual. Although this manual cannot cover all possible contingencies, following these guidelines will provide safe, reliable deflagration flame arrester service.

The arrester shall be treated as a safety device and must be maintained by a knowledgeable repair technician. Carefully read and understand this manual before installing or servicing this product.

For information not contained in this manual, please contact:

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CERTIFICATION

Groth Model 7698 in-line deflagration flame arresters are manufactured in compliance with the ATEX Directive 2014/34/EU, as confirmed by Certificate IBExU12ATEX2015 X.

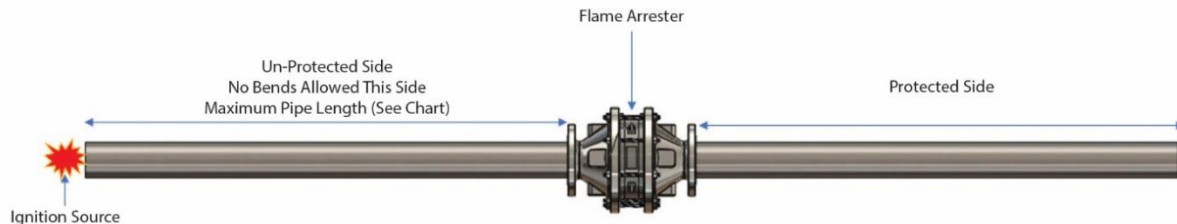
INSTALLATION

APPLICATION LIMITATIONS

For an arrester to be properly installed in a given application, **all** the requirements listed below must be met:

Connection Size (mm)	Gas Group	End Condition	Allowable Bend(s)*	Maximum Pipe Length from Ignition Source to Flame Arrester	Maximum Operational Pressure	Maximum Burn Time at Atmospheric Pressure	Operational Temperature Range °F (°C)
2" (50 mm)	IIA	Closed End	None	50 pipe diameters	23.2 psia (1.60 bara)	10 minutes	-4 to 140 (-20 to 60)
3" (80 mm)	IIA	Closed End	None	50 pipe diameters	23.2 psia (1.60 bara)	10 minutes	-4 to 140 (-20 to 60)
4" (100 mm)	IIA	Closed End	None	20 pipe diameters	17.4 psia (1.20 bara)	10 minutes	-4 to 140 (-20 to 60)
6" (150 mm)	IIA	Closed End	None	20 pipe diameters	17.4 psia (1.20 bara)	10 minutes	-4 to 140 (-20 to 60)
8" (200 mm)	IIA	Closed End	None	20 pipe diameters	17.4 psia (1.20 bara)	2 minutes	-4 to 140 (-20 to 60)
10" (250 mm)	IIA	Closed End	None	20 pipe diameters	17.4 psia (1.20 bara)	2 minutes	-4 to 140 (-20 to 60)
12" (300 mm)	IIA	Closed End	None	20 pipe diameters	17.4 psia (1.20 bara)	2 minutes	-4 to 140 (-20 to 60)

***No additional bends or restrictions are allowed. Bends and flow restrictions can cause additional turbulence, which can increase the intensity of the flame propagation; potentially compromising the performance of the flame arrester.**



INTEGRATED TEMPERATURE SENSORS (Required for ATEX certified arresters, recommended for all others.)

Flame arresters for short time burning must be fitted with one or more integrated temperature sensors, taking into account the intended orientation of the flame arrester. Each temperature sensor with respect to connection size has to trigger an emergency function within half of the burn time.

These arresters may be used in systems and situations where the flow of the flammable mixture can be stopped within half of the burn time.

Groth model 7698 flame arresters were tested with one Groth integrated temperature sensor installed on the ignition side. All arresters are manufactured with a minimum of one thermowell that contacts the face of the element. Multiple thermowells may be on one or both faces as specified by the purchaser. Groth temperature sensors may also be installed as specified.

If the purchaser installs an integrated temperature sensor, it must be an ATEX approved device, installed in the Groth thermowell such that the sensor contacts the bottom of the thermowell.

These devices can activate warning or shutdown systems if abnormal conditions are detected.

INITIAL INSTALLATION

Operating Conditions:

Based on the testing conditions, this series of In-line deflagration flame arrester may be installed in piping systems where:

1. All the parameters shown in the table on page 4 are met.
2. The piping system in which the deflagration arrester is to be installed does not exceed the arrester flange size.

All Groth in-line deflagration flame arresters are bi-directional and can be used in vertical or horizontal piping systems.

This series of flame arresters are available to mate with 125# ASME, 150# ASME, PN 10 DIN or PN 16 DIN class flanges. Please follow the torque guidelines listed in Table 1 for flange make-up torque.

NOTE

When transporting the arrester, support it with the flanges in the horizontal position. This position provides the maximum support for the flame element winding. Lift the assembly with the (2) lifting eyes attached to the bases if applicable.

The following guidelines should be observed at installation:

1. Remove any flange protectors and discard all packing material.
2. Inspect the gasket seating surface of the mating flanges. It must be clean, flat and free of scratches, corrosion and tool marks.
3. Inspect the gasket; make sure that the material is suitable for the application.
4. Lubricate all studs and nuts with an appropriate thread lubricant. If the arrester will see high temperature service or stainless steel fasteners are used, select an anti-seize compound such as moly-disulfide.
5. Center the gasket within the bolt circle.
6. Set the arrester between its mating flanges or nozzle. Position the lifting handles and jacking nuts to facilitate future removal of the flame arrester housing. Position the drain and instrument ports to provide proper access and function. (See Maintenance Instructions). Install the studs and tighten nuts hand tight.

NOTE

When installing a model 7698 in a horizontal pipeline, use the lowest 1" ports to drain condensed vapors from the housing. Note previous warning when connecting the drain piping.

(Torque is an average value based on a nitrile binder synthetic gasket, 1/32" thick and lubricated threads).

7. Torque all fasteners to half the value listed in Table 1 in a cross torquing pattern to provide an evenly compressed gasket joint.
8. Make up the final torque and check that no further nut rotation occurs at the specified torque value.

Table 1								
PIPE FLANGE STUD TORQUE CHART								
Lb-Ft (N-m)								
Size Inches (mm)	Class (Flat Face (FF) and Raised Face (RF))							
	ASME 125#		ASME 150#		DIN PN 10		DIN PN 16	
	FF	RF	FF	RF	FF	RF	FF	RF
2" (50mm)	N/A	N/A	60 (82)	60 (82)	60 (82)	60 (82)	60 (82)	60 (82)
3" (80mm)	N/A	N/A	60 (82)	60 (82)	30 (41)	30 (41)	30 (41)	30 (41)
4" (100mm)	60 (82)	60 (82)	60 (82)	60 (82)	60 (82)	60 (82)	60 (82)	60 (82)
6" (150mm)	105 (143)	105 (143)	105 (143)	105 (143)	111 (150)	111 (150)	111 (150)	111 (150)
8" (200mm)	105 (143)	105 (143)	105 (143)	105 (143)	110 (149)	110 (149)	73 (100)	73 (100)
10" (250mm)	140 (190)	170 (231)	140 (190)	170 (231)	126 (171)	153 (207)	150 (204)	184 (249)
12" (300mm)	140 (190)	170 (231)	140 (190)	170 (231)	126 (171)	153 (207)	150 (204)	184 (249)

DESIGN AND FUNCTION

Groth's in-line deflagration flame arresters are designed to prevent flame propagation in gas piping systems that contain flammable gas/vapor mixtures. The arrester must prevent flame passage under certain specified conditions while permitting free flow of gas/vapor through the system. Thus, it protects vulnerable equipment or components of the system from damage due to explosive pressures caused by gas/vapor ignition in another part of the system. The deflagration flame arrester must be used under only those operating conditions for which it was designed and tested.

The flame arresters consist of two main components: the arrester bases and the flame element housing assembly. The bases serve as the connecting interface to the piping system. The housing retains and supports the flame element. Both components are essential in stopping the passage of the flame.

The flame element is comprised of small parallel passageways aligned so that an approaching flame front is slowed down and then quenched before it can propagate to the protected side of the device. All Groth deflagration arresters utilize spiral wound, crimped ribbon constructed of corrosion resistant materials, to ensure the best flame quenching performance with minimum pressure drop. The element is supported by rigid beams, securely welded into the housing to withstand the pressures of an in-line deflagration.

The bases must also withstand the deflagration pressures while conveying the burning vapors and flame front to the element. Depending on the design of the system in which it is used, the arrester bases can include optional ports for thermocouples or pressure monitoring devices.

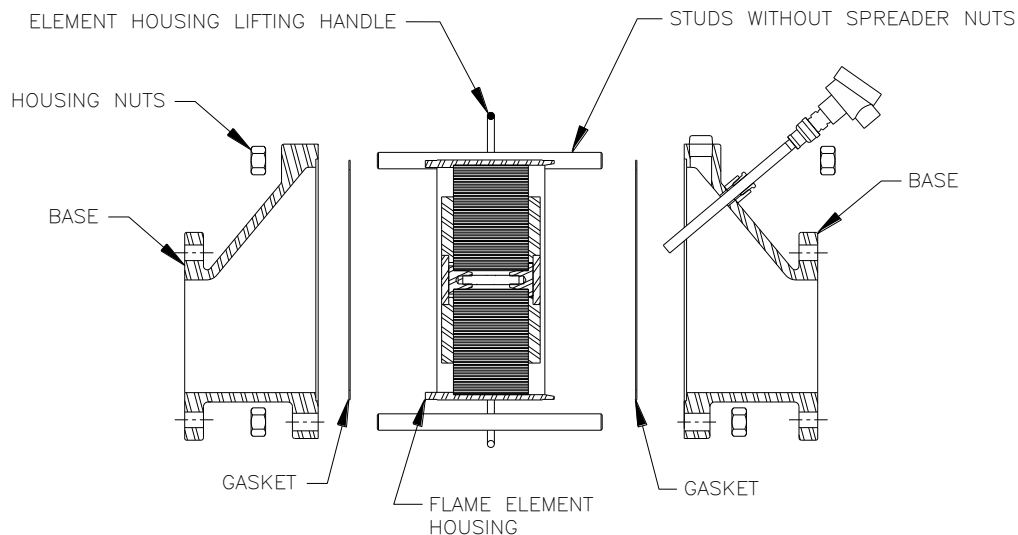
MAINTENANCE

For maximum operating efficiency, the element of a flame arrester must be inspected and maintained at regular intervals. Frequency of inspection should be based on the experience gained in each application. Inspection of wetted components is recommended at least once per year or any time that one of the following conditions occur:

- Excessive pressure drop is encountered at a known flow rate.
- A flame front is detected.

Maintenance is accomplished by removing the element assembly for inspection and cleaning or replacement.

1. When removing the element housing for maintenance, support the weight by attachment to the housing handles, or lifting eyes, and proceed as follows.
2. Loosen the hex nuts and remove only those studs or tie rods necessary to withdraw the housing.



3. On the remaining studs, loosen the holding nuts and use the spreader nuts to separate the base halves from the housing. Use spacer blocks or spreader tools, if necessary, to safely secure the base halves so the housing is free for removal.

CAUTION

In a horizontal line, the flame bank assembly should be supported before removing the studs. Use structures and equipment suitable for supporting the component's weight.

4. Remove the housing assembly for inspection. The flame element and supporting grids shall be visually inspected for damage or corrosion build-up from both sides. If the flame element appears to be damaged, it should be replaced immediately with a new one.
5. Verify that the element openings are not obstructed by viewing a light source through the element passages. If the flame element is dirty it can be cleaned by one of the following methods:
 - Compressed air.
 - High pressure steam or water purge.
 - Solvent wash followed by compressed air.
6. Inspect the sealing gasket for damage and replace if necessary.
7. Reassemble the housing, bases and gaskets. The counterbores will position the housing on the base centerline. Insert the studs and torque all fasteners to half the value listed in Table 2 in a cross torquing pattern to provide an evenly compressed gasket joint.
8. Lubricate all studs and nuts with an appropriate thread lubricant. If the arrester will see high temperature service or stainless steel fasteners are used, select an anti-seize compound such as moly-disulfide.

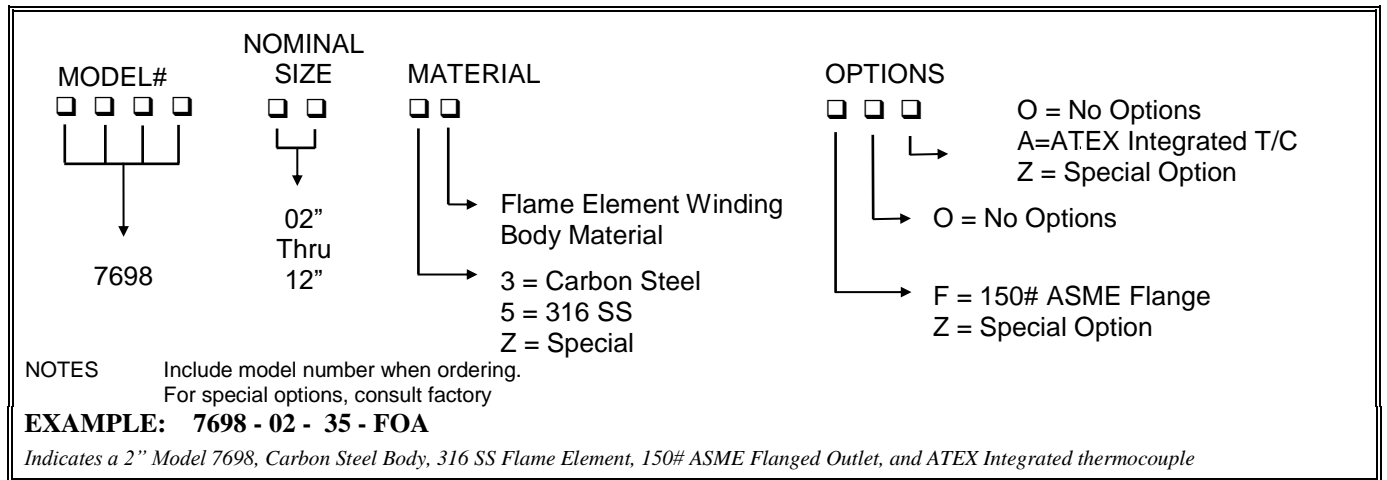
9. Make up the final torque and check that no further nut rotation occurs at the specified torque value. The torque values are based on original gaskets supplied by Groth Corporation.

NOTE

When replacing a temperature sensor, make sure that the tip of the sensor makes firm contact with the end of the integrated thermowell.

Table 2 HOUSING STUD TORQUE CHART	
SIZE Inches (mm)	TORQUE
	Lb-Ft (N-m)
2" (50mm)	40 (54)
3" (80mm)	40 (54)
4" (100mm)	40 (54)
6" (150mm)	105 (143)
8" (200mm)	105 (143)
10" (250mm)	220 (300)
12" (300mm)	220 (300)

MODEL NUMBER IDENTIFICATION



PRODUCT LIMITED WARRANTY

- A. Seller warrants that products which are manufactured by Seller, are manufactured in accordance with published specifications and free from defects in materials and/or workmanship for a period of (12) twelve months. Seller, at its option, will repair or replace any products returned intact to the factory, transportation charges prepaid, which Seller, upon inspection, shall determine to be defective in material and/or workmanship. The foregoing shall constitute the sole remedy for any breach of Seller's warranty.
- B. THERE ARE NO UNDERSTANDINGS, AGREEMENTS, REPRESENTATIONS, OR WARRANTIES, EXPRESS OR IMPLIED, (INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING PRODUCTS) UNLESS SPECIFIED IN THE SALES CONTRACT. THIS CONTRACT STATES THE ENTIRE OBLIGATION OF SELLER.
- Seller makes no warranties, either express or implied, except as provided herein, including without limitation thereof, warranties as to marketability, merchantability, for a particular purpose or use, or against infringement of any patent of products. In no event shall Seller be liable for any direct, incidental or consequential damages of any nature, or losses or expenses resulting from any defective new product or the use of any such product, including any damages for loss of time, inconvenience, or loss of use of any such product.
- C. The original Manufacturer shall be solely responsible for the design, development, supply, production, and performance of its products hereunder, and the protection of its trade name or names, if any. It assumes no responsibility, for products modified or changed in any way by its agent or customer. Any such modifications or changes to products sold by Seller hereunder shall make the product limited warranty null and void.
- D. The Manufacturer shall be under no obligation to manufacture, sell, or supply, or to continue to manufacture, sell or supply any of the Products.

Groth Corporation has representatives throughout the world.
Contact Groth Corporation or visit us on the web for the authorized representative in your area.



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