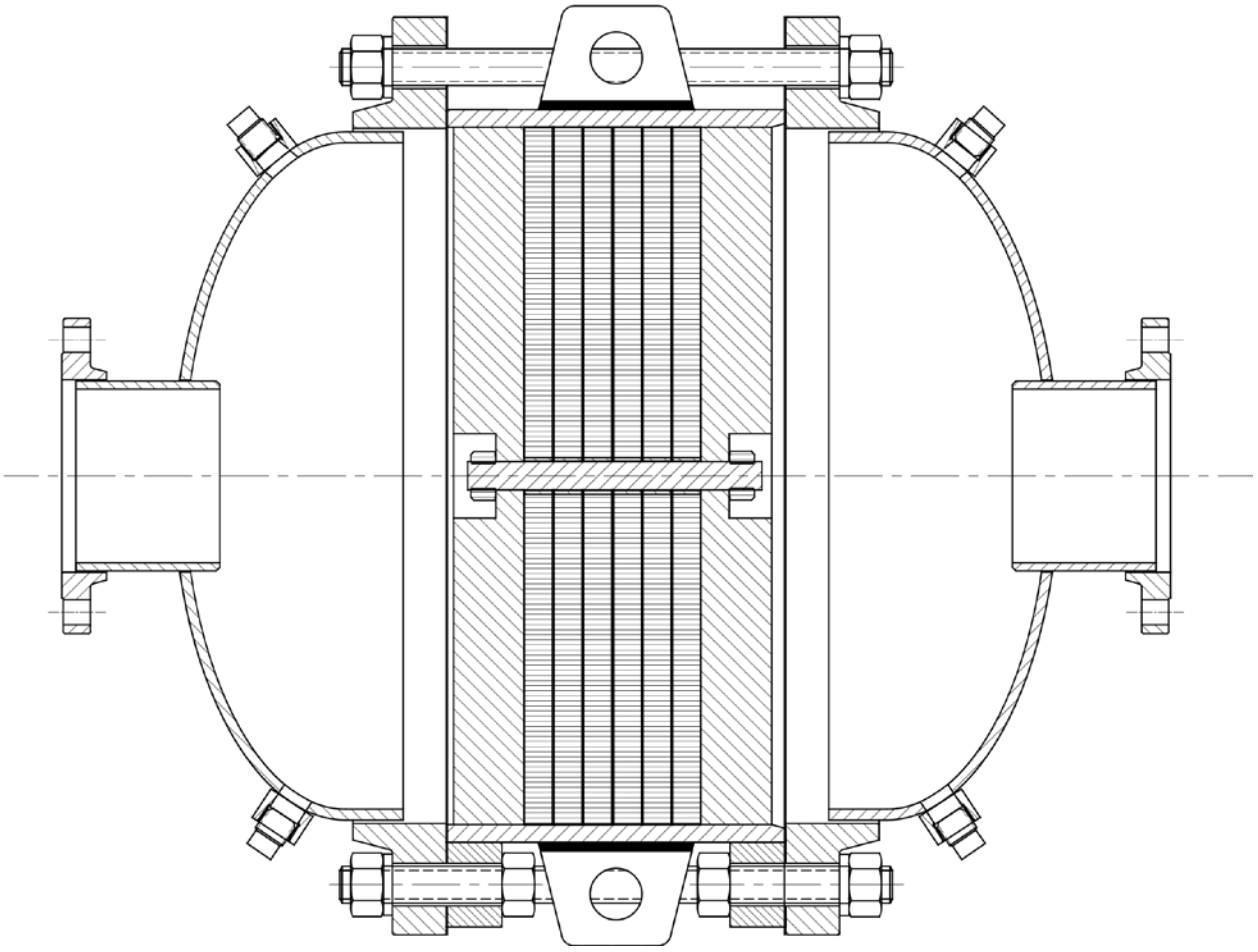
Installation, Operation and Maintenance

7661
Detonation
Flame Arrester



IOM 7661RevB USCG
Log # 99849
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GROTH CORPORATION®

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INTRODUCTION

This manual is intended to provide recommended procedures and practices for installation, operation and maintenance of the Groth Model 7661 detonation 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 detonation flame arrester service.

The detonation flame 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. Groth Corporation offers repair services for all products manufactured by the Tank Protection Division.

For information not contained in this manual, please contact:

Groth Corporation
13650 N. Promenade Blvd
Stafford, Texas 77477
281-295-6800
281-295-6995(Fax)

SPECIFICATIONS

Detonation flame arrester,Bi-directional, Type II	
Minimum MESG 0.0354" [0.90 mm]	
Maximum operating pressure 15.7 PSIA	
Ambient temperature range -13° F to 140° F	
Element Size	Test Report
16”	IBExU IB-15-8-115
20”	IBExU IB-16-8-031
24”	IBExU IB-16-8-031
30”	IBExU IB-15-8-115

Groth detonation flame arresters are constructed in compliance with the United States Coast Guard [USCG] specifications for Marine Vapor Control Systems.

SUMMARY OF TEST RESULTS

The Groth Model 7661 detonation flame arrester has been subjected to the following test procedures:

- Detonation testing in compliance with USCG 33 CFR Part 154 Appendix A
- Endurance burn test in compliance with USCG 33 CFR Part 154 Appendix A
- Corrosion test in compliance with USCG 33 CFR Part 154 Appendix A
- Flow capacity tests.
- Hydrostatic and pneumatic pressure tests.

OPERATION AND FUNCTION

See Figure 1

Groth's detonation flame arresters are designed to prevent flame propagation in gas piping systems which contain flammable gas/vapor mixtures. The detonation flame 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 detonation flame arrester must be used under only those operating conditions for which it was designed and tested.

The detonation flame arresters consist of two main components, the arrester bases and the flame bank assembly. The arrester bases serve as the connecting interface to the piping system. The arrester bases retain's and supports the flame bank assembly. Both components are essential in stopping the passage of the flame.

The flame bank assembly 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 flame bank assemblies utilize spiral wound, crimped ribbon elements constructed of corrosion resistant materials, to insure the best flame quenching performance with minimum pressure drop. The flame bank assembly is supported by rigid beams, securely welded into the flame bank assembly to withstand the extreme pressures of an overdriven detonation.

The arrester bases must also withstand the detonation pressures while conveying the burning vapors and flame front to the flame bank assembly. 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. These devices can activate warning or shutdown systems if abnormal conditions are detected. Both arrester bases may be equipped with large diameter inspection/clean-out ports for in-line maintenance of the flame bank assembly.

Warning

A Type II detonation flame arrester cannot withstand a continuous flame, and must have a continuous flame monitoring system capable of shutting down the vapor flow within the time specified on the arrester nameplate.

WARNING

A detonation flame arrester may be exposed to instantaneous pressure spikes in excess of 1000 PSI. Any instrumentation attached to the arrester must be capable of continued operation in this environment.

INSTALLATION

Operating Conditions:

Based on the testing conditions, this series of detonation flame arrester may be installed in piping systems where:

1. The MESG of the vapor constituent(s) is greater than or equal to .0354" (0.90 mm).
2. System operating pressure is less than or equal to 15.7 PSIA (1.08 BarA).
3. Normal operating temperature is between -13° F (-25° C) and 140° F (60° C).
4. The piping system in which the detonation arrester is to be installed must not exceed the arrester flange size.

WARNING

The 7661 detonation flame arrester may NOT be effective in stopping flame propagation in systems which contain vapors with an MESG less than 0.036" [0.92 mm] or when any of the operating conditions are exceeded.

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

WARNING

The flame arrester bases or adjacent piping may have various pipe taps for pressure sensing, temperature sensing, condensate drainage, etc. Never connect such taps to a common line or system as this could provide a flame bypass around the flame bank assembly.

This series of detonation flame arresters all have 150# ANSI flanges. Please follow the torque guidelines listed in Table 1 for flange make-up torque.

Warning

When transporting the detonation arrester unit, support it with the arrester bases in the horizontal position. This position provides the maximum support for the flame bank assembly. When lifting the flame bank assembly lift with the [2] lifting eyes or lugs attached to the flame bank assembly 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 detonation flame arrester between its mating flanges or nozzle. Position the lifting handles and spreader (jacking) nuts to facilitate future removal of the flame bank assembly. For horizontal installations, position the arrester with the spacers on the bottom and the lifting handle on top to facilitate future removal of the flame bank assembly. Position the drain and instrument ports to provide proper access and function. When the arrester is installed in a horizontal mounting position, the arrester has to be so installed that the temperature sensor is directed upwards (connection side in the twelve o'clock position) and the drain directed downward (in the six o'clock position). (See Maintenance Instructions). Install the studs and tighten nuts hand tight.

- When installing the Models 7661 in a horizontal pipeline, use the lowest 1" ports to drain condensed vapors from the arrester base. Note previous warning when connecting the drain piping.

7. Torque all fasteners to half the value listed in Table 1 in a staggered, alternating pattern to provide an evenly compressed gasket joint.

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

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. (Nm)

Size	Torque
4"	70 [95]
6"	110 [150]
8"	110 [150]
10"	110 [150]
12"	110 [150]

WARNING

After installation, all connections must be inspected for vapor leakage. This may be accomplished by static test, gas detector, or "bubble" test using Snoop or similar liquid.

MAINTENANCE

For maximum operating efficiency the flame bank assembly must be inspected and maintained at regular intervals. Inspection frequency varies widely due to various operating conditions and environments to which the unit maybe subjected. Records reflecting periodic test results and service experiences for each flame arresting device are valuable guides for establishing safe and economical inspection frequencies. It is the responsibility of the user to determine an acceptable inspection frequency for their application and environment. Unless a documented experience and /or a RBI (Risk Based Inspection) assessment indicates that a longer interval is acceptable; test, maintenance, and inspection intervals for these flame bank assemblies should NOT exceed 1 year. Inspection and maintenance should occur any time that one of the following conditions occur:

- Excessive pressure drop is encountered at a known flow rate.
- A flame front is detected.
- Any instance where sizeable debris has be reported in the up stream flow.

WARNING

Never try to repair a flame bank assembly unless authorized by the manufacturer – replace when found defective.

The flame bank assembly can be easily removed for inspection and maintenance without removing the arrester bases from the line. Maintenance is accomplished by removing the flame bank assembly for inspection and cleaning or replacement. Life expectancy of flame arresting products are contingent on a variety of factors. Prolonging the life of flame arresting products is highly dependent on the level of routine inspection and maintenance and the absence of any flame or over pressure events.

Flame arresters are to be tested only by methods and or equipment recommended by the manufacturer – if at all.

CAUTION

The connecting pipeline must be free of all hazardous or flammable vapors before inspection procedures begin. 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.

1. When removing the flame bank assembly for maintenance, support the weight by attachment to the flame bank assembly handles, or lifting eyes, and proceed as follows.

WARNING

The lifting eyes or lugs on the flame bank assembly are to be used for handling the flame bank assembly only during inspection and maintenance. DO NOT use these eyes to lift the entire detonation flame arrester assembly.

2. Loosen all of the hex nuts and remove only those studs or tie rods necessary to withdraw the flame bank assembly. Do not remove the two studs with spacers or the spreader (jacking) nuts.

3. Use the spreader nuts to separate the arrester base halves from the flame bank assembly. Use spacer blocks or spreader tools, if necessary, to safely secure the arrester base halves so the flame bank 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 components weight.

4. Remove the flame bank assembly for inspection. The flame bank assembly and supporting grids shall be visually inspected for damage or corrosion build-up from both sides. If the flame bank assembly appears to be damaged, corroded, or if any separation in the flame bank assembly windings or looseness is observed, then the flame bank assembly should be replaced immediately with a new one.
5. Verify that the flame bank assembly openings are not obstructed by viewing a light source through the openings. If the flame bank assembly is dirty it can be cleaned by one of the following methods:

- Compressed air.
- High pressure steam or water purge.
- Biodegradable solution wash followed by compressed air.

WARNING:

Care should be taken when using compressed air or high pressure steam or water to ensure no damage occurs to the winding edges. Bent windings will obstruct flow, and windings that have separated will affect the flame bank assembly's ability to prevent flame propagation. Never try to clean the flame bank assembly by inserting a sharp tool or probe into the element openings. Any damage to the integrity of these passages can render the flame arrester ineffective.

6. Measure a statistical sample of element openings using pin gauges to verify their inscribed diameters. A .018" [.46mm] diameter gauge pin should enter all openings. A .022" [.56mm] diameter gauge pin should not enter an opening more than .011" [.28mm] deep. The openings can change size over time due to corrosion, material build up, physical damage, or flame events. Upon routine inspection flame bank assemblies whose orifices fall outside of this prescribed range should be replaced.

7. Sealing gaskets should ALWAYS be replaced when providing maintenance to your flame bank assembly

8. Reassemble the arrester bases and gaskets. The support spacers will position the flame bank assembly on the base centerline. Insert the studs and torque all fasteners to half the value listed in Table 2 in a staggered, alternating pattern to provide an evenly compressed gasket joint.

   Lubricate all studs and nuts with an appropriate thread lubricant. If the detonation 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.

Table 2
ARRESTER BASE STUD TORQUE CHART
Lb.Ft. (Nm)

STUD SIZE	TORQUE
3/4"	70 [95]
7/8"	110 [150]
1"	170 [230]
1 1/8"	240 [330]

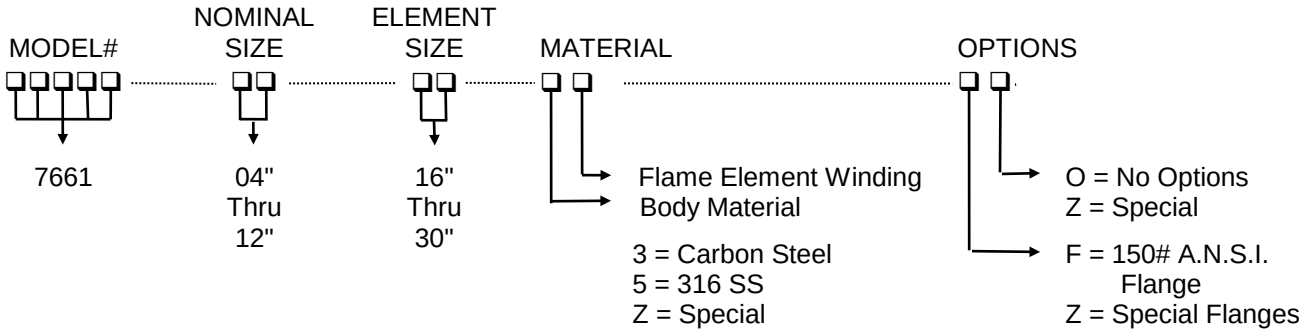
The table below is a partial list of vapors for which the MESG has been measured and found to be greater than or equal to 0.0354" [0.90 mm]. If your system contains a gas not listed in the table, please consult the factory.

Chemical Compound	MESG* (mm)	MESG (Inches)
acetone	1.02	0.040
acetonitrile	1.50	0.059
ammonia	3.17	0.125
amyl acetate	0.99	0.039
butane	0.98	0.039
butyl acetate	1.02	0.040
butyl alcohol	0.94	0.037
carbon monoxide	0.94	0.037
cyclohexane	0.94	0.037
decane	1.02	0.040
ethane	0.91	0.036
ethyl acetate	0.99	0.039
ethyl nitrite	0.96	0.038
heptane	0.91	0.036
hexane	0.93	0.037
isobutyl alcohol	0.96	0.038

Chemical Compound	MESG* (mm)	MESG (Inches)
isooctane	1.04	0.041
isopentane	0.98	0.039
isopropyl alcohol	0.99	0.039
methane	1.14	0.045
methyl acetate	0.99	0.039
methyl alcohol	0.92	0.036
methyl ethyl ketone	0.92	0.036
methyl isobutyl ketone	0.98	0.039
octane	0.94	0.037
pentane	0.93	0.037
propane	0.92	0.036
propyl acetate	1.04	0.041
propylene	0.91	0.036
vinyl acetate	0.94	0.037
vinyl chloride	0.99	0.039

**Corrected MESG (mm), 100KpA, 20°C*

MODEL NUMBER IDENTIFICATION



NOTES Include model number when ordering.
For special options, consult factory

EXAMPLE: 7661 - 02 - 05 - 35 - FO

Indicates a 4" Model 7661 with 165" Element Size, Carbon Steel Body, 316 SS Flame Winding, 150# Flanged Outlet, and no options

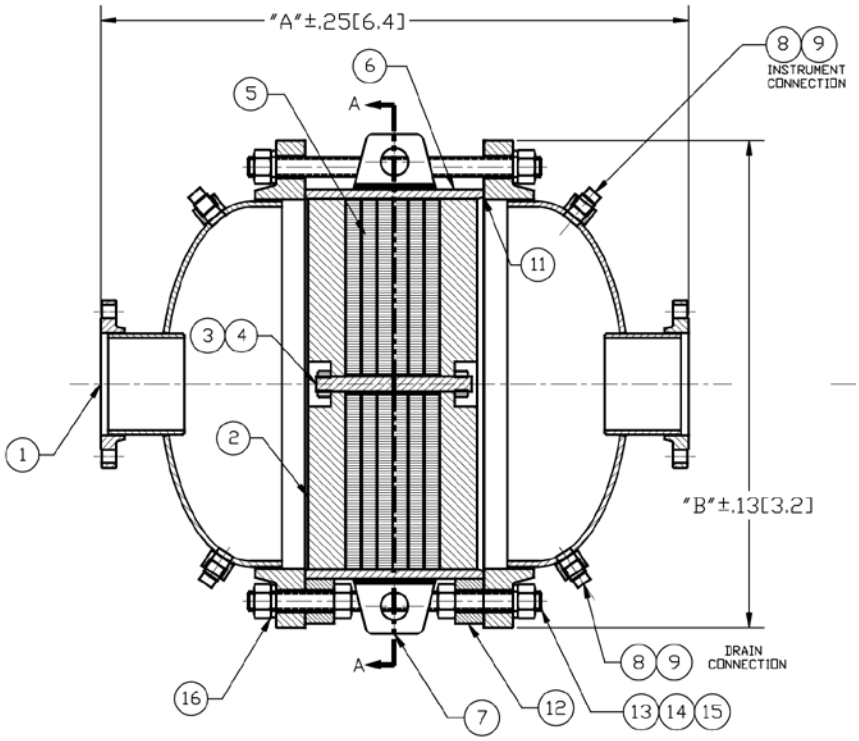


Figure 1

ITEM		DESCRIPTION	STANDARD MATERIALS OF CONSTRUCTION			OPTIONAL FEATURES
			CARBON STL ☐	316 SS ☐	☐	☐
1		BASE **(1)**	CS	316 SS		
2		WAGON WHEEL RETAINER	CS	316 SS		
3		NUT, HEX	316 SS	316 SS		
4		STUD, ELEMENT	316 SS	316 SS		
5		ELEMENT, FLAME	316 SS	316 SS		
6		HOUSING, ELEMENT	CS	316 SS		
7		HANDLE/LIFTING LUG	CS	316 SS		
8		PLUG, PIPE	CS	316 SS		
9		COUPLING	CS	316 SS		
10		SUPPORT, ELEMENT	316 SS	316 SS		
11	*	GASKET	NON-ASB	NON-ASB		
12		SPACER	CS	316 SS		
13		NUT, SPREADER (HEX)	SS	SS		
14		STUD	SS	SS		
15		NUT, HEX	SS	SS		
16		LOCK WASHER	SS	SS		

* SPARE PARTS

(1) STANDARD CONSTRUCTION INCLUDES (1) INSTRUMENT CONNECTION AT THE TOP (12:00 O'CLOCK) POSITION OF EACH BASE AND (1) DRAIN CONNECTION AT THE BOTTOM (6:00 O'CLOCK) POSITION OF EACH BASE.

DWG. NUMBER: 99200
BOM NUMBER: 99200BOM.XLS

GROTH® CORPORATION
a Continental Disc Company

WARNINGS

a. Customer and/or user shall be responsible for determining proper venting, flow requirements and product sizing. Company assumes that Customer has provided for proper sizing and venting of a system to relieve the specific pressure and flow requirement. Safe direction or containment of relief should be considered when processes involve toxic, flammable, or volatile materials. Extreme caution must be taken in order to prevent personal injury or property damage.

b. There is no guarantee of product life. Such life span is affected by process media, corrosion, creep, fatigue, physical damage and maintenance of the equipment. The Customer and/or user shall be responsible for determining and providing adequate inspection and maintenance to identify product degradation that could affect product performance. The media or other environmental conditions should not allow any build-up or solidification of media to occur on a product.

c. When flame arresting devices or other products used by the Customer involve assemblies incorporating or utilizing products not manufactured by Company or its subsidiaries, Company and its subsidiaries specifically disclaim any and all warranties, express or implied, and disclaim any and all liability for damages, either direct, indirect, punitive, incidental, or consequential, arising from or related to the use of that portion of the assemblies not comprised of Company or its subsidiaries' manufactured products. Company and its subsidiaries do not warrant any component not manufactured by Company or its subsidiaries.

d. Customer and/or its installer shall be responsible for the proper installation of Company's products into a system. Customer and/or its installer shall be responsible for improper installation and physical damage resulting therefrom, including, but not limited to, damage resulting from leakage, improper torqueing and failure to follow installation instructions. The limited warranty hereinabove set forth shall not apply to any of Company's products that are improperly installed.

e. The Company assumes no responsibility for products modified or changed by its agent or customer, or any other third party. Any such modifications or changes to products sold by Company hereunder shall make the product limited warranty null and void.

f. Company shall be under no obligation to manufacture, sell or supply, or to continue to manufacture, sell, or supply any of its products.