Amerex Modular Dry Chemical Vehicle Fire Suppression System

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
No. 13980
Revision L, September 2024

MODELS:
V13 ABC & V13 PK
V25 ABC & V25 PK
VH25 ABC & VH25 PK
V30 ABC
VH30 ABC
V50 ABC & V50 PK
VS50 ABC & VS50 PK
VS75 ABC
V250 ABC

DESIGNED AND MANUFACTURED IN THE USA

AMEREX

FM APPROVED

Quality is Behind the Diamond

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Revision Record			
Revision	**Revision Date**	**ECN#**	**Description**
H	11-23-13	B000033	UPDATED ENTIRE MANUAL. CREATED NEW MANUAL AS PUBLISHER FILE
J	1-15-15	B000288	ADDED V30, VSR50, VSR75, V150 AND MANUAL/ELECTRIC ACTUATOR AND UPDATED ASSOCIATED SECTIONS (ADDED SECTIONS 2.2.4, 2.2.9, 2.5.5, 4.4.3, 4.5.9, 6.2.7.3; FIGURES 2.1.1.b, 4.7.4.c); ADDED SECTIONS 3.2.6 –3.2.8; REMOVED WEIGHTS FROM TABLES 2.1.1, 2.1.2 & 2.2, AND ADDED TABLE 4.4; ADDED P/N 20500 AND P/N 23850 TO ASSOC. SECTIONS; CHANGED 10167-P006/P025 NOZ CAP TO BLUE; REMOVED BASE HOLES FROM 12156 V13 BRACKET (FIG 2.2.1)
K	3-25-20	B002013	ADDED UNECE REG 107 E MARK TO MANUAL, SEE FOLLOWING SECTIONS: CH1 NOTE 3, 1.1, 1.3.1, CH2, 2.1.1, 2.2, 2.2.2, 2.2.3, 2.3.1, 2.3.3.1, 2.3.4, 2.3.5, 2.6, 4.2, 4.3, 4.4, 4.4.1, 4.4.2, 4.5, 4.5.1, 4.5.6. REVISED CH7. REMOVED V150 AGENT CYLINDER FROM MANUAL. 100psi PRESSURE SWITCH WAS CHANGED TO 50psi. REVISED HEADER AND FOOTER FORMAT. ADDED NOTE TO SECTION 4.9.
L	9-1-24		Updated all Amerex Logos to the new artwork with copyright on right 1.1 Remove VSR50 & VSR75. Updated Nozzle addition quantities (see 4.5 networks). 1.3 Updated by reformatting section as it pertains to FM5970 Testing. Inserted HDME Tables for ABC & Purple K with achievement values from FM 5970 Witness Testing. Artwork has been relocated to the new Appendices A-F at the end of manual. 1.4 Add bullet point not for use on Lithium-Ion batteries Figure 2.1.1.b (V125) removed Table 2.1.1 removed VSR50 & VSR75 Table 2.2 removed VSR50 & VSR75 Section 2.2.9 (VSR50 &VSR75 bracket) removed Section 2.4.6 Tee handle removed. Tee handle not allowed for actuation 2.5.2 removed 20500 2.5.3 removed 20500 2.6.a removed VSR 50/75 and brackets 2.6.a add V30 abc no p/s 2.6.a add V75 and VS 75 no P/S 2.6.a Parts list – remove 20500 3.1 add bullet point Tape measure to measure the hazard area and estimate cabling and hose runs 3.2.6 replaced ICE with Dual Agent Dry Chem/ICS – 3.2.7 replaced 450 degree with 500 degree 3.2.7 remove programmable heat detectors 3.2.8 At least one manual means of actuation must be located within reach or on the path of egress of the vehicle operator during normal vehicle operation. 4.3 Edited note, now reads: *“Do NOT weld on or drill into fuel tanks, vehicle Roll Over Protection System (ROPS) or Falling Object Protection Systems (FOPS)”* 4.4 Edited note, now reads: *“Do NOT weld on or drill into fuel tanks, vehicle Roll Over Protection System (ROPS) or Falling Object Protection Systems (FOPS)”*

Revision Record			
Revision	**Revision Date**	**ECN#**	**Description**
L (CON'T.)			4.4 table remove vsr50/75 Removed Section 4.4.3 VSR50/VSR75 Agent Cylinder & Weld Ring Added V13 3x Nozzle (4.5.4), V25/VH25 5x Nozzle (4.5.7), V25/VH25 6x Nozzle (4.5.8, 4.5.10), V30/VH30 7x Nozzle (4.5.12 & 4.5.13), V50/VS50 10x Nozzle (4.5.15 & 4.5.17), VS75 14x Nozzle (4.5.22, 4.5.23, 4.5.24, 4.5.25, & 4.5.26) 4.5 Revised note about P Clamps to *"The Agent Distribution Network must be secured to the vehicle with the use of padded "P" clamps. Consult the hose manufacturer's specifications for best mounting practices."* 4.5 Note updated: *"Elbows may be used in a 45° or 90° configuration but cannot exceed quantities as shown in the Tables in Sections 4.5.2 thru 4.5.18. Note: elbows attached after nozzle bracket do count towards the total for that section of hose."* 4.5 Note added: *"The use of "Street Elbows" or any other elbow that creates a reduction in cross-sectional area is NOT ALLOWED."* 4.5 removed note *"Hoses must have operating temperatures of –65°F to + 200°F (-54°C to +93°C)." Revised note to now say "*The installer must be aware of ambient temperature range for hose selection and not to exceed those temperature ratings." 4.5.3 Reducing tees can be used in place of tees with reducing bushings 4.5.5 Reducing tees can be used in place of tees with reducing bushings 4.5.11 Reducing tees can be used in place of tees with reducing bushings 4.5.13 Reducing tees can be used in place of tees with reducing bushings 4.5.30 Listed the tubing ID requirement and sidewall thinkness/specification 4.6.1 Tee Handle – removed tee handle. Only used for service/recharge. 4.5.31 Added note "vehicle Roll Over Protection System (ROPS) and Falling Object Protection Systems (FOPS)" 4.6.1 Remove section. Tee handle in service parts only 4.6.2 Remove 20500 4.6.5 Remove 20500 4.6.6 Remove 20500 Moved Electric/Pneumatic Control Head from 4.6.4 to 4.6.2. Moved Pneumatic Control Head from 4.6.2 to 4.6.4. Moved Pneumatic Control Head, V250 Agent Cylinder from 4.6.3 to 4.6.5 Moved Electric/Pneumatic Control Head, V250 Agent Cylinder from 4.6.5 to 4.6.3. 4.7 removed note *"Hoses must have operating temperatures of –65°F to + 200°F (-54°C to +93°C)." Revised note to now say "*The installer must be aware of ambient temperature range for hose selection and not to exceed those temperature ratings." 4.7 Revised note about P Clamps to *"The Agent Distribution Network must be secured to the vehicle with the use of padded "P" clamps. Consult the hose manufacturer's specifications for best mounting practices."* 4.7 Revised note allowing Actuation Hoses within the hazard area if properly protected with Fire Sleeve

Revision Record			
Revision	**Revision Date**	**ECN#**	**Description**
L (CON'T.)			4.7.1 Remove 23850 4.7.3 Edit note: *"Do not weld on or drill into fuel tanks, vehicle Roll Over Protection System (ROPS) and Falling Object Protection Systems (FOPS)"* 4.7.4 remove 20500 2 places 4.8.1, 4.8.2, & 4.8.3 Remove 23850 4.8.3 figure remove 20500 4.9 Remove 20500 & 23850 6.2.1.3 Note 11 & Note 12 NOW reads "Apply one drop of medium grade thread lock (for example Loctite 242) " 6.2.1.5 Note 10 NOW reads "must be lightly lubricated with Visilox Bluestar V711 or equivalent silicone style lubricant." 6.2.1.6 remove 20500 6.2.2.1 remove VSR75 6.2.4.1 remove VSR75 6.2.6 Add chart/graph with cylinder pressure vs temperatures for charging 6.2.7.2 remove 20500 6.2.7.3 remove 20500 Reduced page count of entire manual Added Appendices A, B, C, D, E, F, G, H

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Chapter 1: General Information

This document must be used in conjunction with the following standards:

1. All applicable NFPA standards.
2. All other standards or laws deemed applicable to an installation by local authorities having jurisdiction.
3. UNECE Regulation 107 Certification rules regarding fire suppression systems in engine compartments of buses and coaches. These specific items throughout the manual will be preceded or noted by the E mark logo shown below:



⚠ **IT IS THE RESPONSIBILITY OF INDIVIDUALS WHO INSTALL, OPERATE, INSPECT, RECHARGE AND /OR MAINTAIN THESE SYSTEMS TO READ THIS ENTIRE MANUAL.**

Updated Installation, Operation, and Maintenance Manuals and Technical Bulletins will be available online at www.amerex-fire.com. It is important that these updates and additions be added to this manual according to the instructions that will accompany them.

The applications and use of the Amerex Modular Dry Chemical Vehicle Fire Suppression Systems are limited to the applications and uses described in this manual. Technical data contained herein is based on controlled laboratory testing deemed appropriate by FM Approvals and other listing agencies, and is intended for informational purposes only. The data presented is accurate for the testing performed, but is published with no guarantee relative to a given hazard where factors are different from those encountered during actual tests. Amerex disclaims any liability for any use of the data and information contained herein by any and all other parties. Please direct questions concerning information in this manual to:

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1.1 Introduction

Amerex Modular Dry Chemical Fire Suppression Systems are pre-engineered FM Approved systems that are designed specifically for protection of mobile equipment. Each system uses stored pressure Agent Cylinders with predetermined nozzle flow rates, quantities and discharge volumes. The Dry Chemical Agent is discharged into hazard areas via an Agent Distribution Network consisting of flexible hydraulic hose or stainless steel tubing. The available Agent Cylinders with number of supported Nozzles are listed in Table 1.1.

Model	Part Number	Number of Nozzles
V13ABC	11345	2 or 3
E11 V25ABC	10103	2, 3, 4, 5, or 6
E11 VH25ABC	12252	2, 3, 4, 5, or 6
V30ABC	23252	2, 3, 4, 5, 6, or 7
VH30ABC	22744	2, 3, 4, 5, 6, or 7
V50ABC	10104	2, 3, 4, 5, 6, 7, 8, or 10
VS50 ABC	16969	2, 3, 4, 5, 6, 7, 8, or 10
VS75 ABC	25204	2, 3, 4, 5, 6, 7, 8, 10, 12, or 14
V13ABC PRS SW	15647	2 or 3
E11 V25ABC PRS SW	15591	2, 3, 4, 5, or 6
E11 VH25ABC PRS SW	15524	2, 3, 4, 5, or 6
V30ABC PRS SW	23251	2, 3, 4, 5, 6, or 7
VH30ABC PRS SW	22743	2, 3, 4, 5, 6, or 7
V50ABC PRS SW	15590	2, 3, 4, 5, 6, 7, 8, or 10
VS50 ABC PRS SW	16979	2, 3, 4, 5, 6, 7, 8, or 10
VS75 ABC PRS SW	22373	2, 3, 4, 5, 6, 7, 8, 10, 12, or 14
V250 ABC PRS SW	22838	12, 18, or 24
V13PK	11346	2 or 3
V25PK	10981	2, 3, 4, 5, or 6
V25PK PRS SW	15651	2, 3, 4, 5, or 6
VH25PK	12318	2, 3, 4, 5, or 6
V50PK	10982	2, 3, 4, 5, 6, 7, 8, or 10
VS50 PK PRS SW	16980	2, 3, 4, 5, 6, 7, 8, or 10

Table 1.1

ABC = ABC Agent, PK = Purple K Agent
PRS SW = Pressure Switch on Valve

1.2 What Can Be Protected

A complete hazard analysis must be performed for each piece of equipment being protected to determine the machine components that would require fire suppression by the Amerex Modular Dry Chemical Fire Suppression System. Protection may include but is not limited to:

- Earth Moving Equipment - Dozers, Haul Trucks, Cranes, Shovels, Excavators, Drill Trucks, Conveyers, Blasthole Drills, Core Drills
- Forestry / Land Clearing - Brush Cutters, Skidders, Feller Bunchers, Chippers
- Landfill / Refuse - Garbage Trucks, Compactors, Track Dozers
- Farming Equipment - Tractors, Harvesters, Mowers, Spreaders
- Transit - Rail, Bus
- Mobile Equipment - Pumps, Generators, Compressors, Fracking Trailers, Grinders

1.3 Testing Performed

Amerex Modular Dry Chemical Fire Suppression Systems have completed rigorous testing witnessed by FM Approvals in compliance with the FM 5970 Standard for Heavy Duty Mobile Equipment Protection dated February 2022. The HDME Categories listed below are considered approved through FM Approvals. The abbreviations listed below are as follows:

- SVR = Static Volume Requirement
- DVR = Dynamic Volume Requirement
- DDM = Duration Design Minimum
- R = Range
- AOC = Area of Coverage
- TFV = Total Flooding Volume

ABC Dry Chem

HDME Category	Description	Application Method	Test Method per 5970 Standard	System Scaling Method	Values
HDME-1	Enclosed Engine Compartment (Total uncloseable openings less than 25% of engine compartment surface area)	Total Flood	Section 4.2.1 & 4.2.2	See Appendix A (SVR & DVR)	SVR = 0.222 lb/ft^3 (3.556098 kg/m^3) DVR = 0.005153 lb/ft^3 (0.082543 kg/m^3) DDM = 7.5 s
HDME-2	Open Engine	Local App	Section 4.2.3	Area of Coverage per Nozzle (AOC)	R = 48 in (122 cm) AOC = 27.5 in x 27.5 in area (69.8 cm x 69.8 cm)
HDME-4	Machinery Spaces (Total uncloseable openings equals 5% or less) Examples: Electrical Cabinets, Switchgear Rooms, Flammable/ Combustible Liquid Storage, Ring Gear, Slip Gear, etc.	Total Flood	Section 4.2.5	Maximum Volume/ Maximum Area of Coverage per Nozzle	TFV = 244 ft^3 (6.9 m^3)
HDME-7	Hydraulic Systems, Propulsion Systems, Brake Systems, Drive Motors, Differential Units, Hydraulic Pumps, Control Valves, etc.	Local App	Section 4.2.3	Area of Coverage per Nozzle (AOC)	R = 48 in (122 cm) AOC = 27.5 in x 27.5 in area (69.8 cm x 69.8 cm)
HDME-8	Class A Materials, Combustible Materials, Wood, Refuse, etc.	Local App	Section 4.2.7	Area of Coverage per Nozzle (AOC)	R = 48 in (122 cm) AOC = 27.5 in x 27.5 in area (69.8 cm x 69.8 cm)

See Appendix A for a complete understanding of variables listed in the values column. Additionally, there are example calculations that show how to apply these values for your scaling needs.

Purple K Dry Chem

HDME Category	Description	Application Method	Test Method per 5970	System Scaling Method	Values
HDME-1	Enclosed Engine Compartment (Total uncloseable openings less than 25% of engine compartment surface area)	Total Flood	Section 4.2.1 & 4.2.2	See Appendix A (SVR & DVR)	SVR = 0.252 lb/ft^3 (4.036652 kg/m^3) DVR = 0.006102 lb/ft^3 (0.097744 kg/m^3) DDM = 7.5 s
HDME-2	Open Engine	Local App	Section 4.2.3	Area of Coverage per Nozzle (AOC)	R = 48 in (122 cm) AOC = 27.5 in x 27.5 in area (69.8 cm x 69.8 cm)
HDME-4	Machinery Spaces (Total uncloseable openings equals 5% or less) Examples: Electrical Cabinets, Switchgear Rooms, Flammable/ Combustible Liquid Storage, Ring Gear, Slip Gear, etc.	Total Flood	Section 4.2.5	Maximum Volume/ Maximum Area of Coverage per Nozzle	TFV = 244 ft^3 (6.9 m^3)
HDME-7	Hydraulic Systems, Propulsion Systems, Brake Systems, Drive Motors, Differential Units, Hydraulic Pumps, Control Valves, etc.	Local App	Section 4.2.3	Area of Coverage per Nozzle (AOC)	R = 48 in (122 cm) AOC = 27.5 in x 27.5 in area (69.8 cm x 69.8 cm)

Limitations: Not approved for Class A Materials Fires

Table 1.3.b

Note: A single cylinder can be used to protect multiple hazards and/or HDME categories of coverage as long as the cylinder sizing and network conditions are properly satisfied.

See Appendix A for a complete understanding of variables listed in the values column. Additionally, there are example calculations that show how to apply these values for your scaling needs.

1.3.1 Additional Testing Performed

Testing in accordance with UNECE Regulation 107 for rear engine buses and coaches was also conducted and completed for specific Amerex Suppression Systems.

Testing was conducted on a full scale bus engine compartment mockup, and included low and high fire load test with airflow, hidden fires and reignition tests to duplicate actual conditions encountered in bus and coach applications.

Amerex Systems that are UNECE Regulation 107 approved for bus protection include:

A single V25 or VH25 ABC dry chemical 4 nozzle agent cylinder.

1.4 Uses & Limitations

The Amerex Modular Dry Chemical Fire Suppression System has two options for agent that can be used for fire suppression:

- ABC Dry Chemical - is a multipurpose ammonium phosphate based dry chemical which is effective in suppressing and extinguishing class A, B, and C fires. These fires can be involved in ordinary combustible materials, flammable liquids, and fires involving energized electrical equipment.
- Purple K - is a potassium bicarbonate based dry chemical which is effective in suppressing and extinguishing class B and C fires involving flammable liquids and is safe on fires involving energized equipment.
- *The Class C aspect of these agents is NOT FM Approved.*

CAUTION: Unless all sources of ignition have been removed, the system may be ineffective in suppression of flowing flammable liquid fires. Flammable gases present a potential explosion hazard. The flow of fuels and other combustibles must be stopped before or during activation of the fire suppression system.

Amerex Modular Dry Chemical Fire Suppression Systems shall NOT be considered satisfactory protection for the following:

- *Chemicals containing their own oxygen supply*
- *Combustible metals such as sodium, potassium, magnesium, titanium, and zirconium*
- *Deep seated or burrowing fires in ordinary combustibles where dry chemical cannot reach point of combustion*
- *Explosions*
- *Lithium-ion batteries*

Amerex Modular Dry Chemical Fire Suppression Systems are useful in protecting major vehicle components such as engines, transmissions, charging systems, hydraulic systems, and brake systems. These systems can also give equipment operators additional time to evacuate the vehicle in the event of a fire.

Chapter 2: Component Description

The following sections describe the various components available for use with the Amerex Modular Dry Chemical Fire Suppression Systems. These include Agent Cylinders of various size and capacity and the Cylinder Brackets used for mounting each Agent Cylinder. Also included are the components that comprise the Agent Distribution Network, the Nozzles used for dispersing the Dry Chemical Agent, and various control heads and accessories used to actuate and discharge the Agent Cylinders.

E11 = Acceptable to use for UNECE Regulation 107 approved systems

2.1 Agent Cylinders

The Amerex Modular Dry Chemical Fire Suppression System Agent Cylinders are available in multiple sizes, with different mounting options and orientations. The Agent Cylinders are shipped fully charged from the factory. Each Agent Cylinder includes a brass Agent Cylinder Valve with a Pressure Gauge and a safety Rupture Disc with Dust Cap installed. Agent Cylinders are pressurized with nitrogen gas to a pressure of 350 psi (2413 kPa) at 70°F (21°C). V13 through VS75 Agent Cylinders are equipped with a Shipping Plate (P/N 10099-P006) on top of the Agent Cylinder Valve and Anti-Recoil Plate (P/N 10646-P006) installed on the Agent Cylinder Valve discharge outlet to prevent accidental discharge and to minimize recoil in the unlikely event of an accidental discharge during shipment. (See Figure 2.1.a). The V250 Agent Cylinder is equipped with a Protective Cap (P/N 17990-P001) and Anti-Recoil Plug (P/N 17559-P001) to prevent accidental discharge and to minimize recoil for an accidental discharge during shipment (See Figure 2.1.b). These safety components are removed only when the Agent Cylinder is installed in the Cylinder Bracket and connected to Agent Distribution Network.

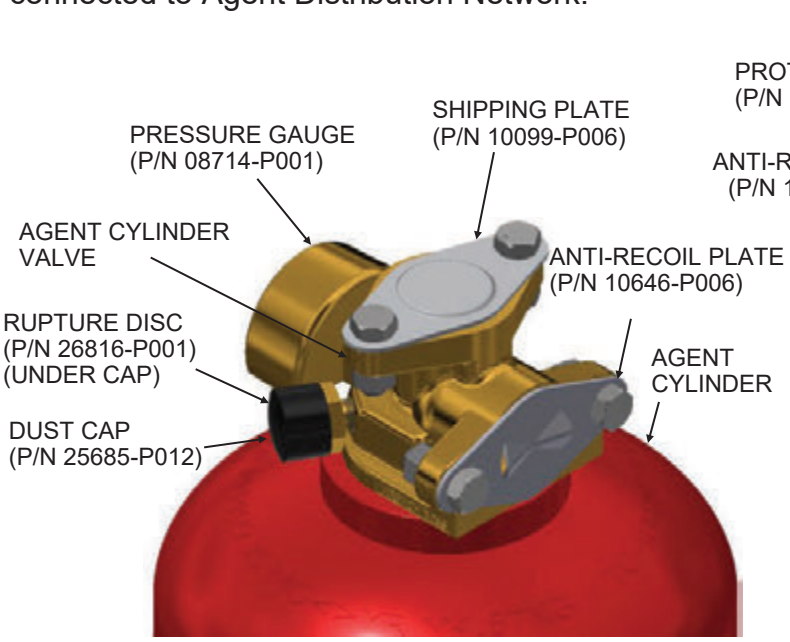


Figure 2.1.a

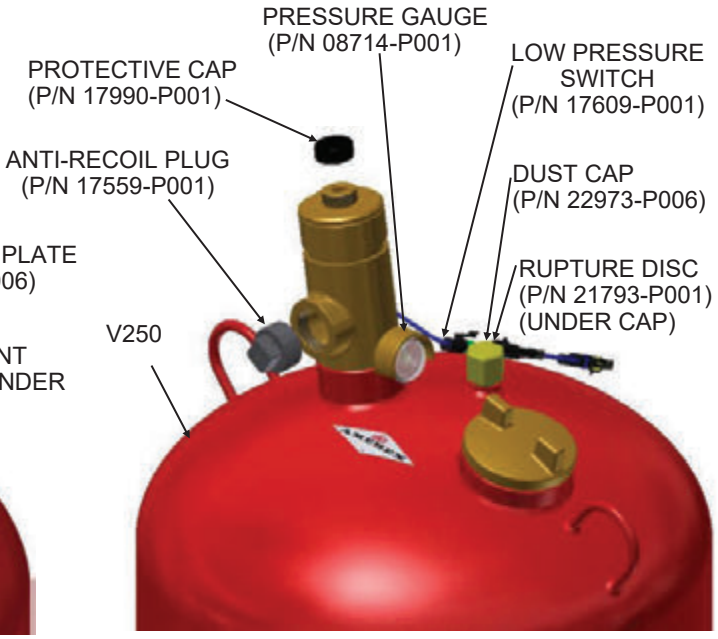


Figure 2.1.b

WARNING: PLATES (FIGURE 2.1.a), PROTECTIVE CAP, AND ANTI RECOIL PLUG (FIGURE 2.1.b) WILL BE REMOVED AT INSTALLATION. RETAIN FOR LATER USE. DO NOT REMOVE UNTIL DIRECTED TO DO SO.

Agent Cylinders are DOT 4BW350, tested to 700 psi (4826 kPa) and require a hydrostatic test every twelve years, or more frequent intervals if warranted. The operating temperature range of the Agent Cylinders is -65°F to 150°F (-54°C to 66°C).

2.1.1 Vertical Agent Cylinders

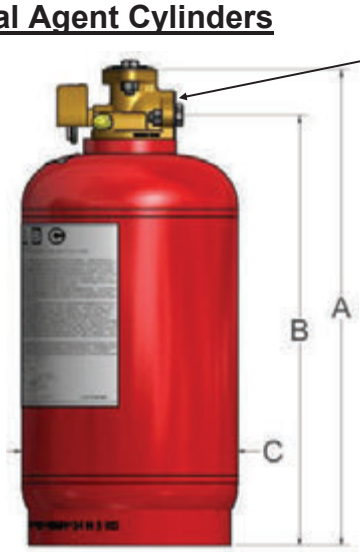


Figure 2.1.1.a

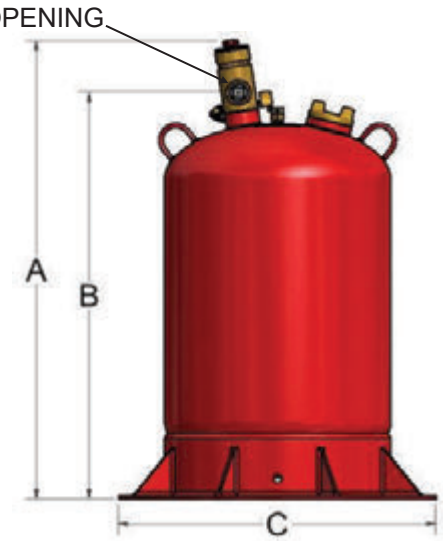


Figure 2.1.1.b

Agent Cylinder	Figure	Overall Height (A) in (mm)	Height to Discharge Opening (B) in (mm)	Diameter (C) in (mm)	Agent Capacity lb (kg)
V13	2.1.1.a	15.5 (394)	14.0 (356)	7.0 (178)	13 (5.9)
E11 V25	2.1.1.a	17.7 (450)	16.2 (411)	9.0 (229)	25 (11.3)
V30	2.1.1.a	21.3 (541)	19.8 (502)	9.0 (229)	32 (14.5)
V50	2.1.1.a	30.9 (785)	29.4 (747)	9.0 (229)	50 (22.7)
VS50	2.1.1.a	16.0 (406)	14.5 (368)	14.0 (356)	50 (22.7)
VS75	2.1.1.a	25.8 (655)	24.2 (615)	14.0 (356)	75 (34)
V250	2.1.1.b	40.4 (1026)	36.0 (914)	28.0 (711)	250 (113.4)

Table 2.1.1

2.1.2 Horizontal Agent Cylinders

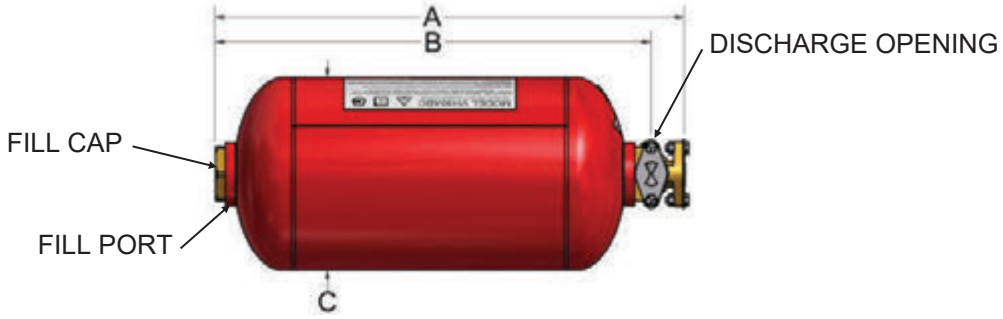


Figure 2.1.2

Agent Cylinder	Overall Length (A) in (mm)	Distance to Discharge Opening (B) in (mm)	Diameter (C) in (mm)	Agent Capacity lb (kg)
E11 VH25	18.4 (467)	16.9 (429)	9.0 (229)	25 (11.3)
VH30	21.8 (554)	20.3 (516)	9.0 (229)	32 (14.5)

Table 2.1.2

2.2 Agent Cylinder Mounting Brackets

Cylinder Brackets vary depending on the size and mounting orientation for the corresponding Agent Cylinder. Available Cylinder Brackets for each Agent Cylinder are shown in Table 2.2. Overall dimensions and mounting locations are shown in the following sections. Only the specified Amerex Cylinder Bracket can be used to mount an Agent Cylinder. Use of non Amerex Cylinder Brackets is prohibited. Refer to Section 4.4 for Cylinder Bracket selection and mounting options.

Agent Cylinder	Cylinder Bracket	Part Number
V13	V13 Cylinder Bracket	12156
E11 V25	V25 Cylinder Bracket	10180
E11 VH25	VH25 Cylinder Bracket	11338
V30	V30 Cylinder Bracket	23259
VH30	VH30 Cylinder Bracket	22685
V50	V50 Cylinder Bracket	10181
VS50	VS50 Cylinder Bracket	16974
VS75	VS75 Cylinder Bracket	22260
V250	V250 Weld Ring	22966

Table 2.2

2.2.1 V13 Cylinder Bracket (P/N 12156) for V13 Cylinder (P/N 11345, 15647 & 11346)

Replacement straps for Cylinder Bracket are available (P/N 24747). Dimensions are in inches [mm].

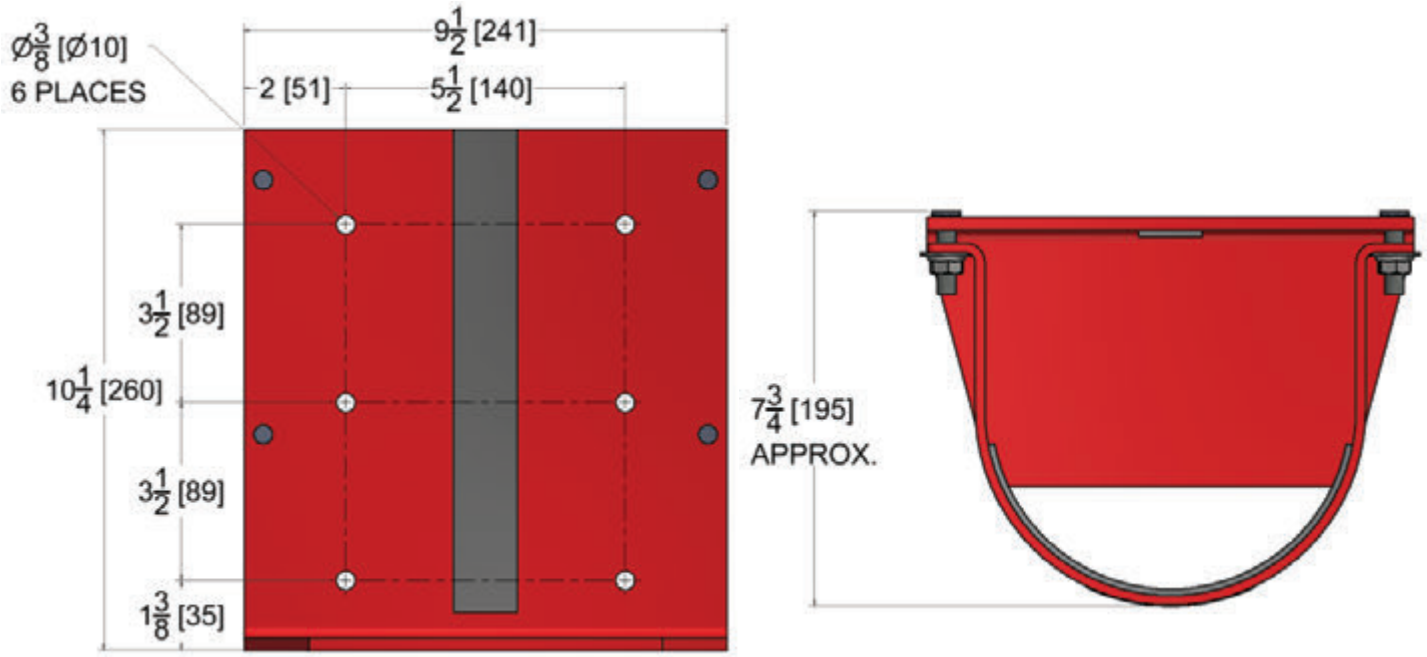


Figure 2.2.1

2.2.2 V25 Cylinder Bracket (P/N 10180) for V25 Cylinder (P/N 10103, 15591, 10981, & 15651) E11

Replacement straps for Cylinder Bracket are available (P/N 14782). Dimensions are in inches [mm].

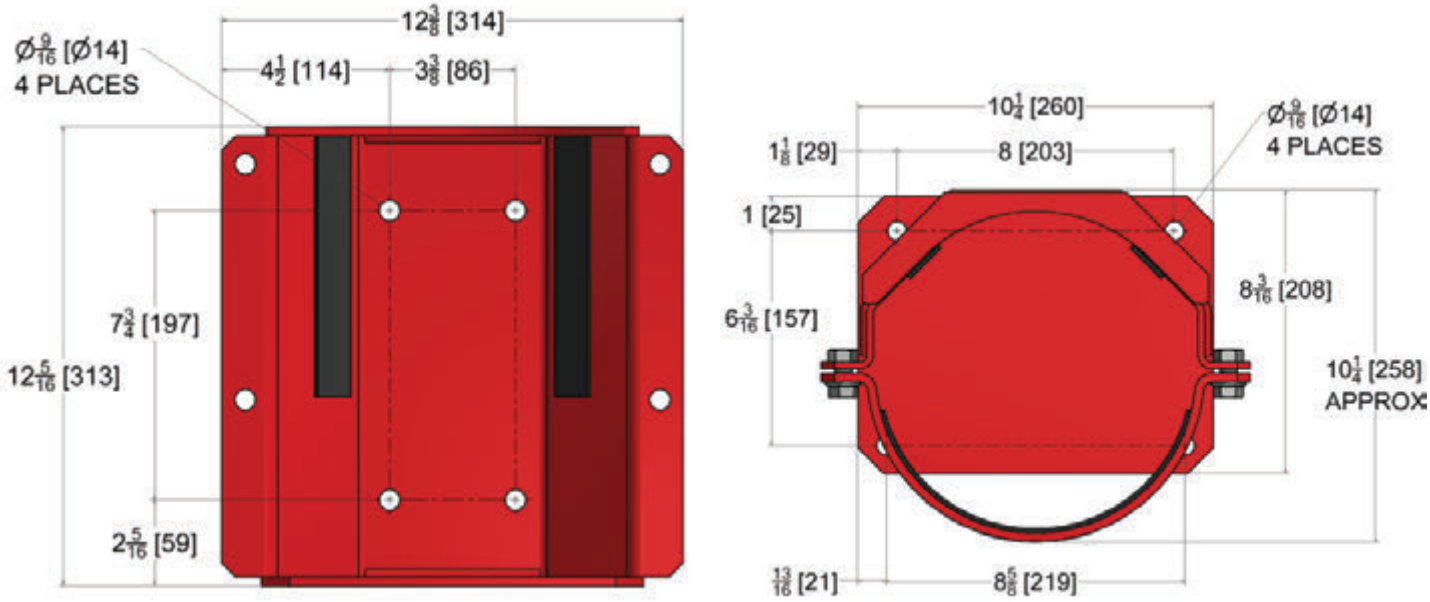


Figure 2.2.2

2.2.3 VH25 Cylinder Bracket (P/N 11338) for VH25 Cylinder (P/N 12252, 15524, & 12318) E11

Replacement straps for Cylinder Bracket are available (P/N 14782). Dimensions are in inches [mm].

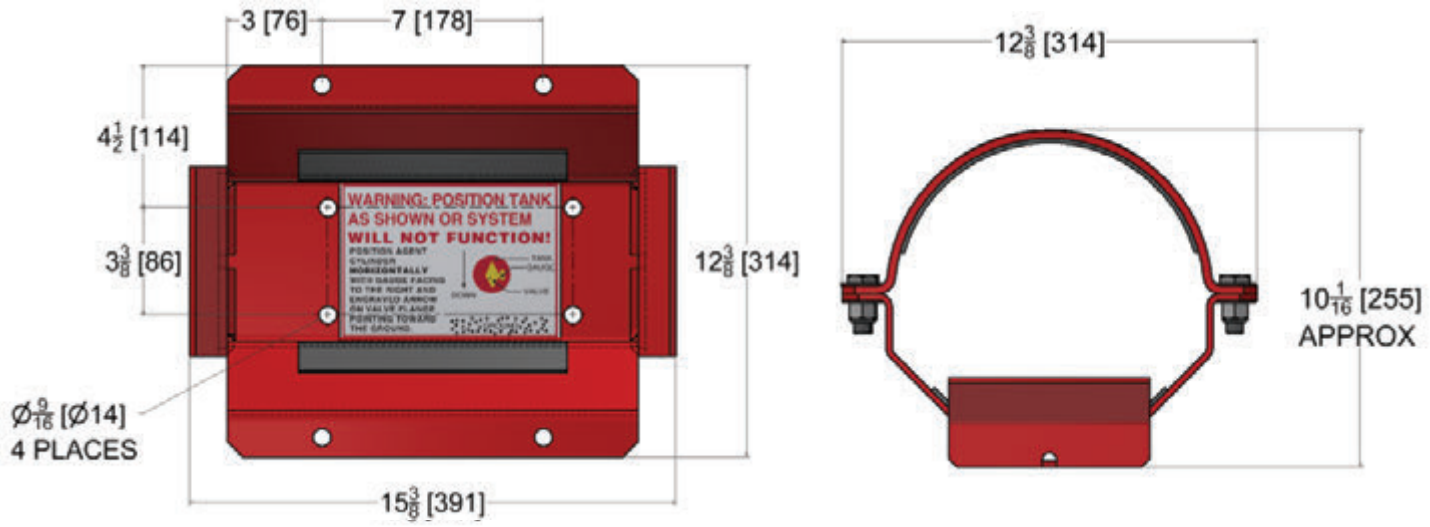


Figure 2.2.3

2.2.4 V30 Cylinder Bracket (P/N 23259) for V30 Cylinder (P/N 23251 & 23252)

Replacement straps for Cylinder Bracket are available (P/N 14782). Dimensions are in inches [mm].

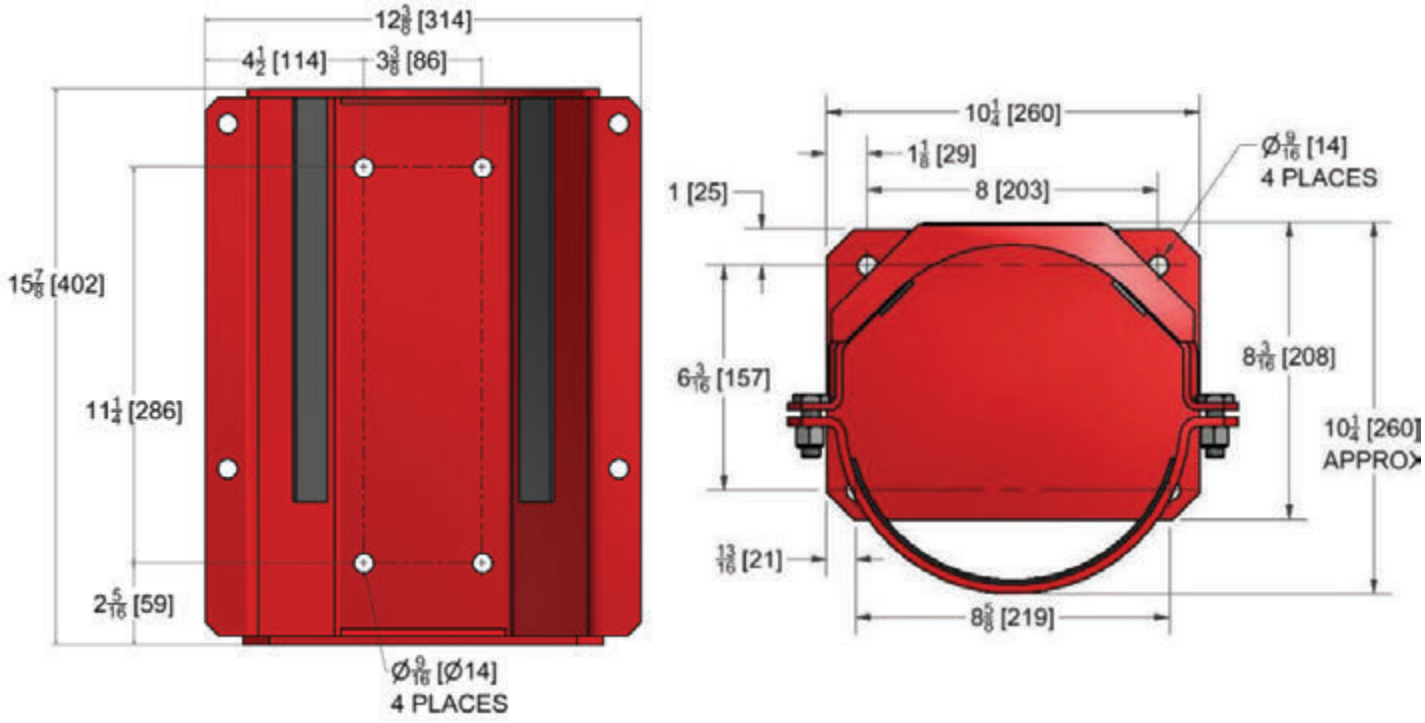


Figure 2.2.4

2.2.5 VH30 Cylinder Bracket (P/N 22685) for VH30 Cylinder (P/N 22743 & 22744)

Replacement straps for Cylinder Bracket are available (P/N 14782). Dimensions are in inches [mm].

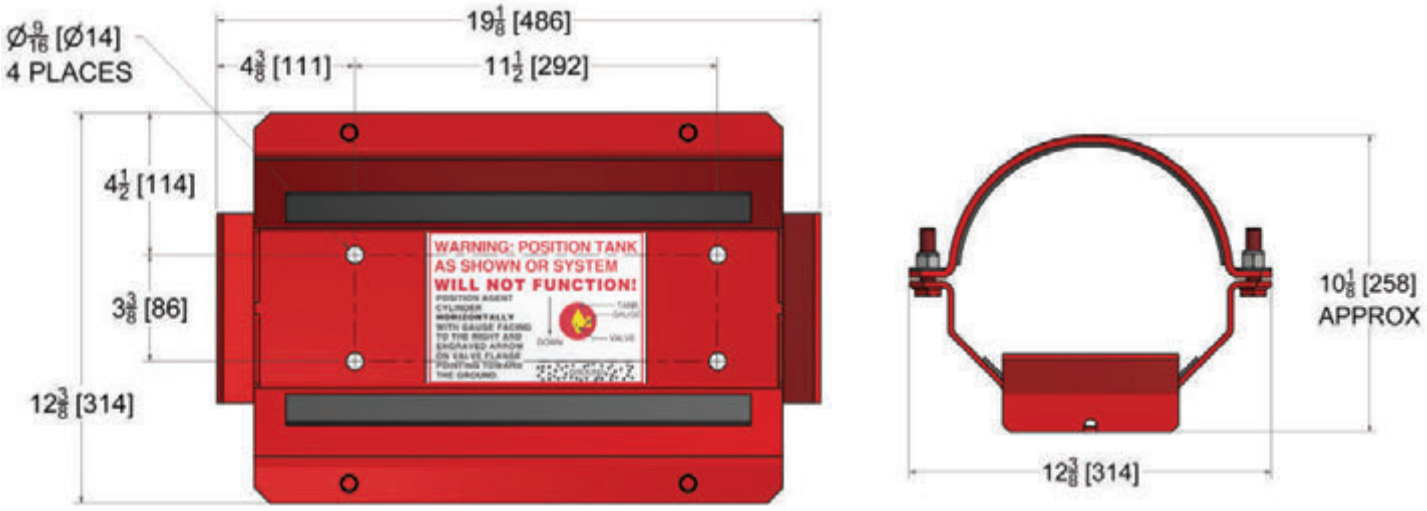


Figure 2.2.5

2.2.6 V50 Cylinder Bracket (P/N 10181) for V50 Cylinder (P/N 10104, 15590 & 10982)

Replacement straps for Cylinder Bracket are available (P/N 14782). Dimensions are in inches [mm].

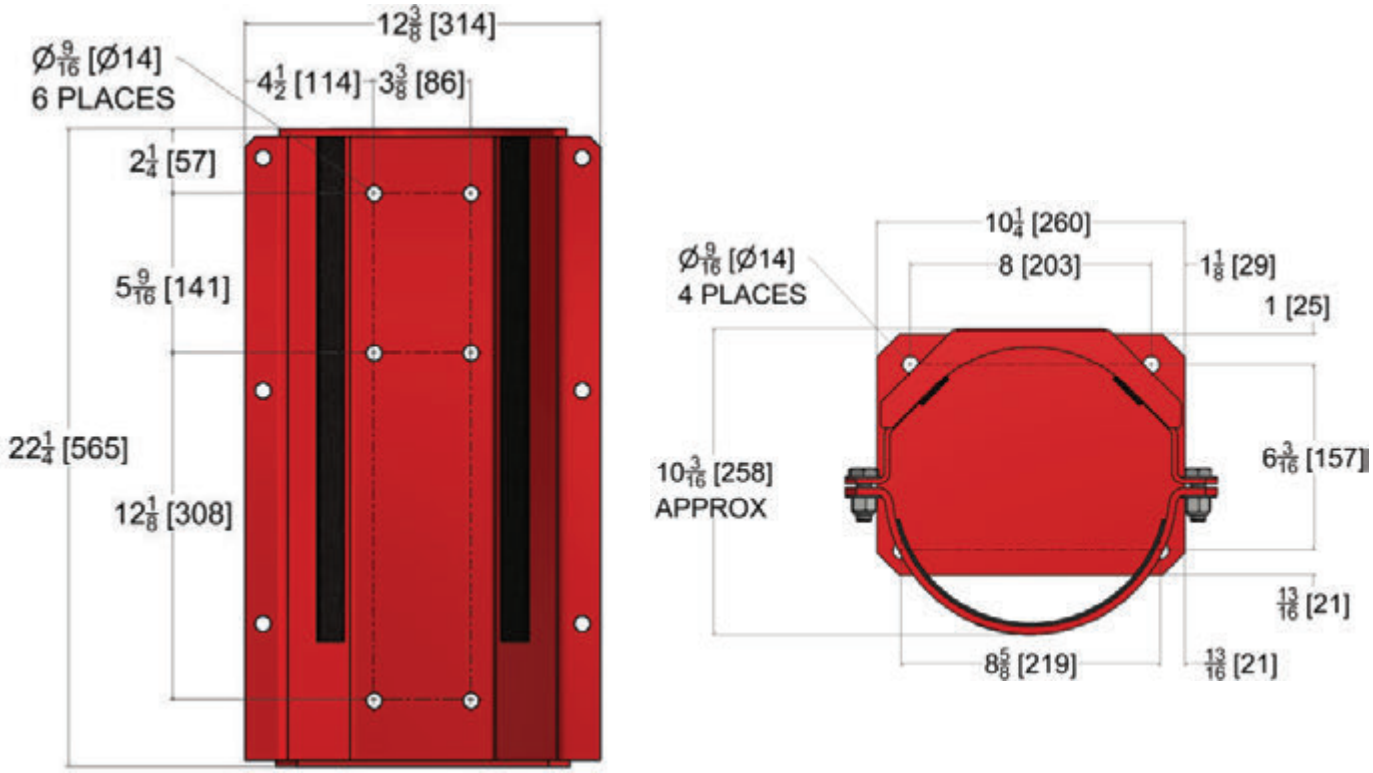


Figure 2.2.6

2.2.7 VS50 Cylinder Bracket (P/N 16974) for VS50 Cylinder (P/N 16969, 16979, 16980)

Replacement straps for Cylinder Bracket are available (P/N 22220). Dimensions are in inches [mm].

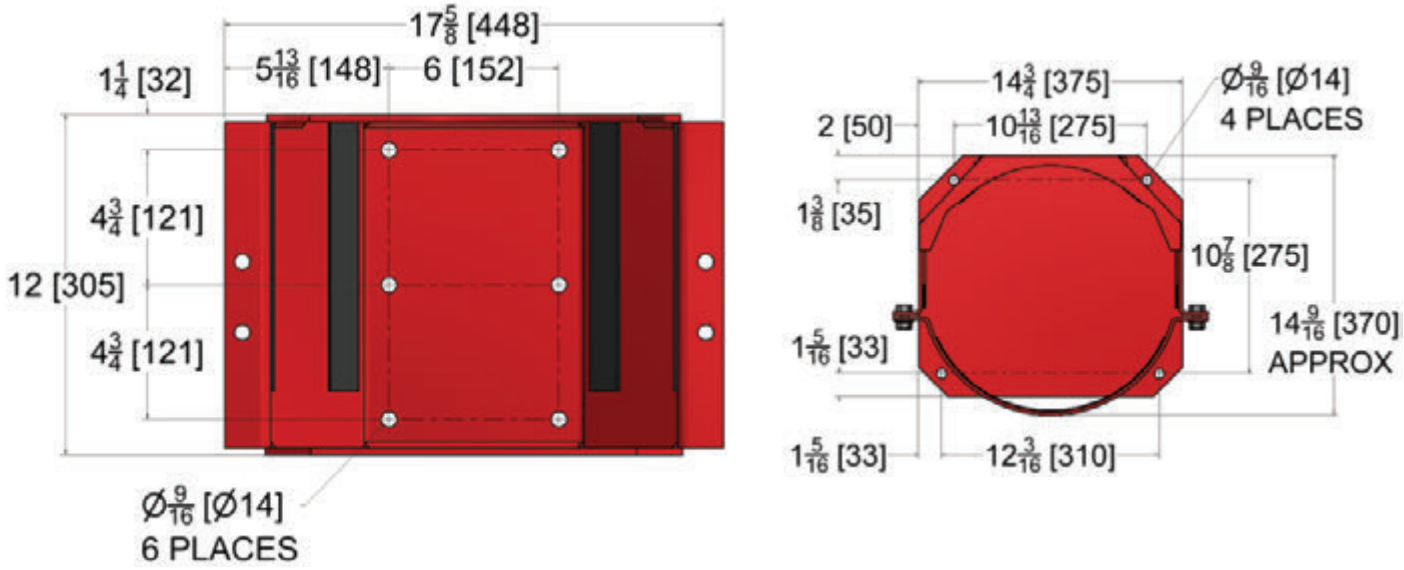


Figure 2.2.7

2.2.8 VS75 Cylinder Bracket (P/N 22260) for VS75 Cylinder (P/N 22373)

Replacement straps for Cylinder Bracket are available (P/N 27393). Dimensions are in inches [mm].

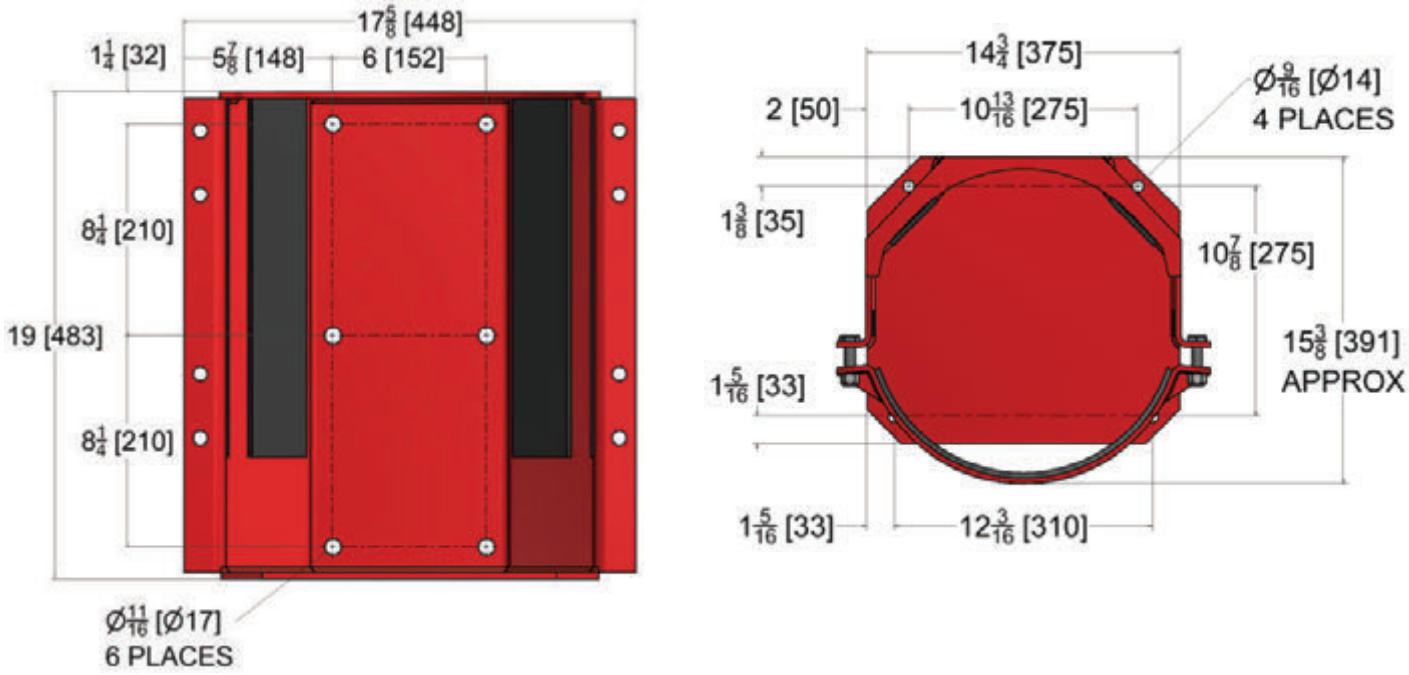


Figure 2.2.8

2.2.9 V250 Weld Ring (P/N 22966) for V250 Cylinder (P/N 22838)

Dimensions are in inches [mm].

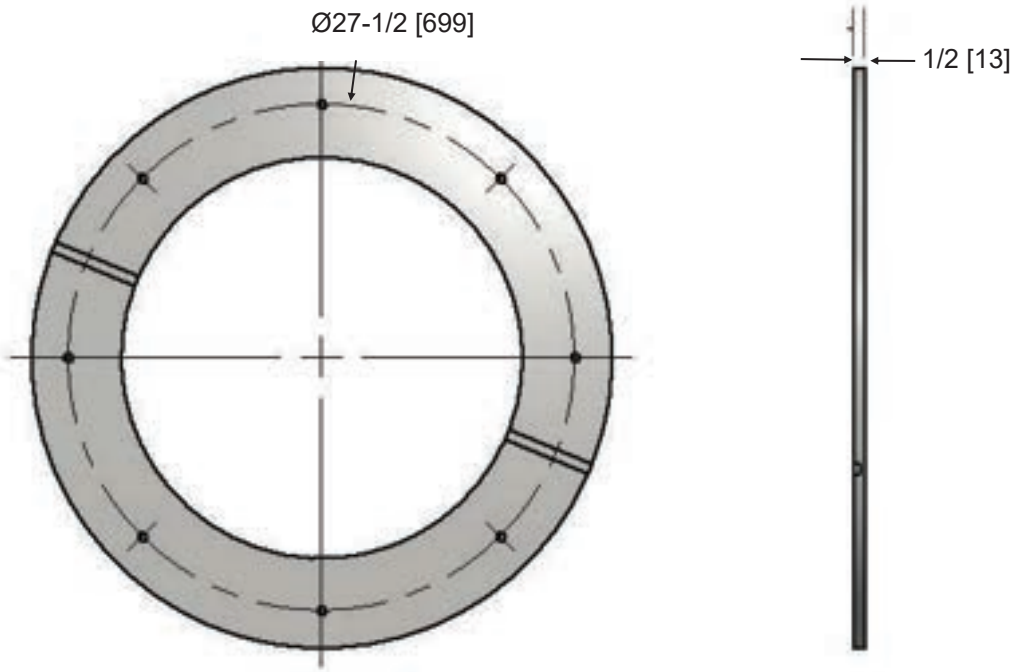


Figure 2.2.9

2.3 Agent Distribution Network Accessories

2.3.1 Discharge Fitting Kit (P/N 10199)

The Discharge Fitting Kit is used to connect the Agent Cylinder Valve to the Agent Distribution Network. It consists of a brass fitting with an o-ring seal (P/N 10140-P006) on one end and 3/4 NPT male pipe threads on the other, and a stainless steel flange for locking the fitting in place. The flange is placed over the threaded end of the fitting before connection to the Agent Distribution Network. See Section 4.5.1 for installation instructions.

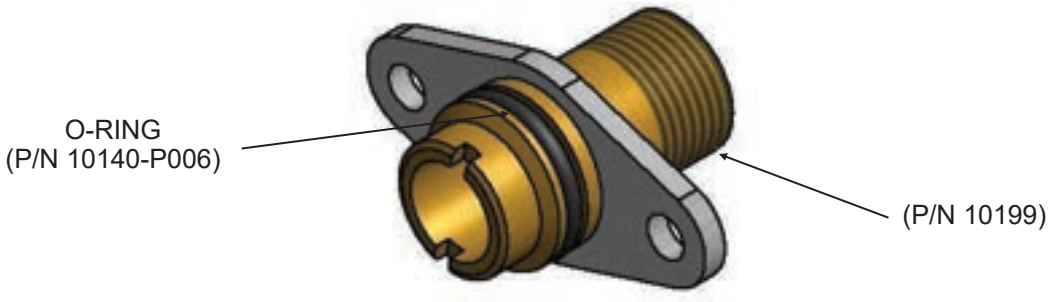


Figure 2.3.1

2.3.2 Agent Distribution Network Plumbing

The Agent Distribution Network carries the Dry Chemical Agent from the Discharge Fitting Kit to the Nozzles. The network consists of 1/2 in (12.7 mm), 3/4 in (19.1 mm) and 1-1/4 in (31.75 mm) ID, wire braided rubber hydraulic hose, and/or stainless steel tubing with their corresponding fittings. Distribution hose/tubing and fittings are installer supplied. Detailed specifications for these hoses/tubing by manufacturer are given in Section 4.5. Care must be taken to always use only the brand of fittings specified by each hose manufacturer for their hose. Substitution of unapproved hose/tubing or that of a different size will void FM Approvals, AMEREX warranty, and will adversely affect system performance. See Section 4.5 for installation instructions.

2.3.3 Distributor Blocks

2.3.3.1 Distributor Block 3/4 X 1/2 (P/N 10178)

The Distributor Block 3/4 X 1/2 is used in the Agent Distribution Network to distribute the flow of Dry Chemical Agent to multiple nozzles. It has one inlet with 3/4 NPT threaded port, and four outlets with 1/2 NPT threaded ports. The Distributor Block is painted black to inhibit corrosion. See Section 4.5 for the proper Agent Distribution Network to be used with this Distributor Block.

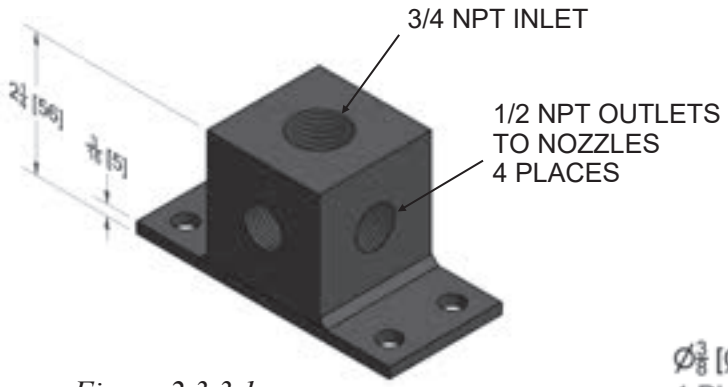


Figure 2.3.3.1.a

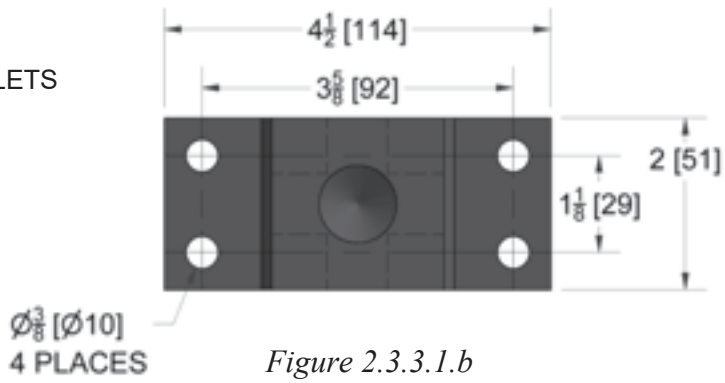


Figure 2.3.3.1.b

2.3.3.2 Distributor Block 3/4 X 3/4 (P/N 22517)

The Distributor Block 3/4 X 3/4 is used in the Agent Distribution Network to distribute the flow of Dry Chemical Agent. It has one inlet with 3/4 NPT threaded port, and four outlets with 3/4 NPT threaded ports. The Distributor Block is painted black to inhibit corrosion. See Section 4.5 for the proper Agent Distribution Network to be used with this Distributor Block.

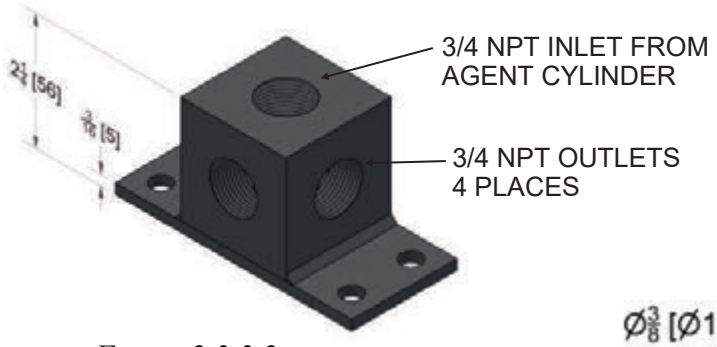


Figure 2.3.3.2.a

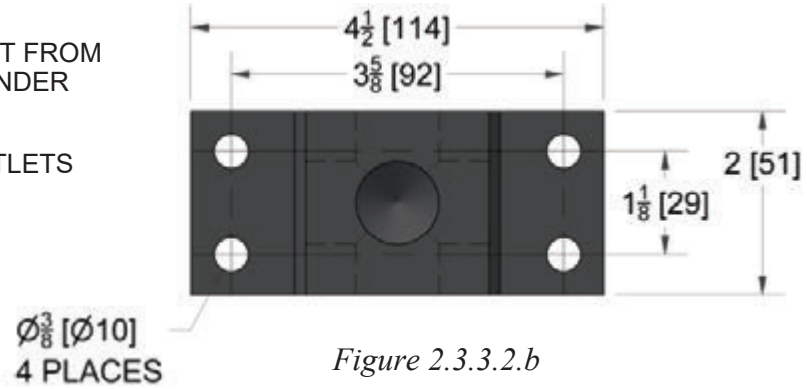


Figure 2.3.3.2.b

2.3.3.3 Distributor Block 1-1/4 X 3/4 (P/N 22853)

The Distributor Block 1-1/4 X 3/4 is used in the Agent Distribution Network to distribute the flow of Dry Chemical Agent. It has one inlet with 1-1/4 NPT threaded port, and three outlets with 3/4 NPT threaded ports. The Distributor Block is painted black to inhibit corrosion. See Section 4.5 for the proper Agent Distribution Network to be used with the Distributor Block.

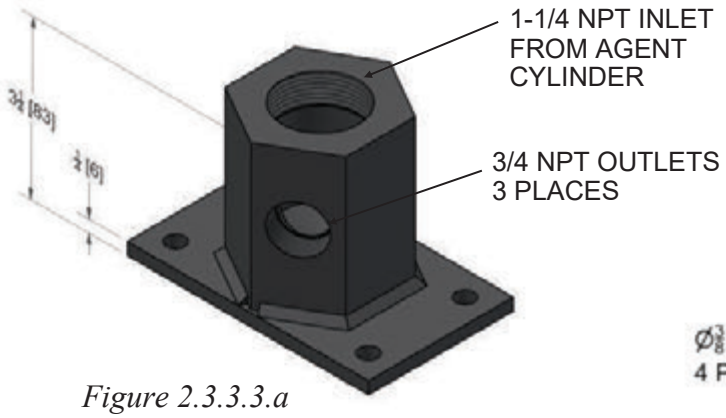


Figure 2.3.3.3.a

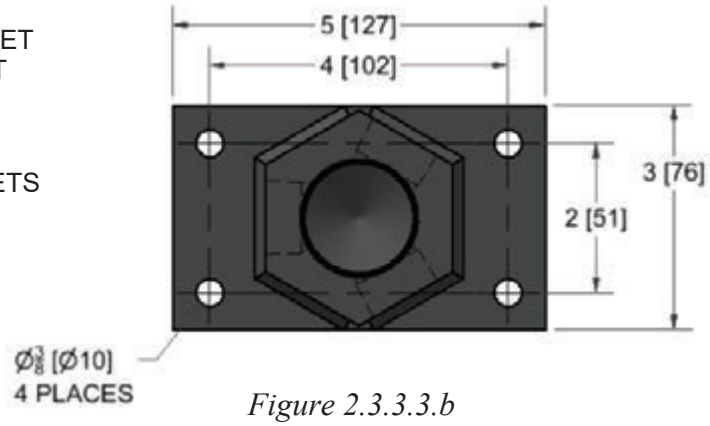


Figure 2.3.3.3.b

2.3.3.4 Distributor Block 1-1/4 X 3/4 (P/N 22856)

The Distributor Block 1-1/4 X 3/4 is used in the Agent Distribution Network to distribute the flow of Dry Chemical Agent. It has one inlet with 1-1/4 NPT threaded port, and four outlets with 3/4 NPT threaded ports. The Distributor Block is painted black to inhibit corrosion. See Section 4.5 for the proper Agent Distribution Network to be used with this Distributor Block.

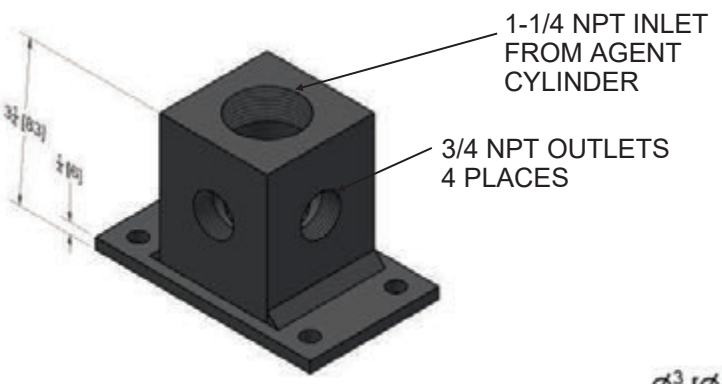


Figure 2.3.3.4.a

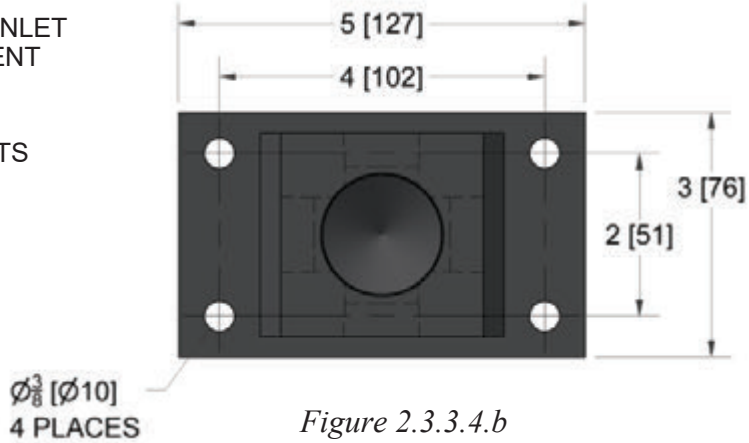


Figure 2.3.3.4.b

2.3.3.5 Distributor Block 3/4 X 1/2 (P/N 22698)

The Distributor Block 3/4 X 1/2 is used in the Agent Distribution Network to distribute the flow of Dry Chemical Agent. It has one inlet with 3/4 NPT threaded port, and six outlets with 1/2 NPT threaded ports. The Distributor Block is painted black to inhibit corrosion. See Section 4.5 for the proper Agent Distribution Network to be used with this Distributor Block.

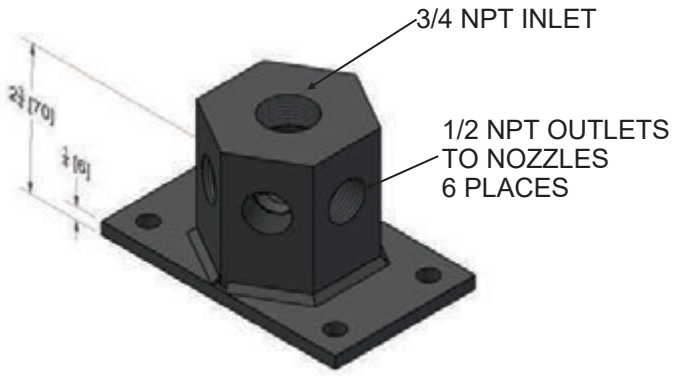


Figure 2.3.3.5.a

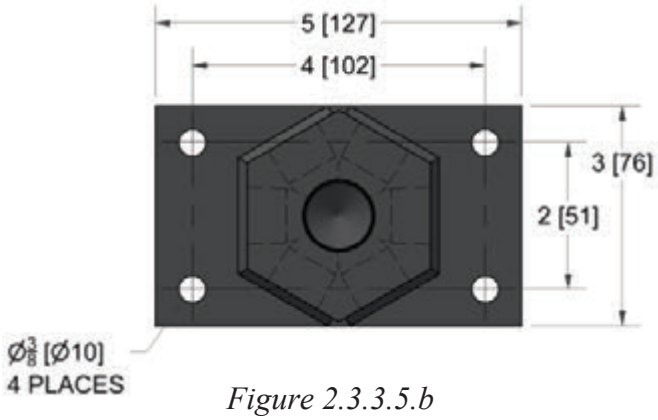


Figure 2.3.3.5.b

2.3.4 Nozzle Bracket (P/N 10780) E11

Nozzle Brackets are used to connect the Agent Distribution Network to the Nozzles as well as support the Nozzles once mounting locations are determined. Nozzle Brackets are a 90° angle with a welded 1/2 NPT coupler. Overall dimensions and mounting locations are shown in Figure 2.3.4. Dimensions are in inches. All Nozzle Brackets are painted black to inhibit corrosion. See Section 4.3 for installation instructions.

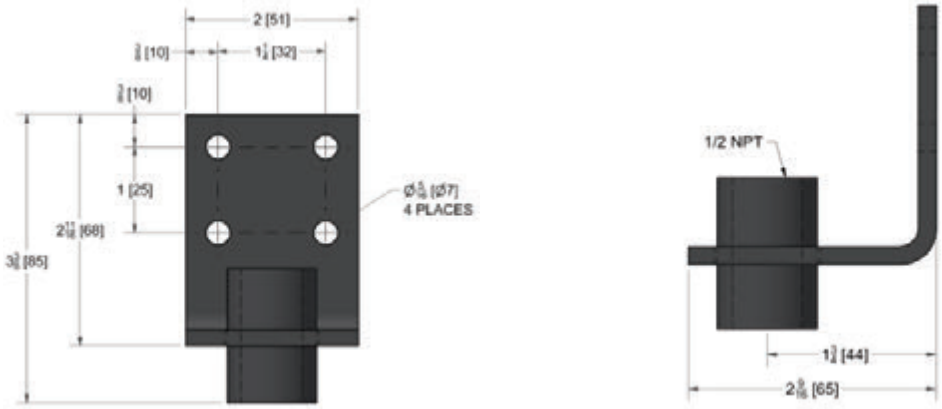


Figure 2.3.4

2.3.5 Discharge Nozzle (P/N 10250) E11

The Discharge Nozzle is used for dispersing Dry Chemical Agent in a cone shaped pattern into the hazard area. It is constructed of brass and is machined with a 1/2 NPT male thread. It is shipped with a heat and weather resistant rubber Protective Nozzle Blow-Off Cap that prevents debris from lodging in the Nozzle outlet. The blow off cap is molded with a retaining loop that assembles over the 1/2 NPT threads before the Nozzle is installed (See Figure 2.3.5). Replacement Nozzle Blow Off Caps are available (P/N 10167-P006/P025). See Section 4.2 for installation instructions.

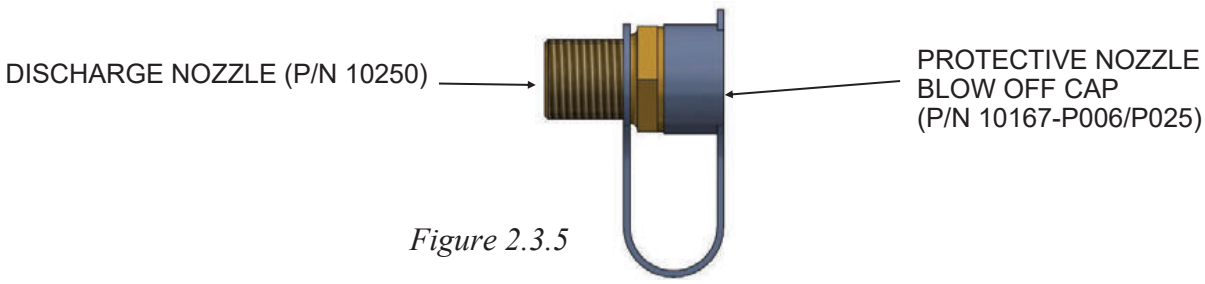


Figure 2.3.5

2.4 System Actuation Control Heads

The following control heads can be used for actuation of the Agent Cylinder Valve, releasing the Dry Chemical Agent from the Agent Cylinder.

2.4.1 Electric Control Head (P/N 14032)

The Electric Control Head is used in electric-only actuated Amerex Modular Dry Chemical Fire Suppression System installations. This device is constructed of machined brass and bolts directly to the top of the Agent Cylinder Valve. The body of the Electric Control Head is threaded to accept a Linear Actuator (P/N 22579). The base retains the actuator piston and locking ring. The Linear Actuator, when activated, will force the piston inside the Electric Control Head down to depress the Agent Cylinder Valve stem, releasing the Dry Chemical Agent. See Section 4.6.1 for installation instructions.

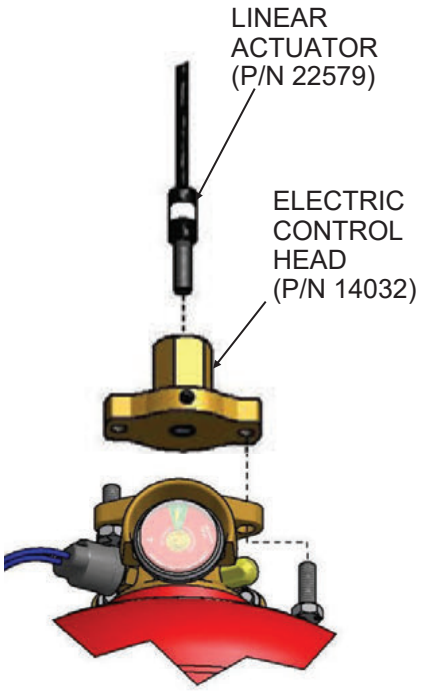


Figure 2.4.1

2.4.2 Electric / Pneumatic Control Head (P/N 17068)

The Electric / Pneumatic Control Head offers two methods to actuate the Amerex Modular Dry Chemical Fire Suppression System. One method is to manually discharge the system using pressure from a Nitrogen Cylinder of a remote Manual Actuator through the Pneumatic Actuation Network. The second method is to discharge the system with use of an electrically actuated Linear Actuator. The Electric / Pneumatic Control Head is constructed of extruded brass and bolts directly to the top of the Agent Cylinder Valve. When supplied with nitrogen pressure from the Pneumatic Actuation Network through 1/4 NPT female ports on either side, the piston inside the Electric / Pneumatic Control Head extends and depresses the Agent Cylinder Valve stem, releasing the Dry Chemical Agent. The top of the Electric / Pneumatic Control Head has a threaded hole that accepts the Linear Actuator (P/N 22579). The Linear Actuator, when activated, will force the piston inside the Electric / Pneumatic Control Head down to depress the Agent Cylinder Valve stem, releasing the Dry Chemical Agent. See Section 4.6.2 for installation instructions.

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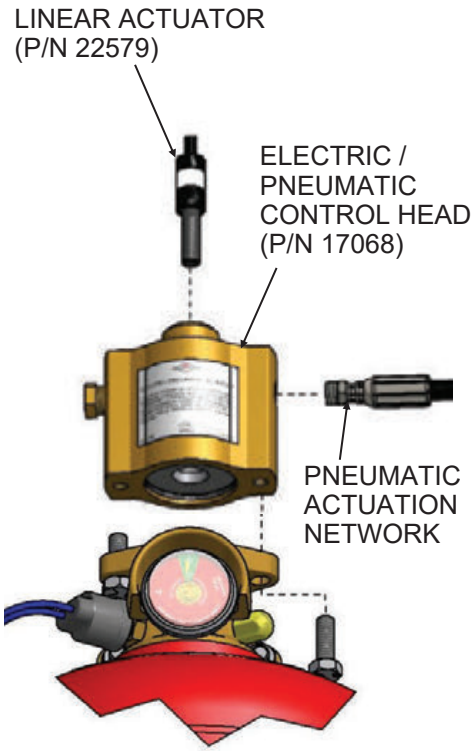


Figure 2.4.2

2.4.3 Electric / Pneumatic Control Head, V250 Agent Cylinder (P/N 22868)

The V250 Electric / Pneumatic Control Head offers two methods to actuate the Amerex Modular Dry Chemical Fire Suppression System. One method is to manually discharge the system using pressure from a Nitrogen Cylinder of a remote Manual Actuator through the Pneumatic Actuation Network. The second method is to discharge the system with use of an electrically actuated Linear Actuator. The Electric / Pneumatic Control Head is constructed of extruded brass and threads directly on the top of the Agent Cylinder Valve. When supplied with nitrogen pressure from the Pneumatic Actuation Network through 1/4 NPT female ports on either side, the piston inside the V250 Electric / Pneumatic Control Head extends and depresses the Schrader valve in the Agent Cylinder Valve, releasing the Dry Chemical Agent. The top of the V250 Electric / Pneumatic Control Head has a threaded hole that accepts a Linear Actuator (P/N 22579). The Linear Actuator, when activated, will force the piston inside the V250 Electric / Pneumatic Control Head down, releasing the Dry Chemical Agent. See Section 4.6.3 for installation instructions.

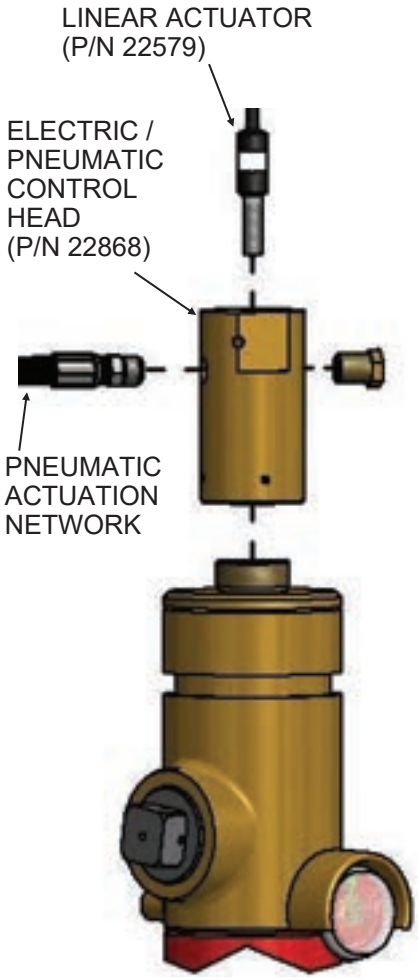


Figure 2.4.3

2.4.4 Pneumatic Control Head (P/N 10147)

The Pneumatic Control Head is used in all pneumatic only actuated Amerex Modular Dry Chemical Fire Suppression System installations using a remote Manual, Electric Nitrogen or Manual/Electric Actuator through the Pneumatic Actuation Network. This device is constructed of extruded brass and bolts directly to the top of the Agent Cylinder Valve. When supplied with nitrogen actuation pressure from the Pneumatic Actuation Network through 1/4 NPT female ports on either side, the piston inside the Pneumatic Control Head extends and depresses the Agent Cylinder Valve stem, releasing the Dry Chemical Agent. See Section 4.6.4 for installation instructions.

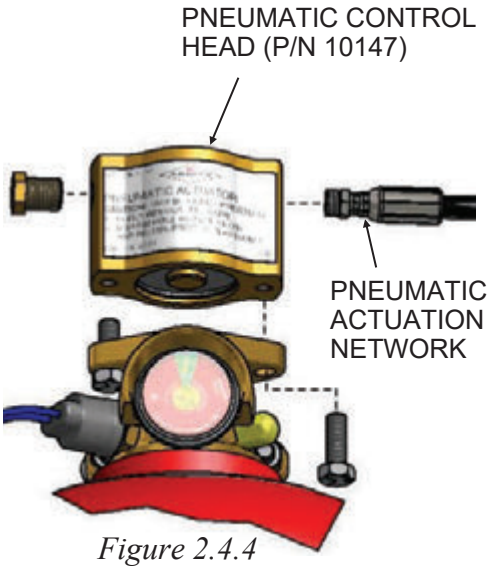


Figure 2.4.4

2.4.5 Pneumatic Control Head, V250 Agent Cylinder (P/N 22869)

The V250 Pneumatic Control Head is used in all pneumatic only actuated Amerex Modular Dry Chemical Fire Suppression System installations using a remote Manual, Electric Nitrogen or Manual/Electric Actuator through the Pneumatic Actuation Network. This device is constructed of extruded brass and threads directly to the top of the Agent Cylinder Valve. When supplied with nitrogen actuation pressure from the Pneumatic Actuation Network through 1/4 NPT female ports on either side, the piston inside the V250 Pneumatic Control Head extends and depresses the Schrader Valve in the top of the Agent Cylinder Valve, releasing the Dry Chemical Agent. See Section 4.6.5 for installation instructions.

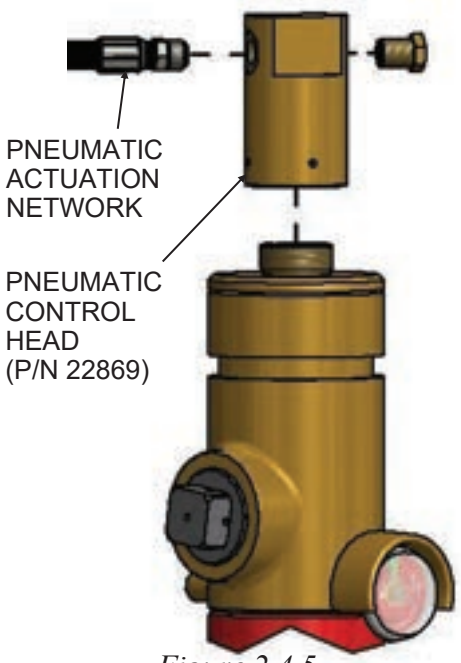


Figure 2.4.5

2.5 System Actuation Accessories

2.5.1 Vent Check (P/N 10173)

The Vent Check is a safety device that installs in the Pneumatic Control Head or the Electric / Pneumatic Control Head. Its function is to relieve any slowly accumulating pressure that could cause the control head to open the Agent Cylinder Valve prematurely. A Vent Check must be used on all systems that utilize nitrogen pressure for activation of the Amerex Modular Dry Chemical Fire Suppression System. The body of the Vent Check is constructed of machined brass. The inside of the Vent Check contains a spring and nylon ball. The Vent Check is supplied with a plastic Dust Cap (P/N 13761-P006), which must be installed on the Vent Check after installation into the Pneumatic Control Head and/or the Electric / Pneumatic Control Head. See Section 4.6 for installation instructions.

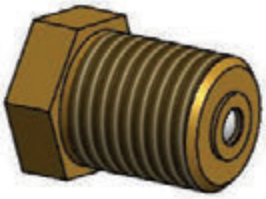


Figure 2.5.1

2.5.2 Linear Actuator (P/N 22579)

The Linear Actuator (P/N 22579 w/ AMP connector) is a device when electrically activated extends a metal shaft which mechanically opens the Agent Cylinder Valve when used in a control head or opens a Nitrogen Cylinder when used in an Electric Nitrogen Actuator. Once activated it cannot be reused and must be replaced. Service life of the Linear Actuator is 6 years after which it must be replaced. Shelf life of the Linear Actuator is 10 years after which it must be replaced whether it has been placed in service or not. Each Linear Actuator is supplied with a Mylar style label for identifying date of manufacture. (P/N 17137-P015)

an O-RING, is provided with each Linear Actuator, and must be used each time that a Linear Actuator is installed. See Section 4.9 for instructions on placing the system into service. See Sections 4.6 and 4.7 for installation instructions.

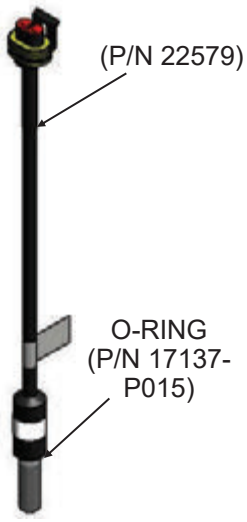


Figure 2.5.2

2.5.3 Electric Nitrogen Actuator (P/N 20775)

The Electric Nitrogen Actuator is used to release nitrogen gas pressure from a Nitrogen Cylinder to pneumatically activate a control head through a Pneumatic Actuation Network. The body of the Electric Nitrogen Actuator is constructed of chrome plated brass and contains a stainless steel puncture point and a 1/4 NPT female port to connect to the Pneumatic Actuation Network. A brass adapter is threaded into the top that accepts a Linear Actuator (P/N 22579). The Electric Nitrogen Actuator is supplied with two 1/4”-20 stainless steel cap screws for securing the assembly to an Actuator Bracket. See Section 4.7.4 for installation instructions.

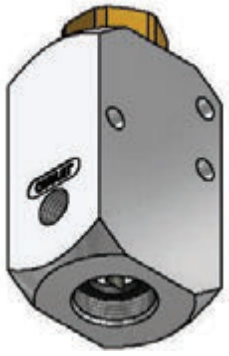


Figure 2.5.3

2.5.4 Manual Actuator (P/N 10210)

The Manual Actuator is used to manually release nitrogen gas pressure from a Nitrogen Cylinder to pneumatically activate a control head through a Pneumatic Actuation Network. The body of the Manual Actuator is chrome plated brass and contains a stainless steel puncture point that is connected to a palm button and locked in place by a stainless steel ring pin. It also contains a 1/4 NPT female port to connect to the Pneumatic Actuation Network. The exposed shaft of the stem is shielded from the elements by a rubber dust boot. The Manual Actuator is supplied with two 1/4”-20 stainless steel cap screws for securing the assembly to an Actuator Bracket. See Section 4.7.4 for installation instructions.

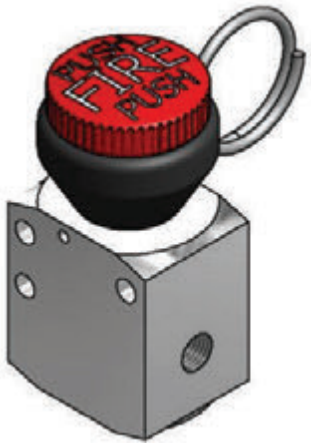


Figure 2.5.4

2.5.5 Manual/Electric Actuator (P/N 23600)

The Manual/Electric Actuator is used to manually or electrically release nitrogen gas pressure from a Nitrogen Cylinder to pneumatically activate a control head through a Pneumatic Actuation Network. The body of the Manual Actuator is chrome plated brass and contains a stainless steel puncture point and upper shaft. This upper shaft contains a palm button, locked in place by a stainless steel ring pin, and also accepts a Linear Actuator (P/N 22579). A 1/4 NPT female port is used to connect to the Pneumatic Actuation Network. The Manual/Electric Actuator is supplied with two 1/4”-20 stainless steel cap screws for securing the assembly to an Actuator Bracket. See Section 4.7.4 for installation instructions.

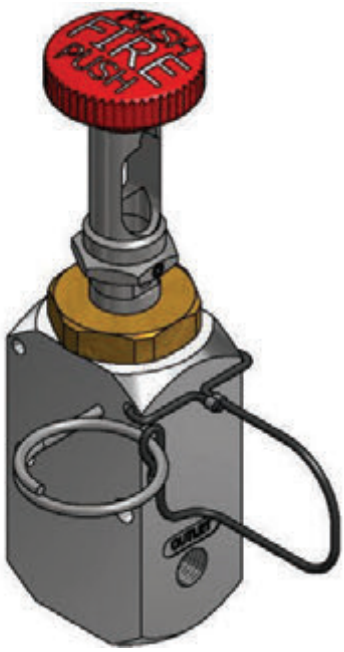


Figure 2.5.5

2.5.6 Actuator Brackets (P/N 10354 & 10355)

The Manual Actuator, Electric Nitrogen Actuator, and Nitrogen Cylinder can be mounted to the vehicle with use of an Indoor Actuator Bracket (P/N 10355) or an Outdoor Actuator Bracket (P/N 10354). Both brackets are constructed of steel and painted to inhibit corrosion. The Outdoor Actuator Bracket includes a steel guard to protect the actuator and Nitrogen Cylinder. See Section 4.7.3 for installation instructions.



Figure 2.5.6

2.5.7 Nitrogen Cylinder (P/N 09956)

The Nitrogen Cylinder supplies nitrogen gas pressure to a control head through the Pneumatic Actuation Network to open the Agent Cylinder Valve. The Nitrogen Cylinder is charged to 1800 psi (12410 kPa) at 70°F (21°C). A pressure gauge is used to identify proper charge pressure of the Nitrogen Cylinder, and is located on the bottom of the Nitrogen Cylinder. The pressure gauge is protected by an impact resistant plastic gauge guard. The Nitrogen Cylinder is shipped fully charged from the AMEREX factory with a protective shipping cap installed on the outlet threads. The cap must be removed at installation but must remain in place at all other times. Retain the shipping cap to reuse when recharging a Nitrogen Cylinder. Construction of the Nitrogen Cylinder is per DOT 3E. The cylinder is rechargeable by certified AMEREX installers and does not require periodic hydro testing. See Section 4.7.4 for installation instructions.



Figure 2.5.7

2.5.8 Check Valve (P/N 10262-P001)

The Check Valve is made of brass material and is required in various locations of the Pneumatic Actuation Network to ensure that the nitrogen gas flows along the correct path to the control head(s). Although more than one actuation circuit can converge in the Pneumatic Actuation Network, each circuit must have an independent path from either a Manual, Electric Nitrogen, or Manual/Electric Actuator to the Agent Cylinder control head. This can be accomplished with use of the Check Valve. Direction of flow must be with nitrogen going into the 1/4 NPT female port and out of the 1/4 NPT male port. See Section 4.8.1 for installation instructions.

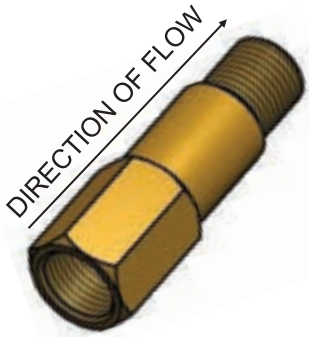


Figure 2.5.8

2.5.9 50 psi Pressure Switch (P/N 22573, 22574)

The 50 psi Pressure Switch is designed to be used in the Pneumatic Actuation Network of a vehicle system. The Switch (P/N 22573 non-terminated version; P/N 22574 w/ AMP connectors) is normally in the open position and closes when subjected to nitrogen pressure in excess of 50 psi. The Switch is threaded with a 1/4 NPT male port. The Switch must be installed in a tee in the Pneumatic Actuation Network just before the first Pneumatic (P/N 10147), or Electric / Pneumatic (P/N 17068) Control Head. The Switch can be utilized to send a signal such as “system discharge” back to the associated electronics panel, or to an external relay for sounding an auxiliary alarm or illuminating a light in the event of system discharge. For terminated Switches, select the appropriate Switch for use with the vehicle’s Amerex Modular Electronics System (See Section 4.9). See Section 4.7.2 for installation instructions. *Note that the pressure switch is NOT a field serviceable part.*



Figure 2.5.9

2.6 Parts List

Parts List			
Item	**Part Number**	**Description**	**Ref. Section**
1	11345	Agent Cylinder, V13ABC	1.1 / 2.1 / 4.4
	(E11) 10103	Agent Cylinder, V25ABC	
	(E11) 12252	Agent Cylinder, VH25ABC	
	23252	Agent Cylinder, V30 ABC	
	22744	Agent Cylinder, VH30ABC	
	10104	Agent Cylinder, V50ABC	
	16969	Agent Cylinder, VS50 ABC	
	25204	Agent Cylinder, VS75 ABC	
	15647	Agent Cylinder, V13ABC PRS SW	
	(E11) 15591	Agent Cylinder, V25ABC PRS SW	
	(E11) 15524	Agent Cylinder, VH25ABC PRS SW	
	23251	Agent Cylinder, V30ABC PRS SW	
	22743	Agent Cylinder, VH30ABC PRS SW	
	15590	Agent Cylinder, V50ABC PRS SW	
	16979	Agent Cylinder, VS50 ABC PRS SW	
	22373	Agent Cylinder, VS75 ABC PRS SW	
	22838	Agent Cylinder, V250 ABC PRS SW	
	11346	Agent Cylinder, V13PK	
	10981	Agent Cylinder, V25PK	
	12318	Agent Cylinder, VH25PK	
	10982	Agent Cylinder, V50PK	
	16980	Agent Cylinder, VS50 PK PRS SW	
2	12156	Cylinder Bracket, V13	2.2.1 / 4.4
	(E11) 10180	Cylinder Bracket, V25	2.2.2 / 4.4
	(E11) 11338	Cylinder Bracket, VH25	2.2.3 / 4.4
	23259	Cylinder Bracket, V30	2.2.4 / 4.4
	22685	Cylinder Bracket, VH30	2.2.5 / 4.4
	10181	Cylinder Bracket, V50	2.2.6 / 4.4
	16974	Cylinder Bracket, VS50	2.2.7 / 4.4
	22260	Cylinder Bracket, VS75	2.2.8 / 4.4
	22966	Weld Ring, V250	2.2.10 / 4.4
3	(E11) 10199	Discharge Fitting Kit	2.3.1 / 4.5
4	-	Network Plumbing	2.3.2 / 4.5
5	(E11) 10178	Distributor Block, 3/4 in X 1/2 in (4)	2.3.3.1 / 4.5
	22517	Distributor Block, 3/4 in X 3/4 in (4)	2.3.3.2 / 4.5
	22853	Distributor Block, 1-1/4 in X 3/4 in (3)	2.3.3.3 / 4.5
	22856	Distributor Block, 1-1/4 in X 3/4 in (4)	2.3.3.4 / 4.5
	22698	Distributor Block, 3/4 in X 1/2 in (6)	2.3.3.5 / 4.5
6	(E11) 10780	Nozzle Bracket	2.3.4 / 4.3
7	(E11) 10250	Nozzle	2.3.5 / 4.2
	10167-P006/025	Nozzle Blowoff Cap Sales	

Table 2.6.a

Item	Part Number	Description	Ref. Section
8	14032	Control Head, Electric	2.4.1 / 4.6 / 6.2.1
	17068	Control Head, Electric / Pneumatic	2.4.2 / 4.6 / 6.2.1
	22868	Control Head, Electric / Pneumatic, V250	2.4.3 / 4.6 / 6.2.1
	10147	Control Head, Pneumatic	2.4.4 / 4.6 / 6.2.1
	22869	Control Head, Pneumatic, V250	2.4.5 / 4.6 / 6.2.1
	10134	Control Head, Tee Handle	2.4.6 / 4.6 / 6.2.1
9	10173	Vent Check	2.5.1 / 4.6 / 4.7 / 4.8
10	22579	Linear Actuator (AMP Connector)	2.5.2 / 4.6 / 4.7 / 4.9
11	20775	Actuator, Electric	2.5.3 / 4.7 / 6.2.7
	10210	Actuator, Manual	2.5.4 / 4.7 / 6.2.7
	23600	Actuator, Manual/Electric	2.5.5 / 4.7 / 6.2.7
12	10354	Actuator Bracket, Outdoor	2.5.6 / 4.7
	10355	Actuator Bracket, Indoor	
13	09956	Nitrogen Cylinder	2.5.7 / 4.7 / 6.2.9
14	10262-P001	Check Valve	2.5.8 / 4.8
15	22573	Pressure Switch, 50 psi, Non-terminated	2.5.9 / 4.7 / 4.8 / 4.9
	22574	Pressure Switch, 50 psi, Terminated (AMP Conn.)	

Table 2.6.a con't.

Service Tools				
Item	**Part Number**	**Description**	**Qty. for Service**	**Ref. Section**
1	10136	Recharge Adapter	1	6.1.1 / 6.2.6.1
	23065	Recharge Adapter, V250		6.1.8 / 6.2.6.2
2	05152	Hydrotest Adapter	1	6.1.2 / 5.5
	23450	Hydrotest Adapter, V250		
3	12129	Blowout Adapter, Distribution Hose	1*	6.1.3 / 6.2.2.1
	22999	Blowout Adapter, Distribution Hose, V250	1	6.1.4 / 6.2.2.2
	23001	Blowout Adapter, Distribution Hose, V250	1	
4	10134	Tee Handle	1*	6.1.5 / 6.2.6.1
5	-	Wrench, 2-1/2" Tight-Clearance Open-End	Installer Supplied	6.1.6 / 6.2.4.1 /6.2.6.1
6	10895	Adapter, Pneumatic Actuation Network Test	1	6.1.7 / 6.2.8
7	10270	Nitrogen Fill Adapter	1	6.2.9

*Not Used for V250 Service

Table 2.6.b

Recharge/Rebuild Parts			
Item	**Part Number**	**Description**	**Ref. Section**
1	10095-P003/P010	Recharge Valve Stem	6.2.4.1
	05239-P012	Quad Ring	6.2.4.1
	23009	Recharge Kit, V250	6.2.4.2
2	09781	Agent Recharge Pail Model 555, ABC Dry Chemical	6.2.5
	04214	Agent Recharge Pail Model 515, Purple K	
3	23761	Actuator Rebuild Kit	6.2.7.1 / 6.2.7.2
	22873	STEM PUNCT E/N ACT MACH	
4	09958-P001/006	Rupture Disc, Nitrogen Cylinder	6.2.9

Table 2.6.c

Chapter 3: Hazard Analysis

Reference the Appendices A through F when considering coverage type, application type, sizing, etc. when protecting a hazard area. Hazard Analysis to be completed by Amerex Trained Personnel only.

3.1 Introduction

When performing a hazard analysis, some helpful tools that can be useful are:

- Flashlights – for those hard to see places.
- Tape Measure—to measure the hazard area and estimate cabling runs and hose runs.
- Cameras and note pads – for helping with documenting the construction of the vehicle fire suppression system and creating a bill of materials. Installers must document and retain all system designs.
- Temperature measuring devices – Thermocouples work well in helping to identify vehicle operating temperatures. Knowing the vehicle operating temperature details is crucial in selecting appropriate hardware when doing a hazard analysis and system layout.
- Access to all Amerex Installation, Operation, & Maintenance Literature – System may require hardware not located in this manual.

NOTE: On all installations, consult the vehicle manufacturer and property owner before making any modifications to equipment.

3.2 Hazard Analysis

A hazard analysis is used as the first step in a process used to assess risk of fire. The result of a hazard analysis is the identification of fire risks. The National Fire Protection Association (NFPA) offers a series of standards with guidelines for a particular product or system being installed. When conducting a hazard analysis, all applicable standards must be observed. Examples of such standards include, but are not limited to: NFPA 17, 17A, 52, 120, and 122. Below are some additional considerations to be evaluated when doing a hazard analysis.

3.2.1 Identify the Ignition Source(s)

Hot surfaces such as exhaust manifolds, muffler compartments, hydraulic pumps, and turbochargers can be potential ignition sources. Additional ignition sources to consider are friction buildup from bearings, brakes, and gears as well as electrical shorts from vehicle electronics and batteries.

3.2.2 Identify the Fuel Source(s)

Fuels can be found in many different forms including, but not limited to:

- Class A Material - Wood, paper, coal dust, rags, hoses, tires, combustible refuse buildup.
- Class B Material - Flammable and combustible liquids such as gasoline, diesel fuel, cleaning fluids, hydraulic fluids, brake fluids, transmission fluids.
- Class C Material - Class C items describe sources of electrical current that can energize an area where a fire is present.

3.2.3 Consulting Vehicle Owner and/or Original Equipment Manufacturer

Previous experience with machinery may indicate where special hazards exist. Knowing the history about a particular model of vehicle/machine may help with decisions in protection.

3.2.4 Potential Workplace Hazards for the Equipment

Refuse vehicles frequently work in landfills. Some landfills carry substantial class A fuel sources. Machines working in steel refineries can be exposed to external ignition sources. These types of external hazards must be considered when determining the protection required for each machine.

3.2.5 Considerations to be Evaluated

- Is the hazard in an open area or closed compartment? In an open area, each hazard must be treated as a local application with direct aim of Nozzles. Open area hazards are more difficult to contain, and will require a more conservative approach for selecting agent and Nozzle quantities. Closed compartments can aid in keeping Dry Chemical Agent in the hazard area longer allowing for better coverage.
- Are there many obstructions? Although dry chemical can act as a total flooding agent in enclosed hazard areas, obstructions can limit the force of the agent discharge for direct application on a fire. Direct application of agent is a very effective way to extinguish many fires. It may be necessary to use additional Nozzles to compensate for obstructions.
- How much air flows through the hazard? Airflow can adversely affect aim of Nozzles and dispersion of Dry Chemical Agents. It may be necessary to use additional Nozzles to compensate for air flow.
- What are the dimensions of the hazard? Determining hazard dimensions allows for Agent Cylinder size(s) and Nozzle quantities to be calculated.
- What is the potential for the hazard to spread to other areas of the vehicle/machine? Additional protection may be required for those areas as well.
- Does the vehicle/machine have additional hand portable extinguishers? Hand portable fire extinguishers are necessary to be used as a backup to an automatic fire suppression system. Appropriate type and rating of hand portable fire extinguishers must be considered.
- For engine compartment hazards, consult Appendix A for scaling capabilities for Static Volume Requirements & Dynamic Volume Requirements. Systems must be scaled accordingly to ensure adequate coverage.

3.2.6 Selecting the Appropriate Agent

After identifying ignition and fuel sources (see Sections 3.2.1 and 3.2.2), the appropriate fire suppression agent must be selected. Also reference tables 1.3.a & 1.3.b to understand approved categories of coverage & specifics for each agent.

- ABC Dry Chemical - Works well on all Class A, B, and C fires.
- Purple K Dry Chemical - Works well on Class B fires.
- Dual Agent Dry Chem/ICS *(NOT FM APPROVED)* - Combination of ABC & ICS. It works well on Class A, B, and C fires utilizing dry chem to suppress the fire. The ICS agent cools the hot surfaces such as turbochargers, exhaust manifolds, etc. reducing the chance that the fire may reignite.
- *The Class C aspect of these agents is NOT FM Approved.*

3.2.7 Selecting the Appropriate Method of Detection

After identifying vehicle hazard areas, it is necessary to select the appropriate form of detection for those areas. See the applicable electronics manuals online at www.amerex-fire.com.

- Spot Heat Detectors - Localized area devices that react to “set point” temperatures of 280ºF (138ºC), 350ºF (177ºC) or 500ºF (260ºC).
- Linear Heat Detectors - Broad area “linear wire” devices of various lengths, that have large surface area for heat detection with a “set point” of 356ºF (180ºC).
- Optical Flame Detectors - Rapid response devices that react to a visual flame signature. These must have visible line of sight to flame to be effective.

3.2.8 Selecting Methods of Actuation

If automatic actuation of any Agent Cylinders in the Amerex Modular Dry Chemical Vehicle Fire Suppression System is selected, a manual means of actuation is also required. At least one manual means of actuation must be located within reach or on the path of egress of the vehicle operator during normal vehicle operation. Additional manual means of actuation should be located conveniently in accessible areas along paths of egress and at ground level. Such manual actuation devices include:

- Manual Actuation Switch - An electronic button located in the drivers area or other locations accessible in the event of a fire. This button is used in conjunction with the Amerex Modular Electronics System. See the applicable electronics manuals online at www.amerex-fire.com.
- Manual or Manual/Electric Actuator (P/N 10210 or 23600) - Pneumatic actuation device located in the drivers area or other locations accessible in the event of a fire (See Section 2.5.4 or 2.5.5).

Chapter 4: System Design & Installation

This Chapter describes system design and installation of the Amerex Modular Dry Chemical System. The addition of electronics, detection, additional agent selection, and any other components required to complete the Amerex Fire Suppression System can be found in the technical literature section of the Amerex website at www.amerex-fire.com. Reference Tables 1.3.a & 1.3.b for information related to system design, coverage, etc. System Design to be completed by Amerex Trained Personnel only.

4.1 Steps to System Design

- The appropriate selection of fire suppression agent(s) should be made after a hazard analysis has been completed.
- After selecting the ideal fire suppression agent(s), the designer must identify the associated Nozzle types and Nozzle quantities that work with the particular fire suppression agent(s) selected (See Section 4.2)
- Nozzle locations must be selected and Nozzles installed (See Section 4.3).
- Agent Cylinder(s) must be located and installed to support Nozzle location and selection. Limitations and requirements (See Section 4.4) should be followed as well as Agent Distribution Network limitations (See Section 4.5).
- Agent Distribution Network(s) must be constructed and installed (See Section 4.5).
- System actuation methods and control heads must be selected (See Section 4.6). Fire detection methods and the appropriate Amerex Modular Electronics System must be selected and considered when choosing system actuation methods. Only compatible FM Approved Amerex Modular Electronics System(s) shall be used. See the applicable electronics manuals online at www.amerex-fire.com.
- If Pneumatic actuation is chosen, Nitrogen Cylinders and the desired actuator must be located and installed to support Agent Cylinder location and control head selection. Location and mounting limitations and requirements should be followed as well as Pneumatic Actuation Network limitations (See Section 4.7 and 4.8).
- Pneumatic Actuation Network must be constructed and installed (See Section 4.7 and 4.8).
- System should be put into service (See Section 4.9)
- Proper owner/operator training should be provided (See Section 4.10)

4.2 Nozzles

Nozzles are designed for and should be installed with two methods for consideration:

- Local Application Method
  - Airflow should be considered when protecting a hazard.
  - Must be considered for obstructions that do not allow direct application.
  - Multiple nozzles may be used to protect larger surface areas.

- Total Flood Application Method
  - Airflow should be considered when protecting a hazard.
  - Can be used when the hazard has external walls.
  - Multiple nozzles may be used to protect larger volumes.
  - Nozzles should be located in areas where obstructions are not present and agent flow is unimpeded.
  - Individual hazards within total flood volume should be considered as well for local application

Nozzles can be aimed with 0°, 45°, or 90° fittings and these fittings count towards the maximum number of fittings allowed on each branch line. PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) may be used for agent distribution connections; However, it is not required. Each defined hazard must have a minimum of one nozzle for protection. If a hazard is too large for one nozzle, carefully aim multiple nozzles at the hazard area to ensure coverage. Nozzles should be aimed to cover the items identified in the hazard analysis from Chapter 3.

4.3 Nozzle Brackets (P/N 10780) E11

Nozzle Brackets can be bolted to the vehicle with a minimum of SAE grade 5 bolts or welded to the vehicle. Do NOT weld on or drill into fuel tanks, vehicle Roll Over Protection System (ROPS), or Falling Object Protection Systems (FOPS). Consult equipment manufacturer and property owner prior to modification of the vehicle.

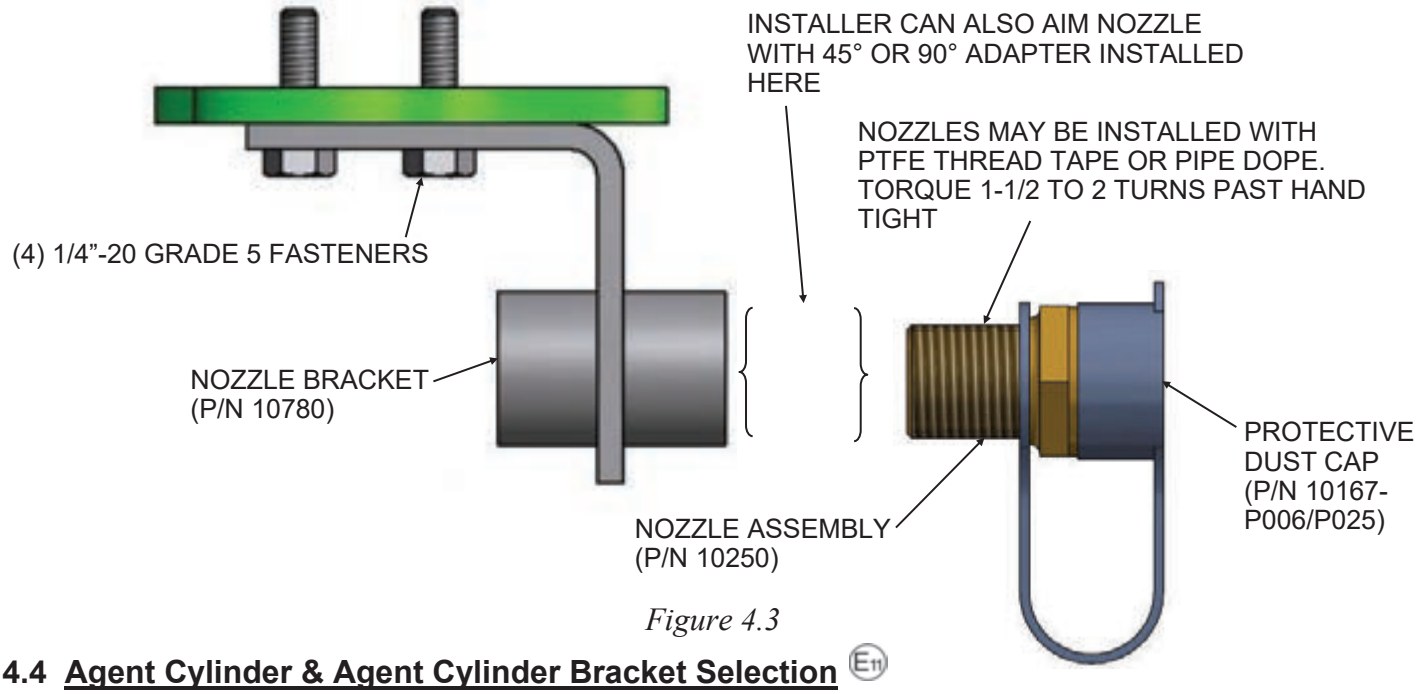


Figure 4.3

4.4 Agent Cylinder & Agent Cylinder Bracket Selection E11

Agent Cylinders and their associated Cylinder Brackets can be selected after first determining the quantity of Nozzles required to protect the hazard(s). Table 1.1 shows the appropriate quantity of Nozzles to be selected for any Agent Cylinder. At no time should the Agent Cylinder be utilized with more than the appropriate quantity of Nozzles as depicted in Table 1.1. Doing so will adversely affect system performance and will void the FM Approval.

Installation Requirements:

- Do not locate Cylinder Brackets in hazard areas where heat or fire can damage the Agent Cylinder.
- Do not locate Cylinder Brackets in areas where risk of damage can occur to the Agent Cylinder or Cylinder Bracket.
- Mount the Agent Cylinder in a location that only experiences a temperature range of -65°F (-54°C) to 150°F (66°C).
- Locate the Agent Cylinder such that the Agent Distribution Network lengths will remain within the parameters specified in the network limitations. (See Section 4.5)
- Mount Agent Cylinders in an area easily accessible for inspection and maintenance. Cylinder Brackets can be bolted or welded to vehicle structure. If bolted, use SAE Grade 8 fasteners to mount Cylinder Brackets to vehicle structure. Required torque values are given in the following Sections. If welded, consult equipment manufacturer and property owner prior to modification of the vehicle. Do NOT weld on or drill into fuel tanks, vehicle Roll Over Protection System (ROPS), or Falling Object Protection Systems (FOPS).

- Mount the Agent Cylinder and Cylinder Bracket where it can be secured to a surface capable of dynamically supporting the total weight of the two assemblies (See Table 4.4). Consult the vehicle manufacturer and property owner for approval of any location.

Agent Cylinder	Cylinder Bracket	Maximum Total Weight*, lb (kg)
V13	V13 Cylinder Bracket	45 (20.4)
(E11) V25	V25 Cylinder Bracket	74 (33.6)
(E11) VH25	VH25 Cylinder Bracket	72 (32.7)
V30	V30 Cylinder Bracket	90 (40.8)
VH30	VH30 Cylinder Bracket	88 (39.9)
V50	V50 Cylinder Bracket	138 (62.6)
VS50	VS50 Cylinder Bracket	144 (65.3)
VS75	VS75 Cylinder Bracket	205 (93.0)
V250	V250 Weld Ring	575 (260.8)

*Maximum total combined weight of Agent Cylinder and Cylinder Bracket shown. Actual total weight may be less.

Table 4.4

- Bracket Strap fasteners are supplied with Cylinder Brackets. V250 fasteners are supplied with the Weld Ring. Required torque values are given in the following Figures.

4.4.1 Vertical Agent Cylinder & Cylinder Bracket (E11)

Several styles of the vertical Agent Cylinders (V25, V30, V50, VS50 and VS75) will be mounted similarly to that shown in Figure 4.4.1.a. Note: The actual number of bracket straps varies per Agent Cylinder (See Section 2.2). The Agent Cylinder must be mounted on a vertical surface. Maximum allowable offset from vertical is +/-10°.

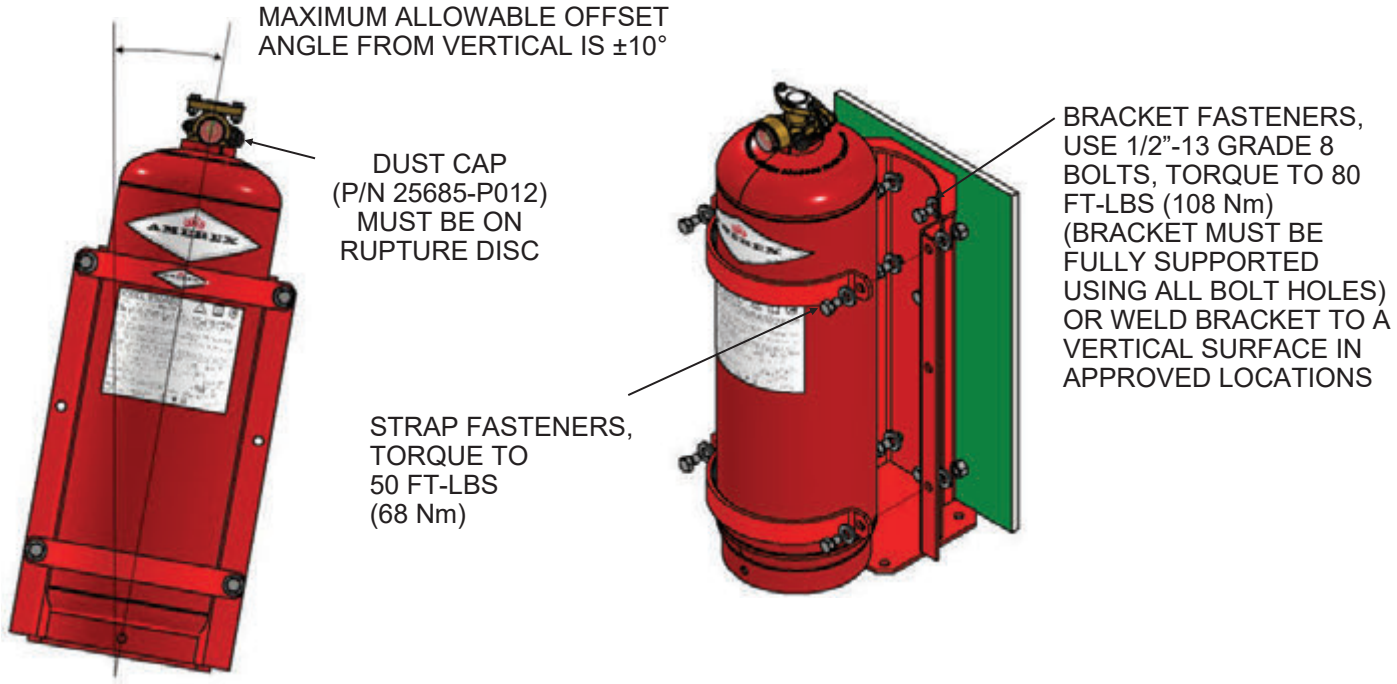


Figure 4.4.1.a

The V13 Agent Cylinder will be mounted as shown in Figure 4.4.1.b. The Agent Cylinder must be mounted on a vertical surface. Maximum allowable offset from vertical is +/-10° as shown.

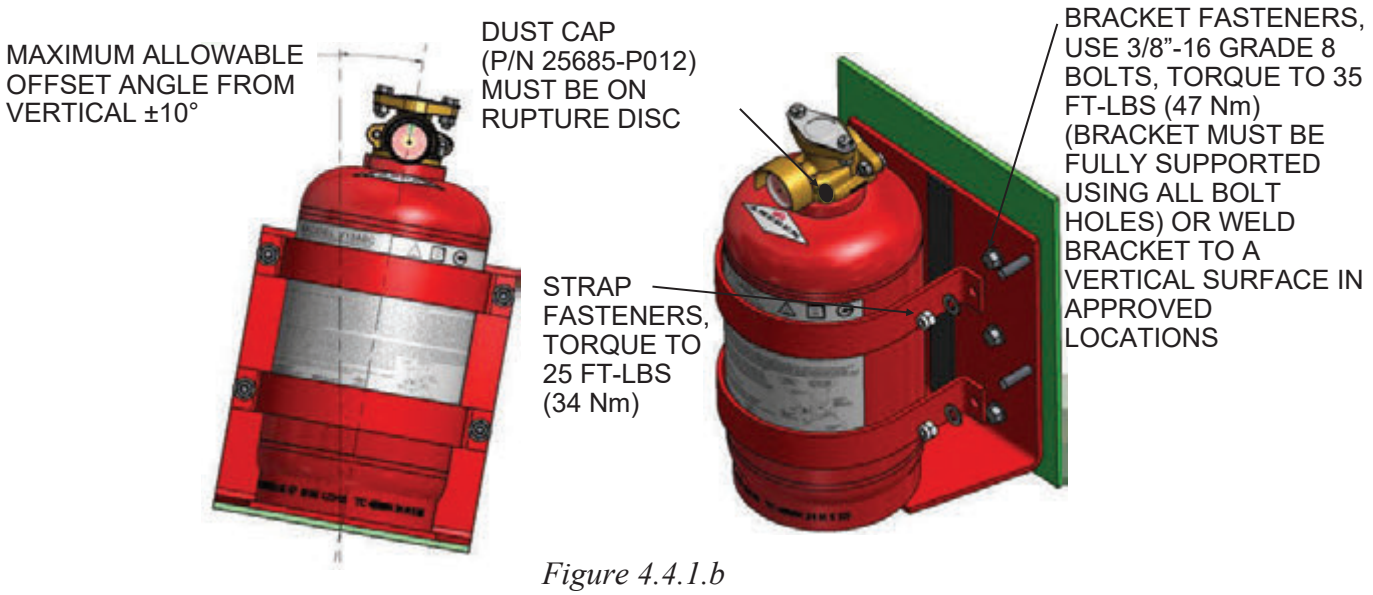


Figure 4.4.1.b

4.4.2 Horizontal Agent Cylinder & Cylinder Bracket

The horizontal Agent Cylinders will all be mounted similarly to that shown in Figure 4.4.2. The Agent Cylinder can be mounted on a vertical or horizontal surface. Maximum allowable offset angle from horizontal is +/-5°.

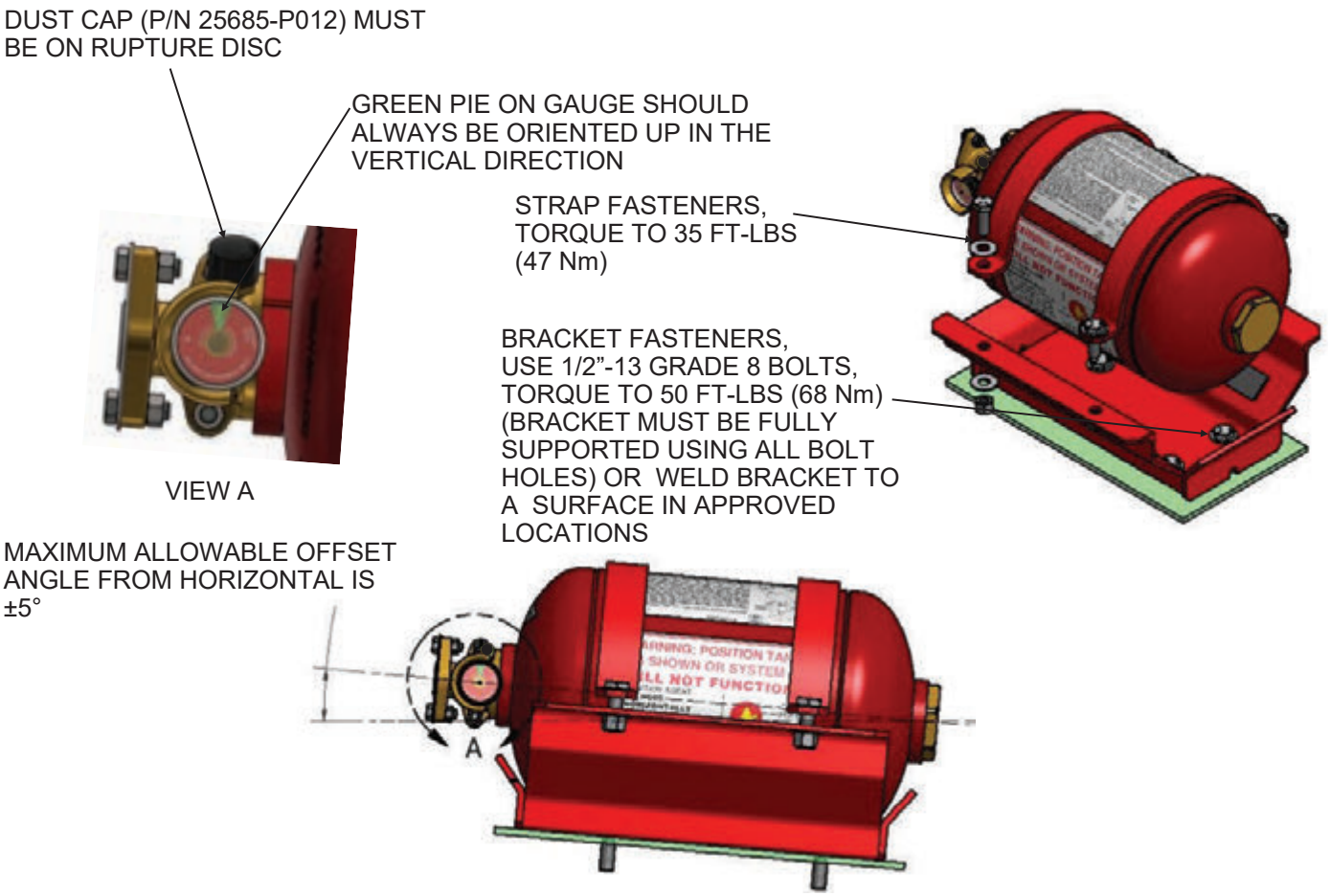


Figure 4.4.2

4.4.3 V250 Agent Cylinder & Weld Ring

The Amerex V250 Agent Cylinder is constructed with heavy gauge steel and is designed with a bolting flange on the foot ring. The bolting flange allows for securing the V250 Agent Cylinder to a horizontal surface with use of the Weld Ring (P/N 22966). The Weld Ring must be welded to a horizontal surface and oriented such that a drain hole is on the lowest point of the horizontal surface. Fillet weld all around entire outer edge of Weld Ring, EXCEPT across the drain holes (See Figure 4.4.4.c). V250 Fasteners (P/N 22925-P001) to secure the V250 Agent Cylinder to the Weld Ring are supplied with the Weld Ring (See Figure 4.4.4.a).

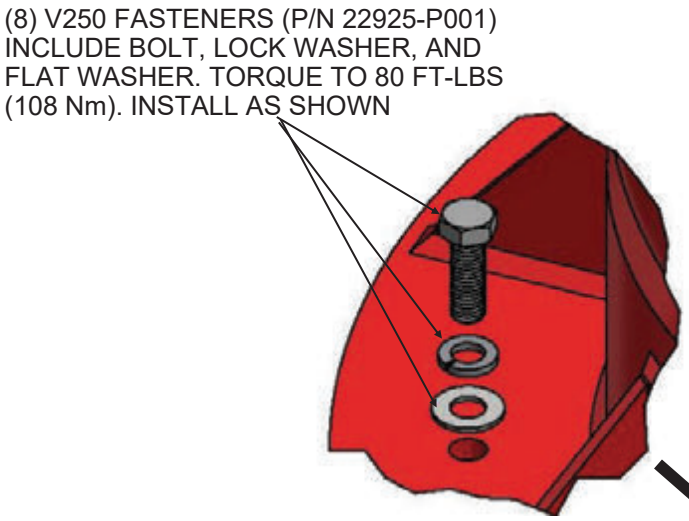


Figure 4.4.3.a

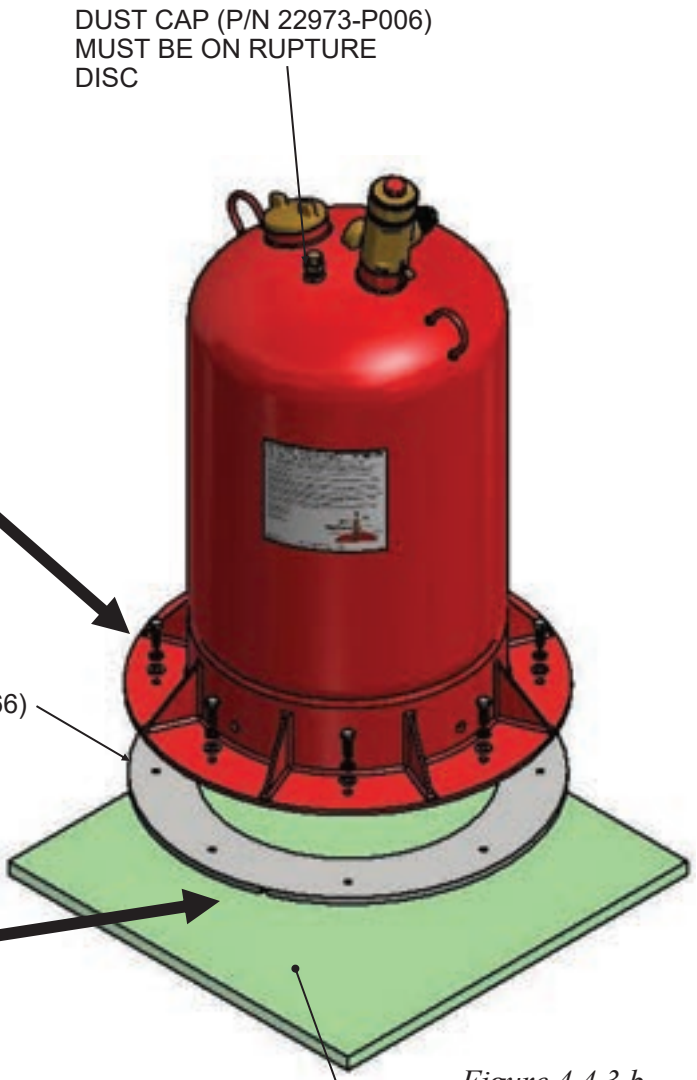


Figure 4.4.3.b

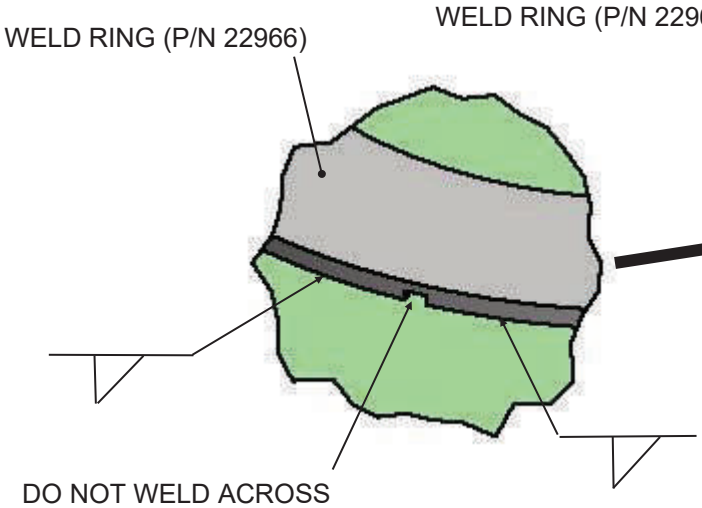


Figure 4.4.3.c

SELECT A GOOD MOUNTING SURFACE THAT WILL SUPPORT THE WEIGHT OF THE V250 AGENT CYLINDER AND WELD RING

4.5 Agent Distribution Network, Specifications & Limitations

After determining Nozzle location(s) and Agent Cylinder location(s), the Agent Distribution Network must be constructed for transferring the Dry Chemical Agent to the Nozzles. This is done using hydraulic hoses, fittings, tees, and/or Distributor Blocks. Rigid tubing can also be used and is explained in Section 4.5.27. Use the following requirements for constructing the Agent Distribution Network. **After the Agent Distribution Network is complete and assembled, purge the network using dry air or nitrogen ONLY per instructions in Section 6.2.2 to remove any debris that may have entered the network during assembly. NOTE: The following requirements are applicable to the Agent Distribution Network ONLY. Refer to Section 4.7 for Pneumatic Actuation Network requirements.**

- After the Cylinder Bracket is installed, vertical Agent Cylinders must be installed with the discharge outlet facing the direction that will allow the Discharge Fitting Kit to be easily connected to the Agent Distribution Network (See Figure 4.5.1). For the V250 Agent Cylinder, orient the Agent Cylinder on the Weld Ring such that the Agent Distribution Network can be easily connected to the Agent Cylinder Valve discharge outlet.
- Horizontal Agent Cylinders must have the discharge outlet oriented such that the pressure gauge has the green pie area pointing in the vertical position.
- The Agent Distribution Network must be secured to the vehicle with the use of padded “P” clamps or other approved methods by the hose size and manufacturer. Consult the hose manufacturer’s specifications for best mounting practices.
- The Agent Distribution Network must be routed in such a manner that the network does not interfere with routine vehicle maintenance.
- The installer must be aware of ambient temperature range for hose selection and not to exceed those temperature ratings.
- When installing the Agent Distribution Network, the installer must comply with the hose manufacturer’s minimum hose bend radius requirements. Avoid pinch points or possible chafing of the network. Avoid routing discharge and actuation hoses on hot surfaces.
- The number of Nozzles used in the Agent Distribution Network must match what is specified in Table 1.1 for the Agent Cylinder used.
- The installer must not exceed the Agent Distribution Network limitations as shown in this section. See Sections 4.5.2 thru 4.5.27 for Agent Distribution Network configurations.
- PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) may be used for NPT connections in the Agent Distribution Network; However, it is not a requirement for the agent distribution network.
- Elbows may be used in a 45° or 90° configuration but cannot exceed quantities as shown in the Tables in Sections 4.5.2 thru 4.5.27.
- ***Note: elbows attached after the nozzle bracket count towards the total for each hose.***
- The use of “Street Elbows” or any other elbow that creates a reduction in cross-sectional area is NOT ALLOWED.
- All hoses used must meet or exceed SAE 100 R5 or 100 R1 (minimum) hose specifications. In addition to SAE hose specification requirements, hoses used for underground mining applications must meet USBM specified flame resistance acceptance.
- All hose end fittings must be only those specified by the hose manufacturer.
- All fittings (elbows, tees, reducers, couplers…etc.) used for connection of the Agent Distribution Network must be minimally rated for use at the maximum Agent Cylinder operating pressure. If fittings are located in a corrosive environment, appropriate fitting material must be considered.
- The following list of appropriate standards is for reference:
  - SAE J1273
  - SAE J516
  - SAE J517
  - SAE J343

4.5.1 Discharge Fitting Kit (E11)

The Discharge Fitting Kit (P/N 10199) is used to connect the Agent Distribution Network to the Agent Cylinder. Remove the Anti-Recoil Plate (P/N 10646-P006) from the Agent Cylinder valve and attach the Discharge Fitting Kit in its place using the same (2) 5/16”-18 bolts and nuts. Use medium grade thread locking compound (for example Loctite 242) and torque to 10 ft-lbs (14 Nm). Connect the threaded end of the Discharge Fitting Kit to the Agent Distribution Network. The Discharge Fitting Kit is not used on the V250 Agent Cylinder.

NOTE: DO NOT APPLY LUBRICANT TO DISCHARGE OPENING OF AGENT CYLINDER VALVE.

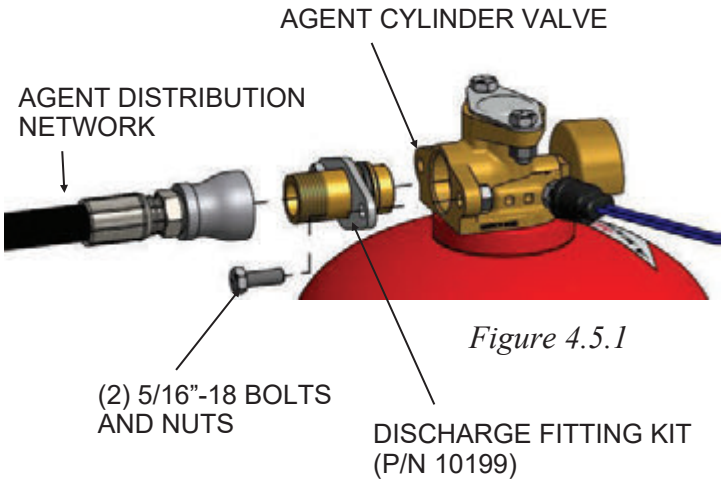


Figure 4.5.1

4.5.2 V13 Agent Distribution Network (2 Nozzles)

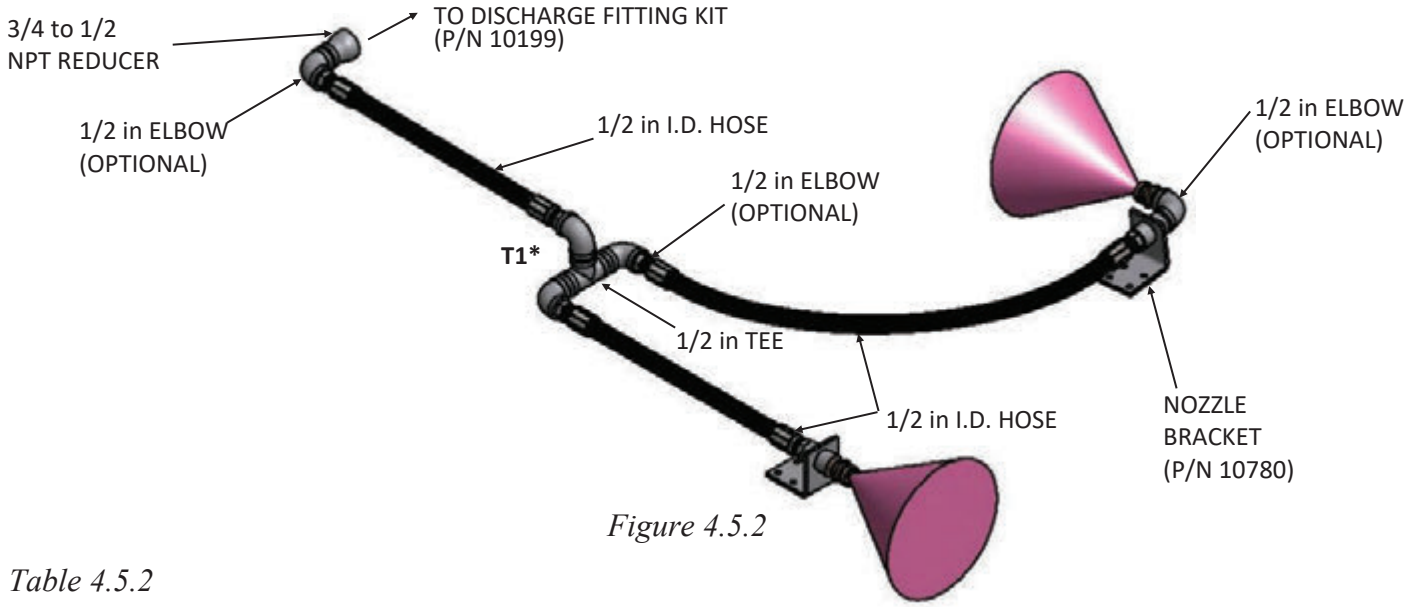


Figure 4.5.2

Table 4.5.2

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to T1	1/2 (12.7)	40 (12.2)	2 (0.61)	2	0
T1 to Nozzle	1/2 (12.7)	15 (4.6)	0	2	0
Cylinder to any Nozzle	—	50 (15.2)	2 (0.61)	-	-
All 1/2” hose	—	65 (19.8)	2 (0.61)	-	-

Note: T1 to nozzle can be 0 if all T1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (T1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (T1 to Nozzle) is 15 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 5 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.3 V25 / VH25 / V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network (2 Nozzles)

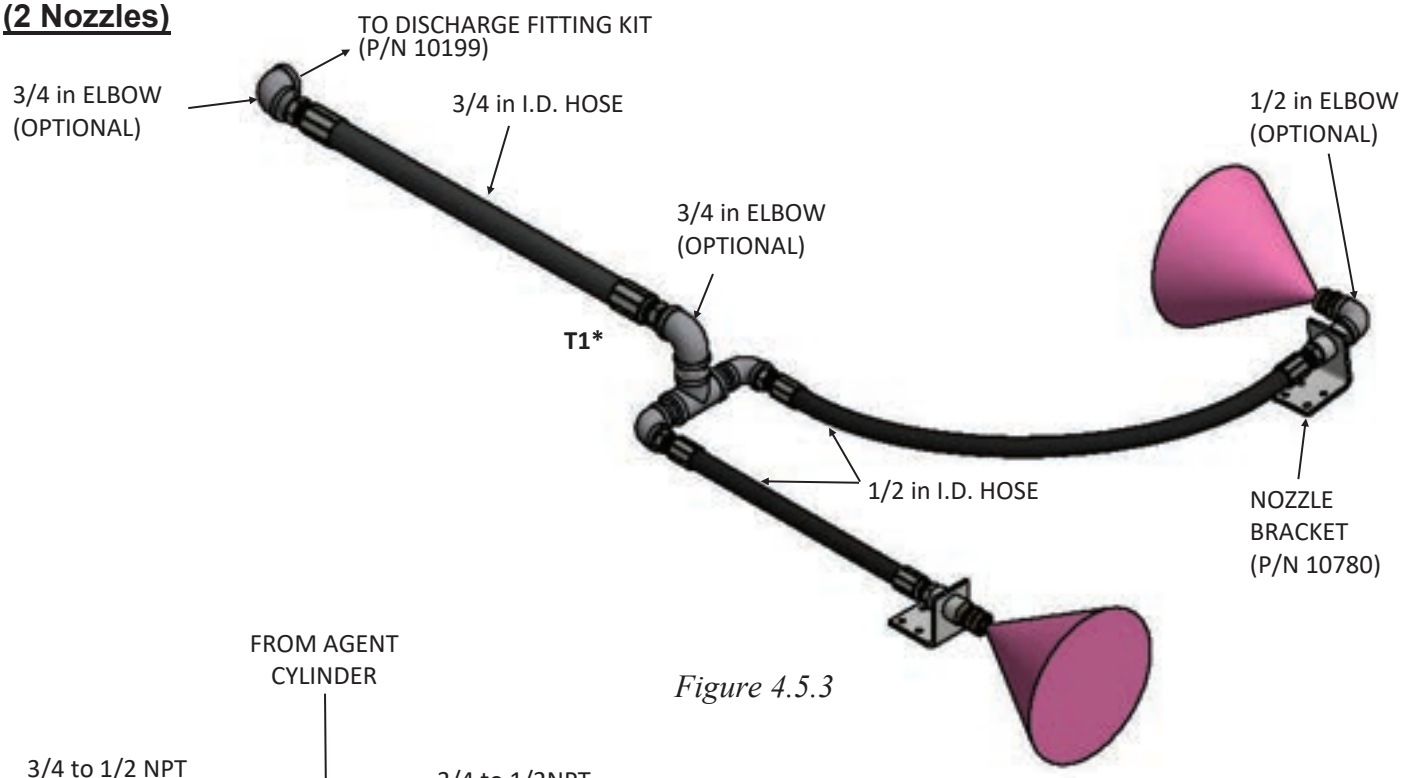
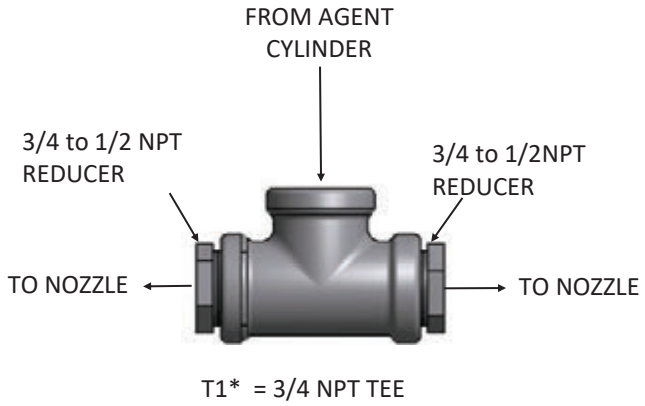


Figure 4.5.3



T1* = 3/4 NPT TEE

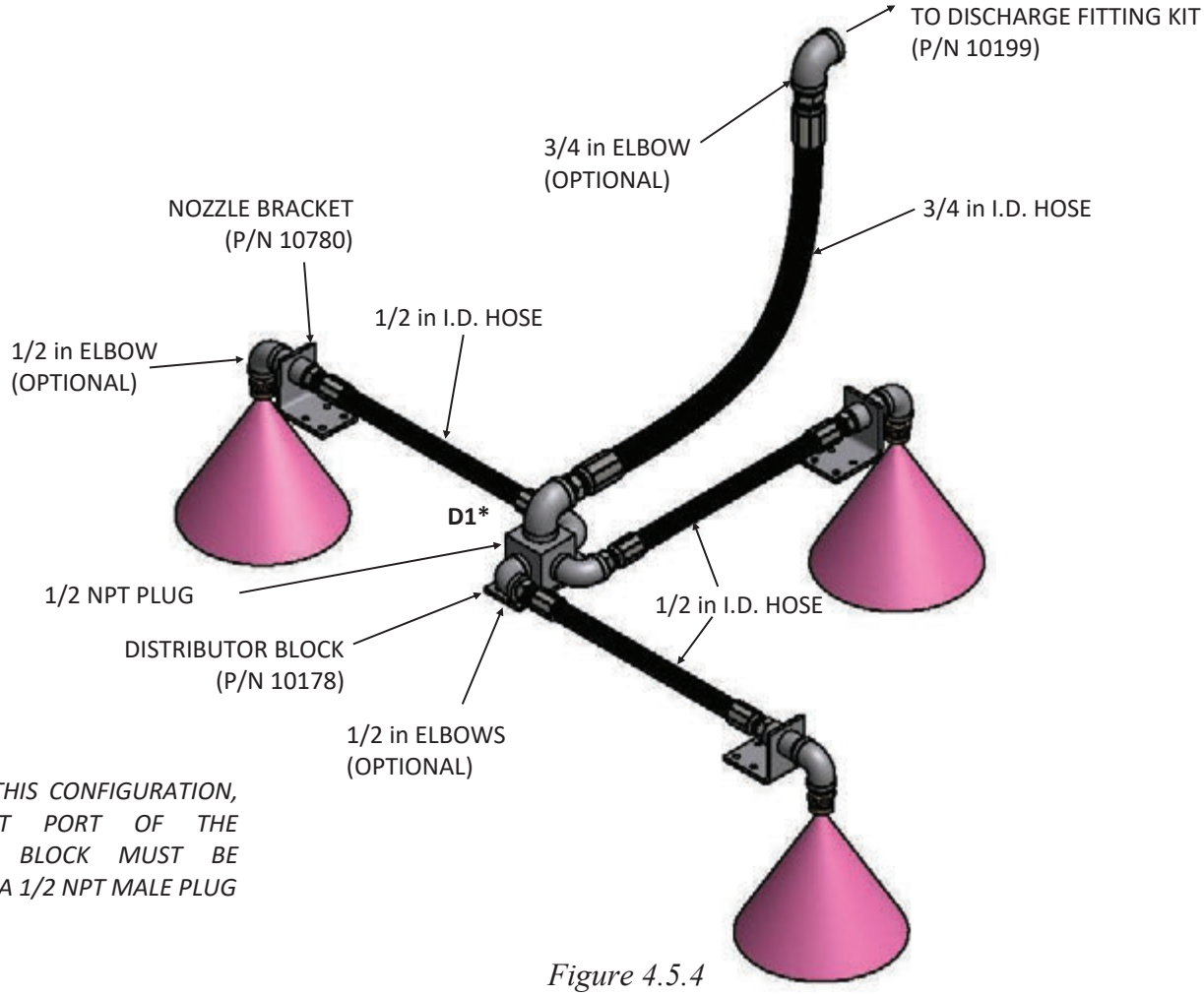
*Reducing tees can be used in place of tees with reducing bushings. Reduction must occur at the outlet of Tee, not the inlet).

Table 4.5.3

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to T1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
T1 to each Nozzle	1/2 (12.7)	15 (4.6)	0	2	0
Cylinder to any Nozzle	—	60 (18.3)	2 (0.61)	-	-
All 1/2” hose	—	30 (9.1)	0	-	-
All 3/4” hose	—	45 (13.7)	2 (0.61)	-	-

Note: T1 to nozzle can be 0 if all T1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (T1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (T1 to Nozzle) is 15 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 5 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.4 V13 / V25 / VH25 / V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network (3 Nozzles)



NOTE: FOR THIS CONFIGURATION, ONE OUTLET PORT OF THE DISTRIBUTOR BLOCK MUST BE SEALED WITH A 1/2 NPT MALE PLUG

Figure 4.5.4

Table 4.5.4

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to each Nozzle	1/2 (12.7)	15 (4.6)	0	2	0
Cylinder to any Nozzle	—	60 (18.3)	2 (0.61)	-	-
All 1/2” hose	—	45 (13.7)	0	-	-
All 3/4” hose	—	45 (13.7)	2 (0.61)	-	-

Note: D1 to nozzle can be 0 if all D1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D1 to Nozzle) is 15 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 5 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.5 V25 / VH25 / V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network with Tees (4 Nozzles)

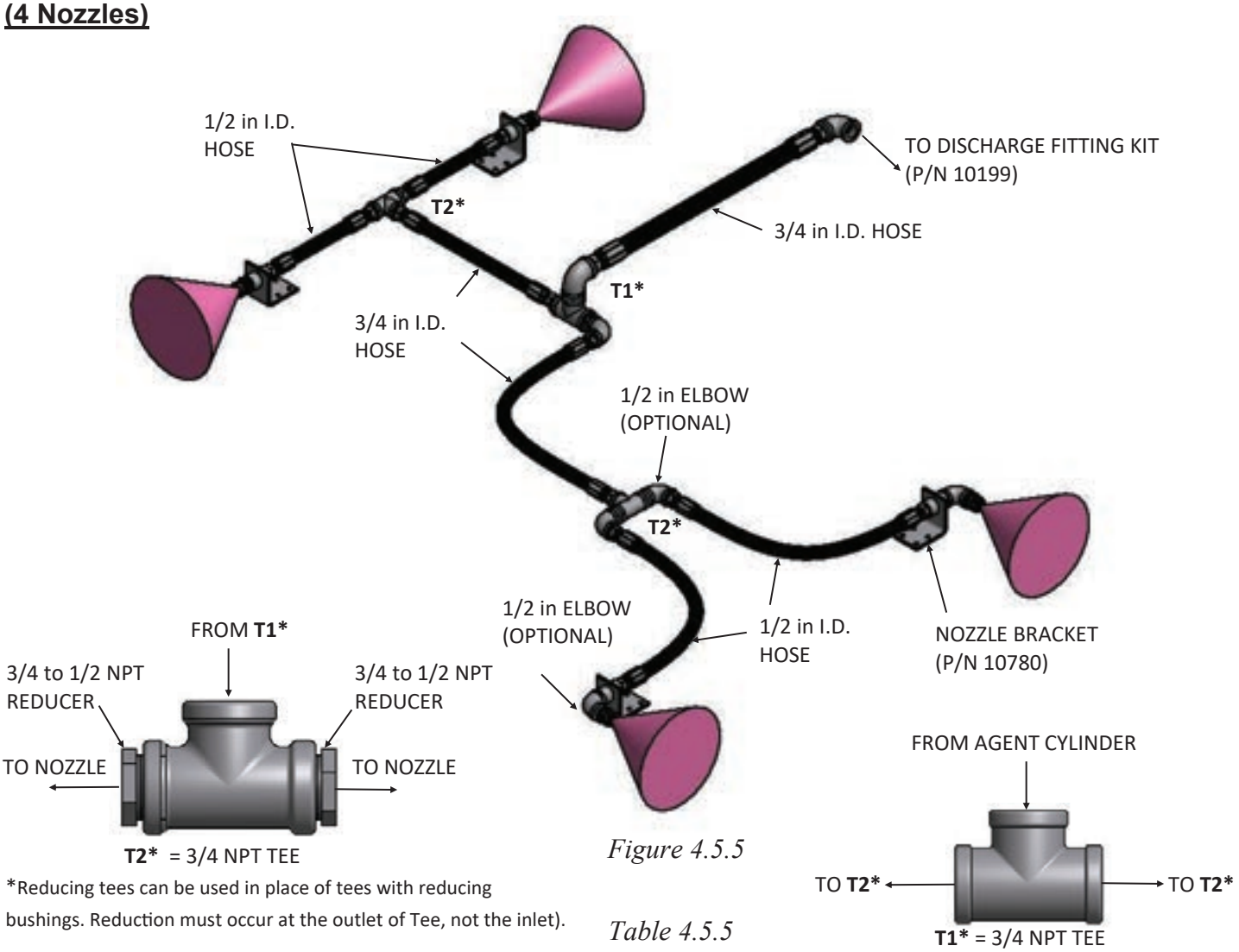


Figure 4.5.5

*Reducing tees can be used in place of tees with reducing bushings. Reduction must occur at the outlet of Tee, not the inlet).

Table 4.5.5

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to T1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
T1 to T2	3/4 (19.1)	20 (6.1)	0.5 (0.15)	2	0
T2 to each Nozzle	1/2 (12.7)	15 (4.6)	0	2	0
Cylinder to any Nozzle	—	60 (18.3)	2.5 (0.76)	-	-
All 1/2” hose	—	60 (18.3)	0	-	-
All 3/4” hose	—	45 (13.7)	3 (0.91)	-	-

Note: T2 to nozzle can be 0 if all T2 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (T1 to T2, or T2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (T2 to Nozzle) is 15 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 5 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.6 V25 / VH25 / V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network with Distributor (4 Nozzles)

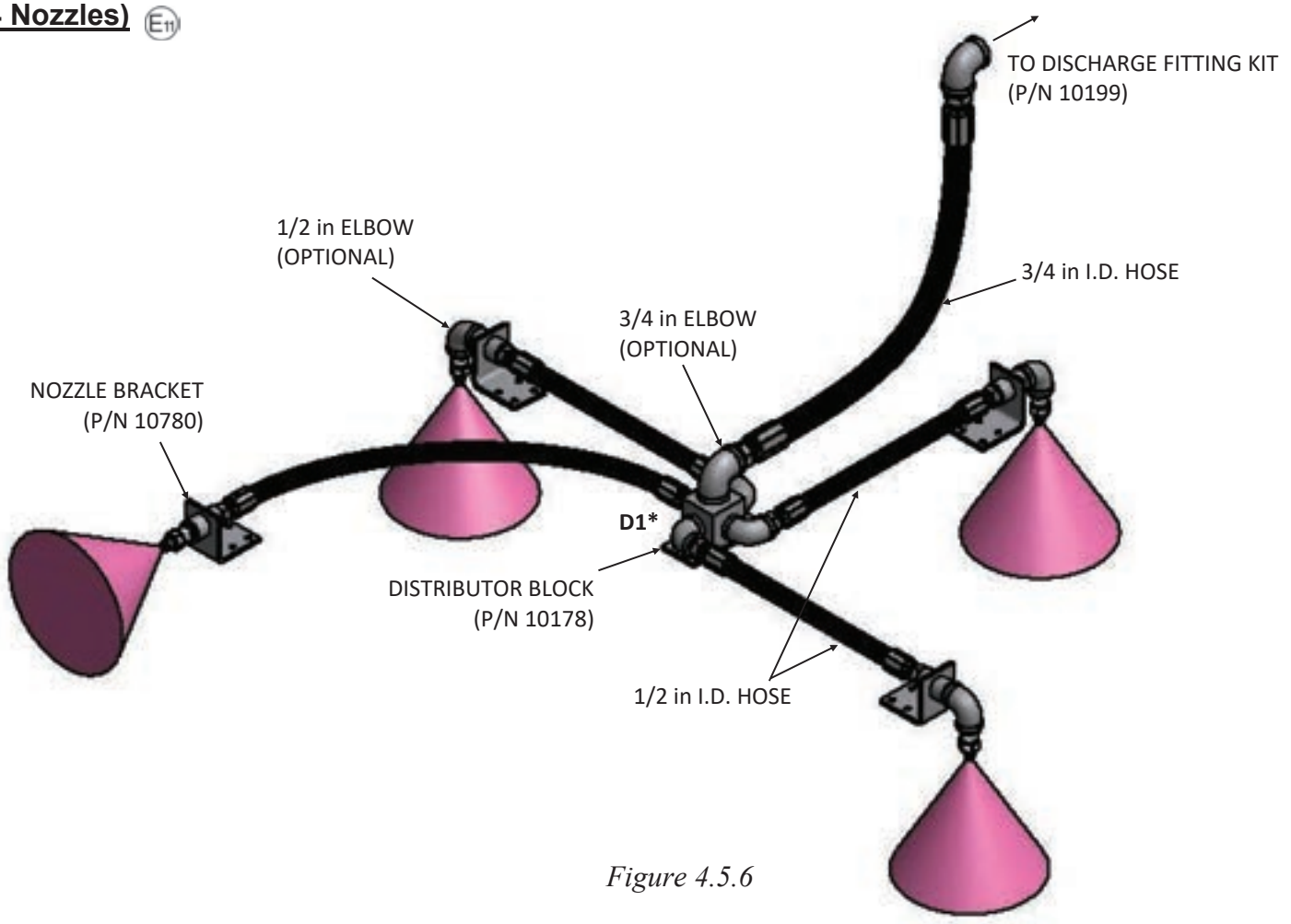


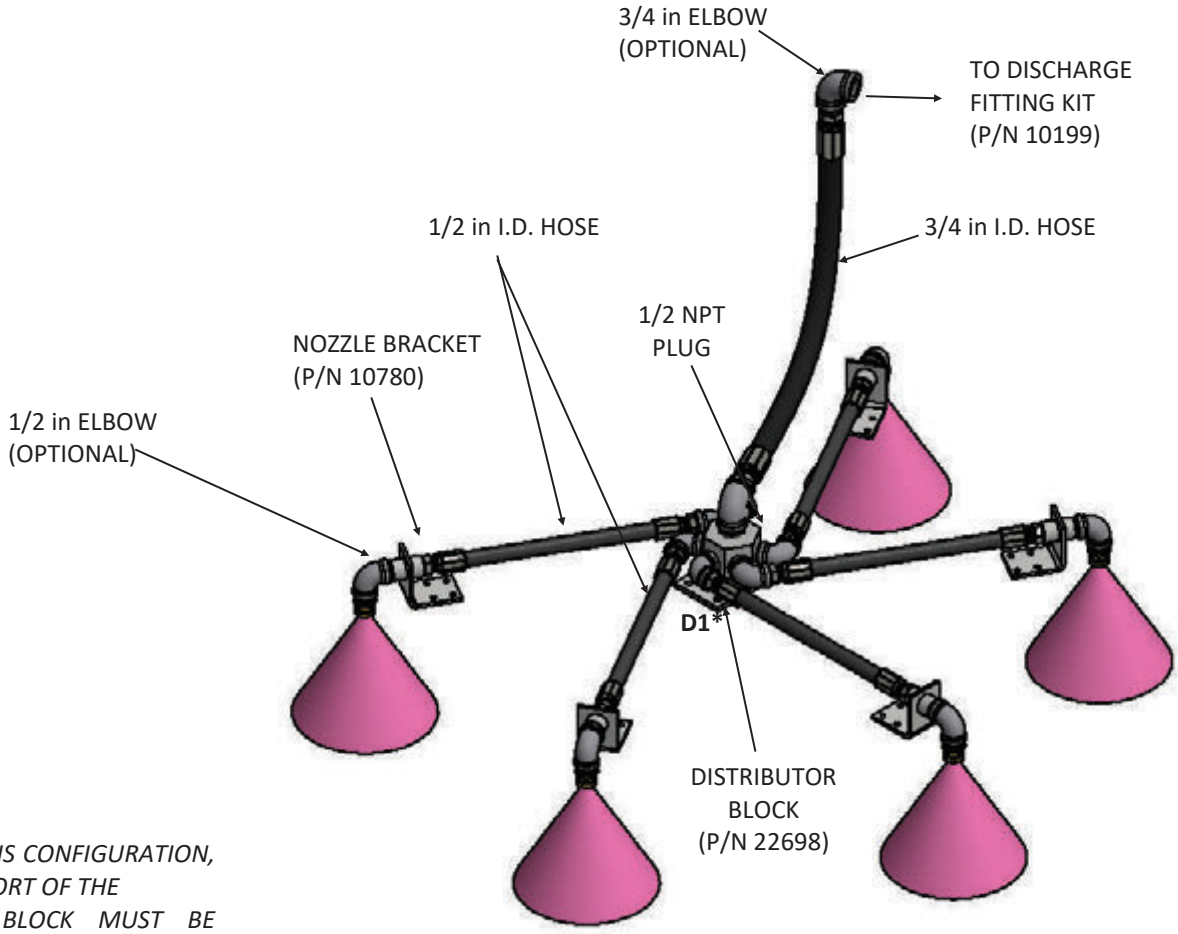
Figure 4.5.6

Table 4.5.6

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1r	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to each Nozzle	1/2 (12.7)	15 (4.6)	0	2	0
Cylinder to any Nozzle	—	60 (18.3)	2 (0.61)	-	-
All 1/2” hose	—	60 (18.3)	0	-	-
All 3/4” hose	—	45 (13.7)	2 (0.61)	-	-

Note: D1 to nozzle can be 0 if all D1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D1 to Nozzle) is 15 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 5 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.7 V25 / VH25 / V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network with Distributor (5 Nozzles)



NOTE: FOR THIS CONFIGURATION, ONE OUTLET PORT OF THE DISTRIBUTOR BLOCK MUST BE SEALED WITH A 1/2 NPT MALE PIPE PLUG

Figure 4.5.7

Table 4.5.7

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	50 (15.2)	2 (0.61)	2	0
D1 to each Nozzle	1/2 (12.7)	30 (9.14)	0	2	0
Cylinder to any Nozzle	—	80 (24.3)	2 (0.61)	-	-
All 1/2” hose	—	150 (45.7)	0	-	-
All 3/4” hose	—	50 (15.2)	2 (0.61)	-	-

Note: D1 to nozzle can be 0 if all D1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D1 to Nozzle) is 30 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 10 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.8 V25 / VH25 / V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network with Distributor to Tees (6 Nozzles)

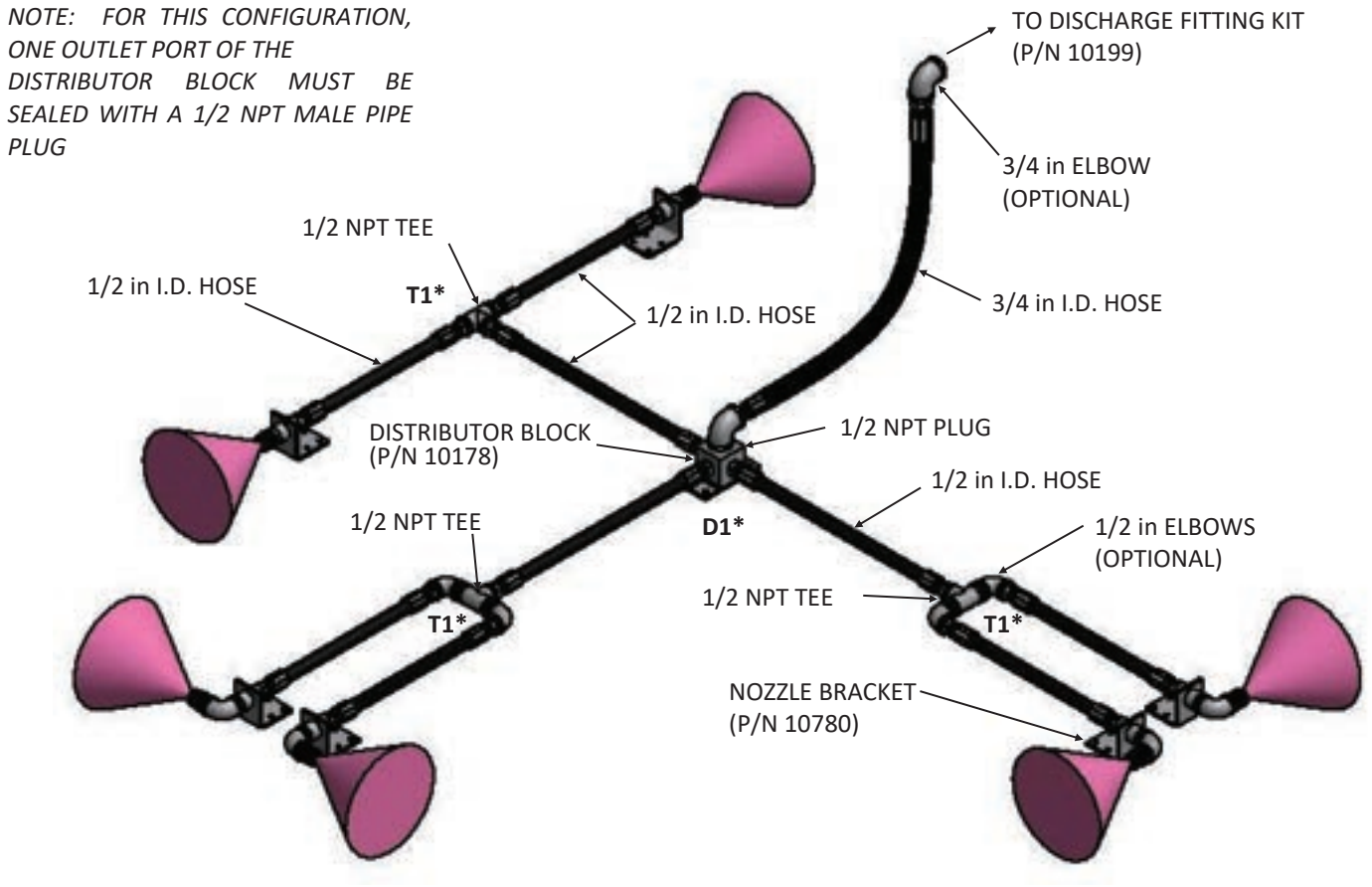


Figure 4.5.8

Table 4.5.8

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to Distributor	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
Distributor to T1	1/2 (12.7)	15 (4.6)	0.5 (0.15)	2	0
T1 to Nozzle	1/2 (12.7)	9 (2.7)	0	2	0
Cylinder to any Nozzle	—	56 (17.1)	2.5 (0.76)	-	-
All 1/2” hose	—	77 (23.4)	1.5 (0.45)	-	-
All 3/4” hose	—	45 (13.7)	2 (0.61)	-	-

Note: T1 to nozzle can be 0 if all T1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to T1, or T1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D1 to T1) is 15 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 5 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.9 V25 / VH25 / V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network with Distributor (6 Nozzles)

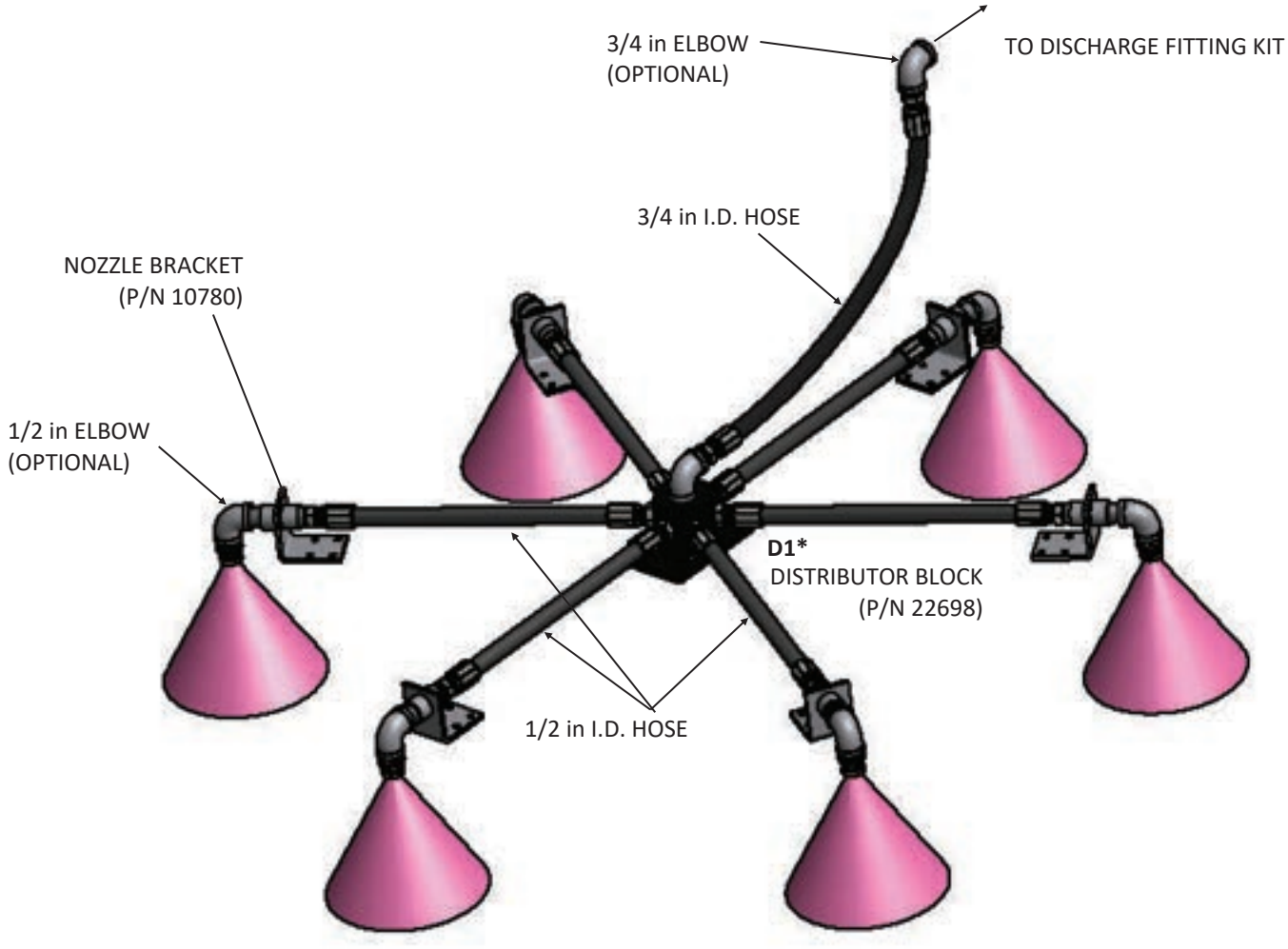


Figure 4.5.9

Table 4.5.9

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to each Nozzle	1/2 (12.7)	15 (4.5)	0	2	0
Cylinder to any Nozzle	—	60 (18.2)	2 (0.61)	-	-
All 1/2” hose	—	80 (24.3)	0	-	-
All 3/4” hose	—	45 (13.7)	2 (0.61)	-	-

Note: D1 to nozzle can be 0 if all D1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D1 to Nozzle) is 15 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 5 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.10 V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network with Distributor (6 Nozzles)

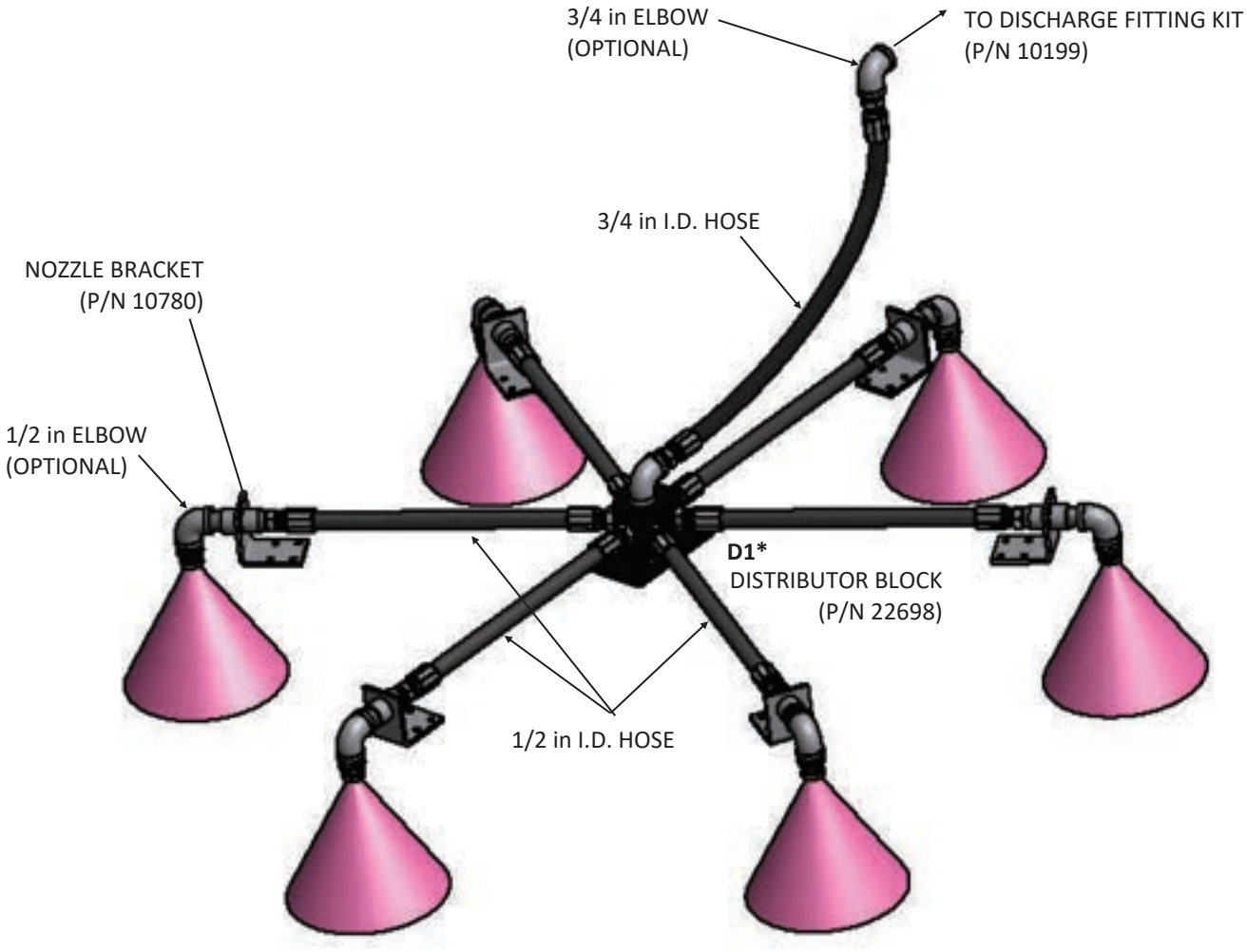


Figure 4.5.10

Table 4.5.10

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	50 (15.2)	2 (0.61)	2	0
D1 to each Nozzle	1/2 (12.7)	30 (9.14)	0	2	0
Cylinder to any Nozzle	—	80 (24.3)	2 (0.61)	-	-
All 1/2” hose	—	180 (54.9)	0	-	-
All 3/4” hose	—	50 (15.2)	2 (0.61)	-	-

Note: D1 to nozzle can be 0 if all D1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D1 to Nozzle) is 30 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 10 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.11 V30 / VH30 / V50 / VS50 / VS75 Agent Distribution Network with Distributor to Tees (7 Nozzles)

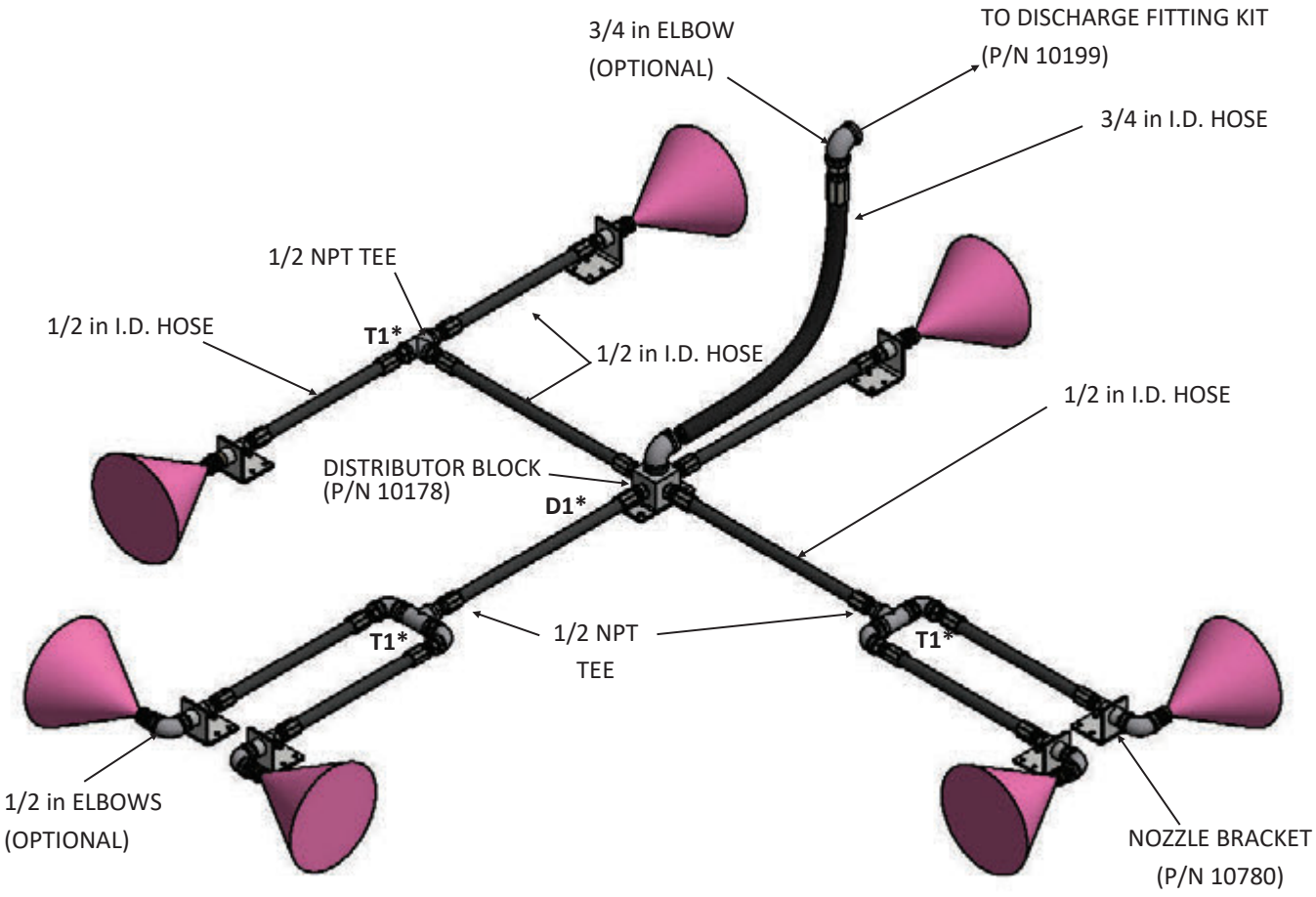


Figure 4.5.11

Table 4.5.11

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to T1/Nozzle	1/2 (12.7)	15 (4.6)	0.5 (0.15)	2	0
T1 to Nozzle	1/2 (12.7)	9 (2.7)	0	2	0
Cylinder to any Nozzle	—	60 (18.2)	2.5 (0.76)	-	-
All 1/2” hose	—	86 (26.2)	2 (0.61)	-	-
All 3/4” hose	—	45 (13.7)	2 (0.61)	-	-

Note: T1 to nozzle can be 0 if all T1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to T1, or T1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D1 to T1) is 15 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 5 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.12 V50 / VS50 / VS75 Agent Distribution Network with Tee to Distributors (8 Nozzles)

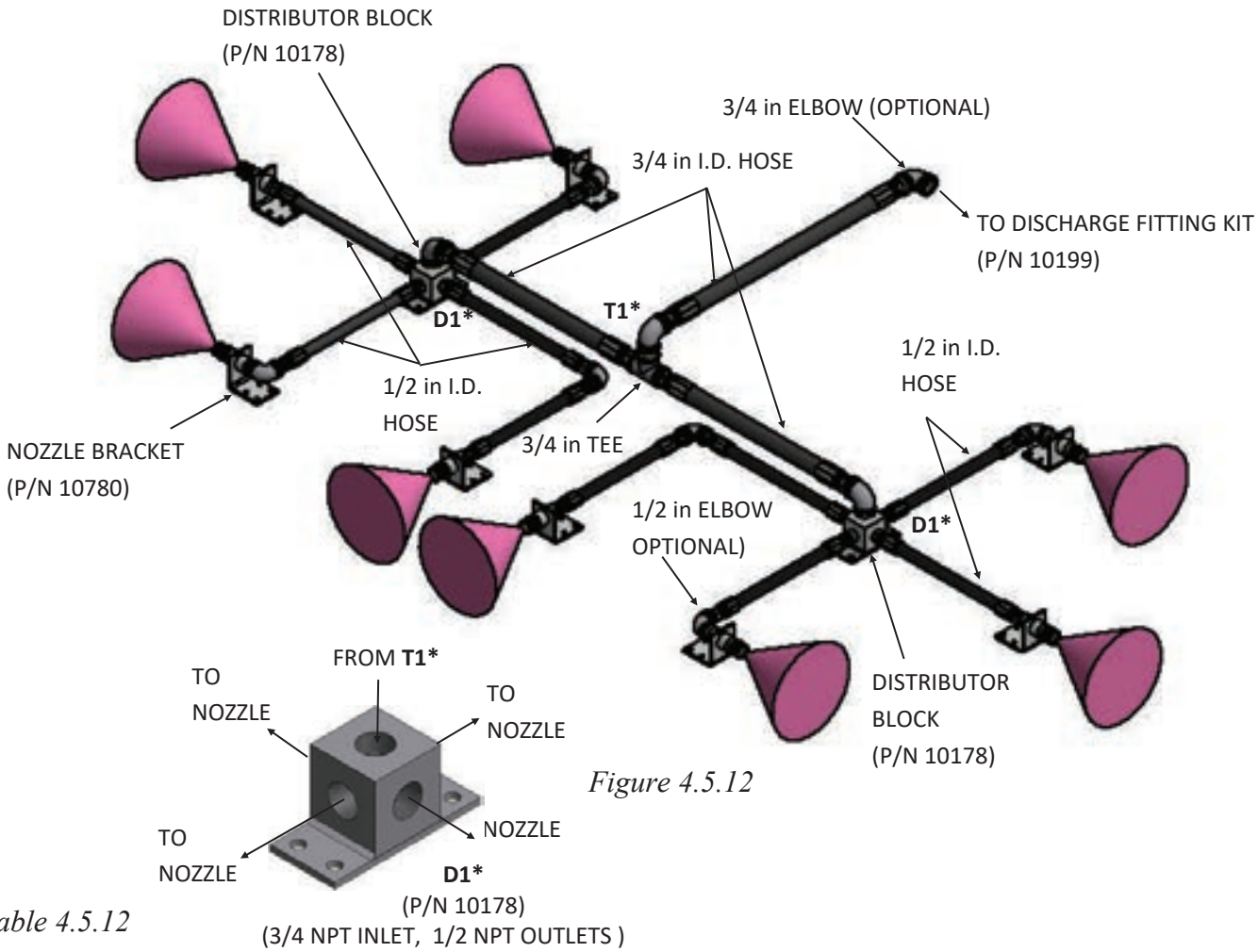


Figure 4.5.12

Table 4.5.12

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to T1	3/4 (19.1)	40 (12.2)	2 (0.61)	2	0
T1 to D1	3/4 (19.1)	20 (6.1)	0.5 (0.15)	2	0
D1 to each Nozzle	1/2 (12.7)	11 (3.4)	0	2	0
Cylinder to any Nozzle	—	60 (18.3)	2.5 (0.76)	-	-
All 1/2” hose	—	88 (26.8)	0	-	-
All 3/4” hose	—	45 (13.7)	3 (0.9)	-	-

Note: D1 to nozzle can be 0 if all D1 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (T1 to D1, or D1 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D1 to Nozzle) is 11 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.6 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.13 V50 / VS50 / VS75 Agent Distribution Network with Distributor to Tees (10 Nozzles)

Figure 4.5.13

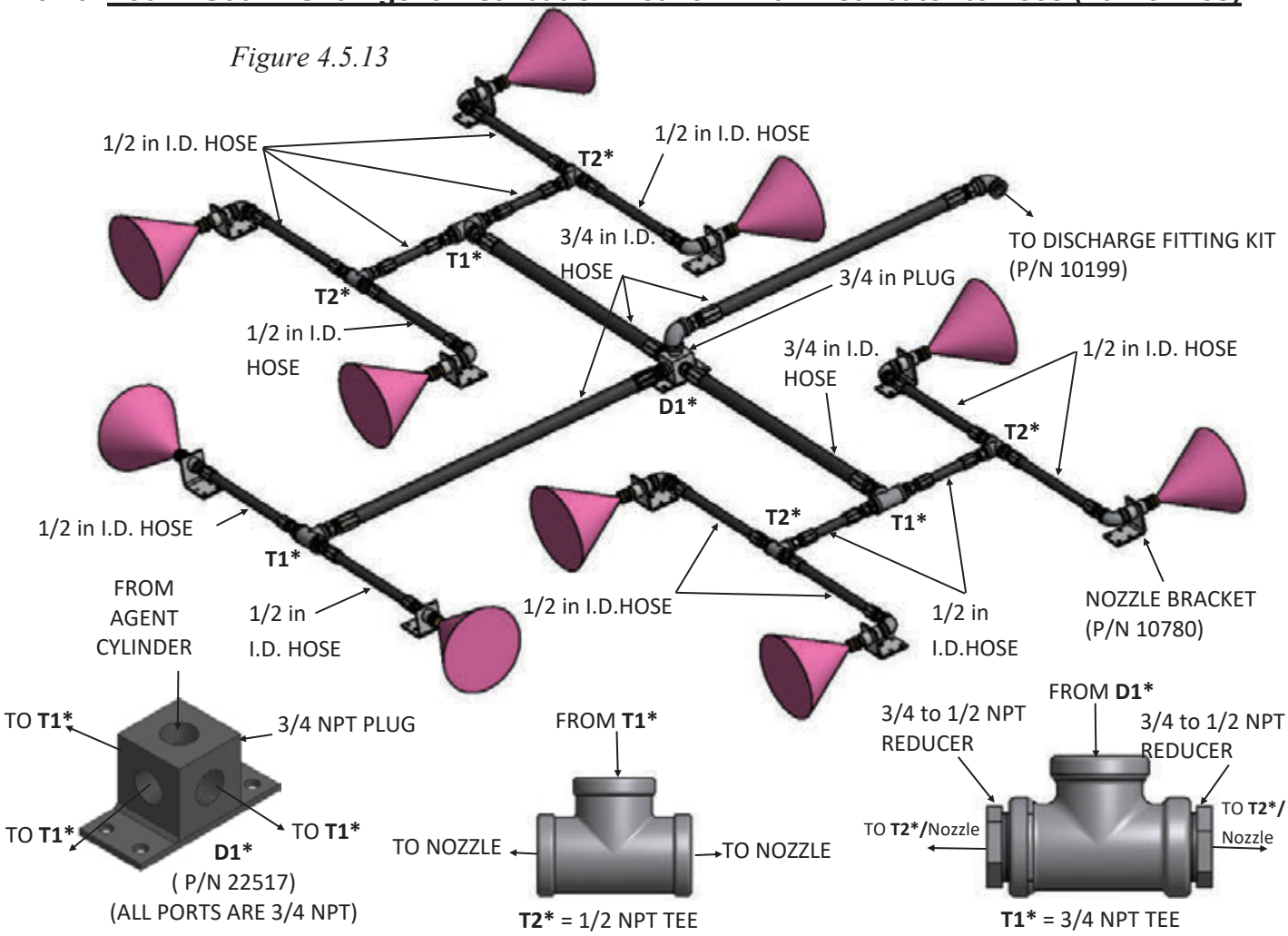
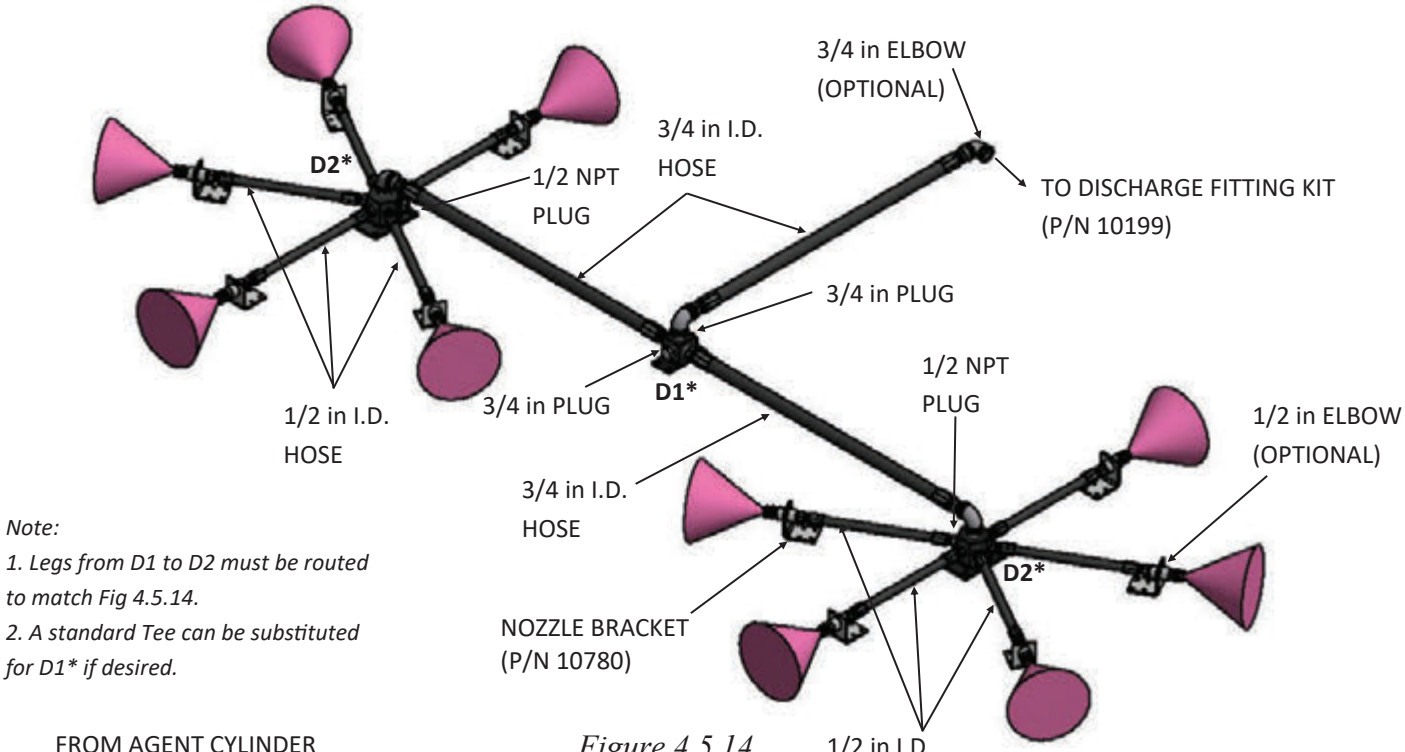


Table 4.5.13 *Reducing tees can be used in place of tees with reducing bushings. Reduction must occur at the outlet of Tee, not the inlet).

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to T1	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
T1 to T2/Nozzle	1/2 (12.7)	9 (2.7)	2 (0.61)	2	0
T2 to Nozzle	1/2 (12.7)	6 (1.8)	2 (0.61)	2	0
Cylinder to any Nozzle	—	70 (21.3)	6 (1.8)	-	-
All 1/2” hose	—	80 (24.4)	28 (8.5)	-	-
All 3/4” hose	—	60 (18.3)	8 (2.4)	-	-

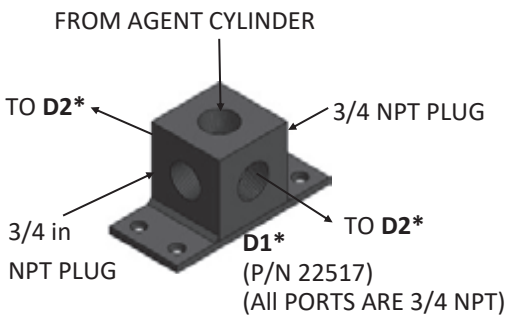
Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to T1, T1 to T2, or T2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (T2 to Nozzle) is 9 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.14 V50 / VS50 / VS75 Agent Distribution Network with Distributor to Distributors (10 Nozzles)



Note:
1. Legs from D1 to D2 must be routed to match Fig 4.5.14.
2. A standard Tee can be substituted for D1 if desired.*

Figure 4.5.14



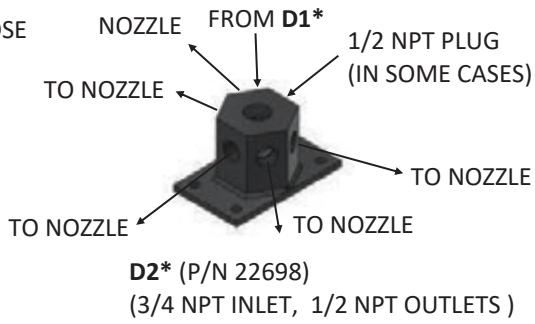


Table 4.5.14

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	10 (3.0)	0	2	0
Cylinder to any Nozzle	—	70 (21.3)	4 (1.2)	-	-
All 1/2” hose	—	80 (24.4)	0	-	-
All 3/4” hose	—	60 (18.3)	6 (1.8)	-	-

Note: D2 to nozzle can be 0 if all D2 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.15 V50 / VS50 / VS75 Agent Distribution Network with Distributor to Distributors (10 Nozzles)

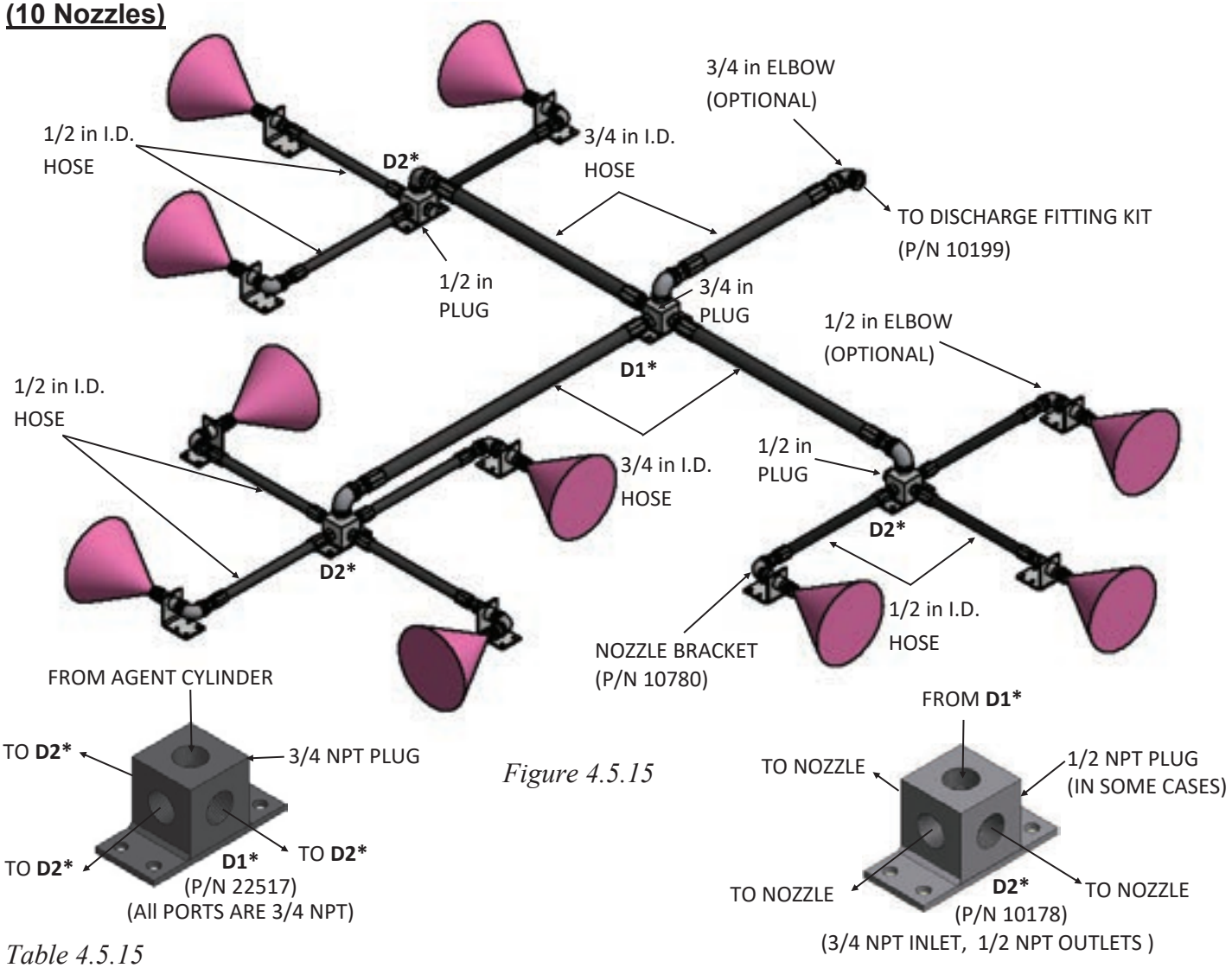


Figure 4.5.15

Table 4.5.15

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	9 (2.7)	2 (0.61)	2	0
Cylinder to any Nozzle	—	69 (21.0)	6 (1.8)	-	-
All 1/2” hose	—	80 (24.4)	20 (6.1)	-	-
All 3/4” hose	—	60 (18.3)	8 (2.4)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.16 VS75 Agent Distribution Network with Distributor to Tees (12 Nozzles)

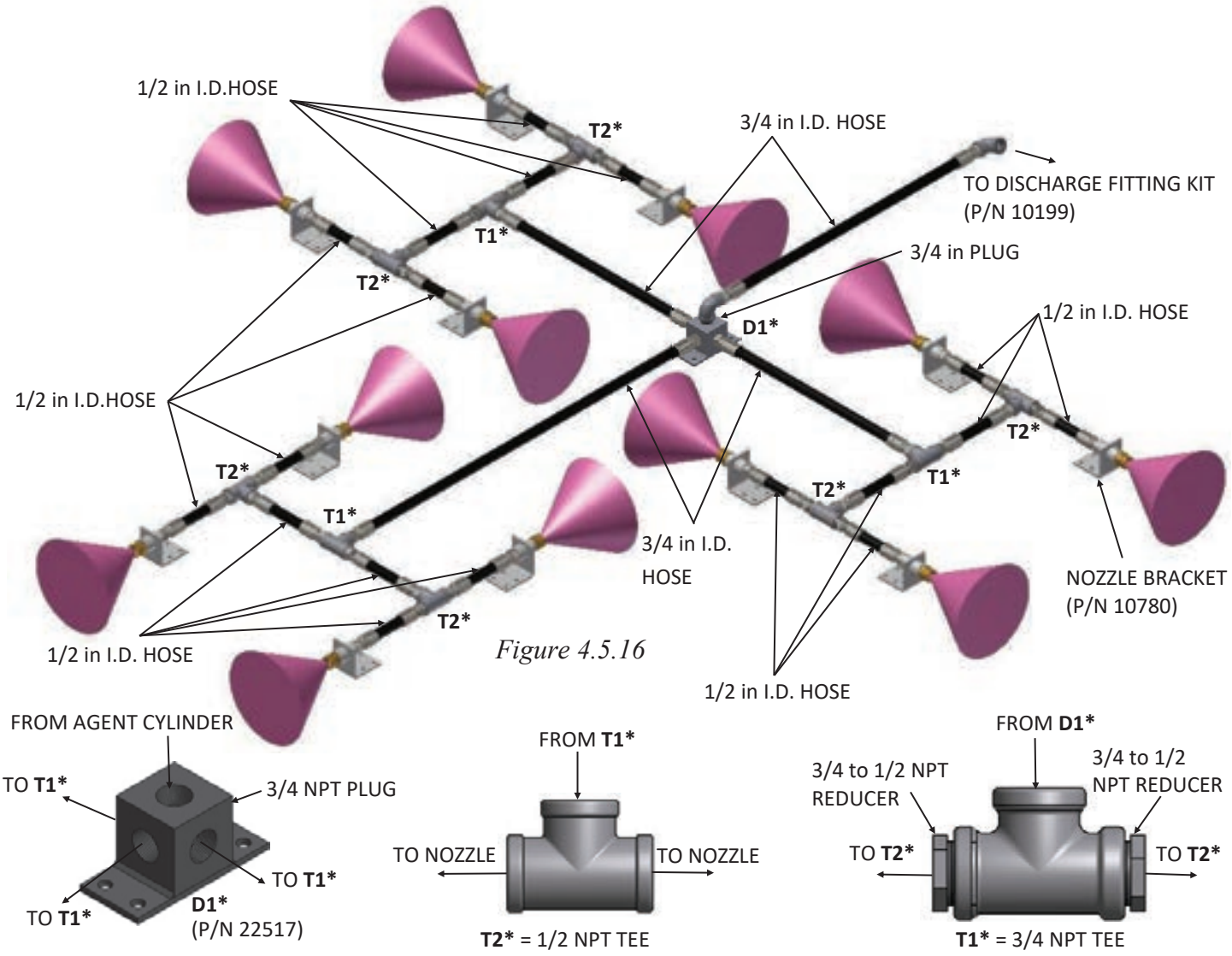


Figure 4.5.16

Table 4.5.16 *Reducing tees can be used in place of tees with reducing bushings. Reduction must occur at the outlet of Tee, not the inlet).

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to T1	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
T1 to T2	1/2 (12.7)	10 (3.0)	2 (0.61)	2	0
T2 to Nozzle	1/2 (12.7)	10 (3.0)	2 (0.61)	2	0
All 1/2” hose	—	80 (24.4)	36 (11)	-	-
All 3/4” hose	—	60 (18.3)	8 (2.4)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to T1, T1 to T2, or T2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (T2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.17 VS75 Agent Distribution Network with Distributor to Distributors (12 Nozzles)

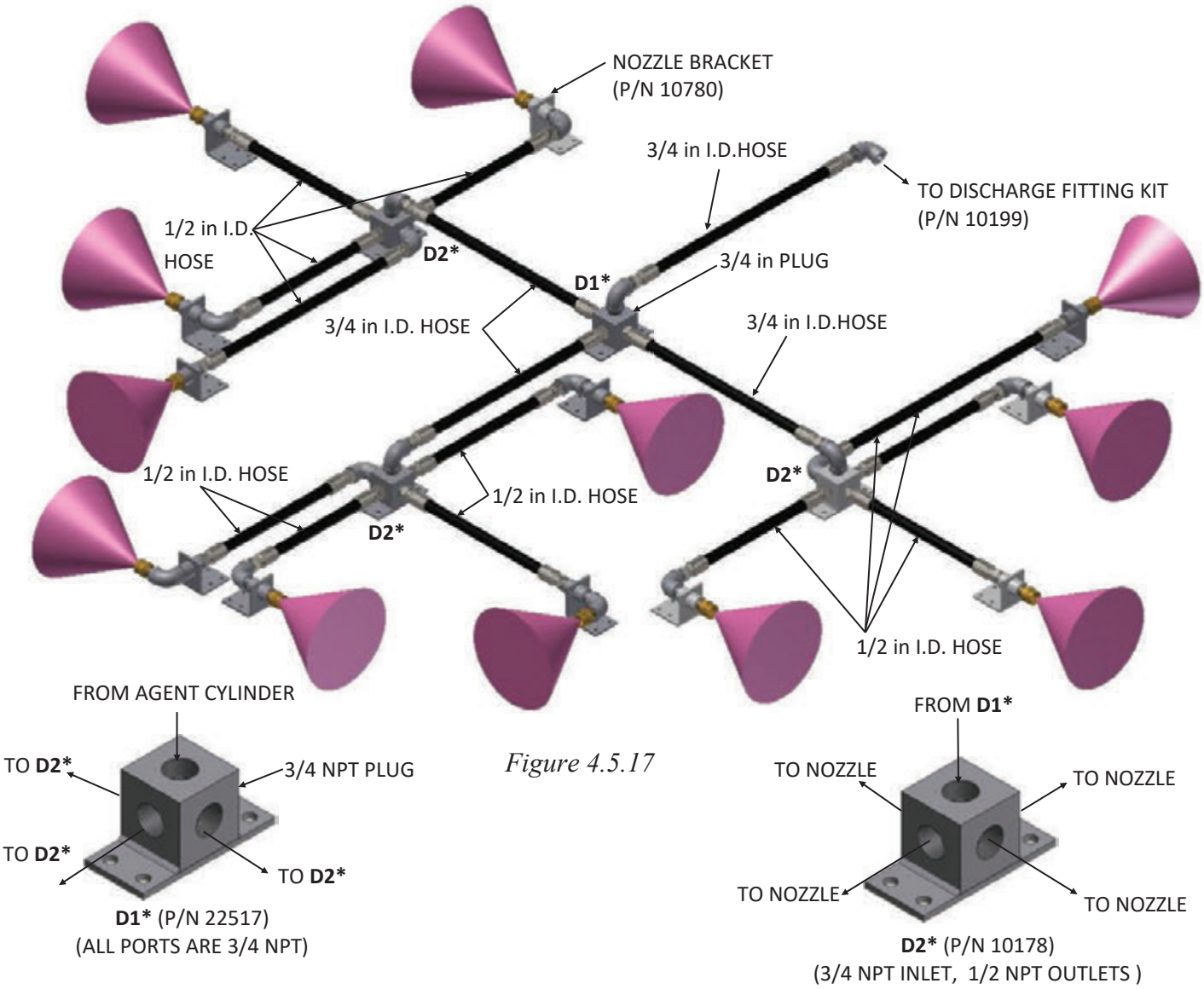


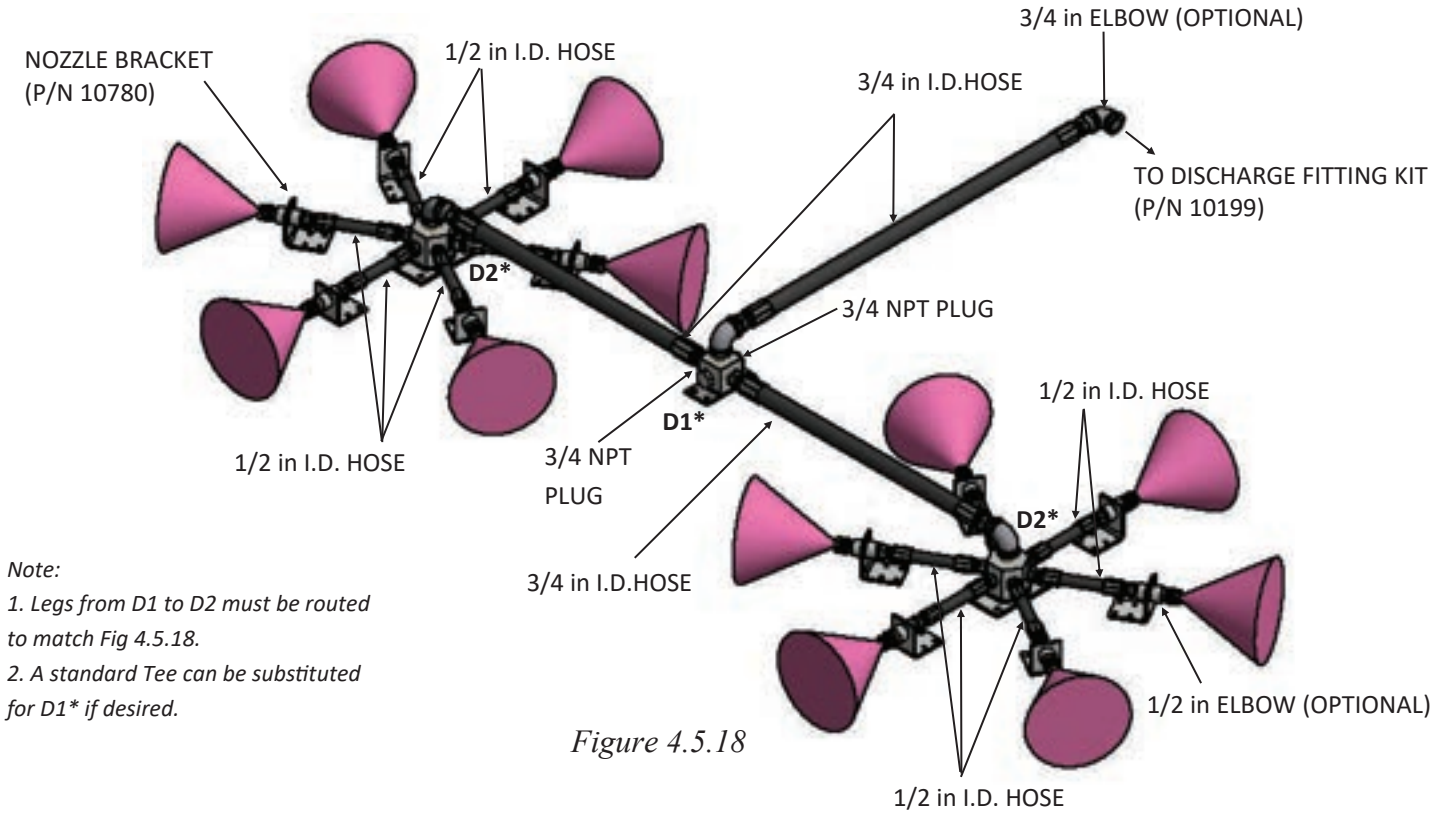
Figure 4.5.17

Table 4.5.17

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	10 (3.0)	2 (0.61)	2	0
All 1/2” hose	—	80 (24.4)	24 (7.3)	-	-
All 3/4” hose	—	60 (18.3)	8 (2.4)	-	-

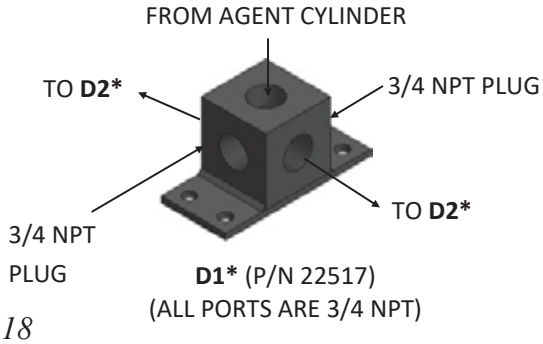
Note: D2 to nozzle can be 0 if all D2 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.18 VS75 Agent Distribution Network with Distributor to Distributors (12 Nozzles)



Note:
1. Legs from D1 to D2 must be routed to match Fig 4.5.18.
2. A standard Tee can be substituted for D1 if desired.*

Figure 4.5.18



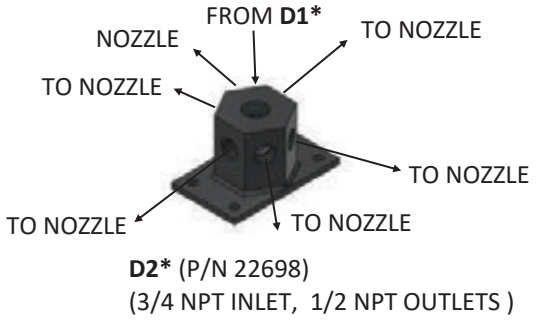


Table 4.5.18

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	10 (3.0)	2 (0.61)	2	0
All 1/2” hose	—	80 (24.4)	24 (7.3)	-	-
All 3/4” hose	—	60 (18.3)	6 (1.8)	-	-

Note: D2 to nozzle can be 0 if all D2 to nozzle dimensions are 0. Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.19 VS75 Agent Distribution Network with Distributor to Distributors (14 Nozzles)

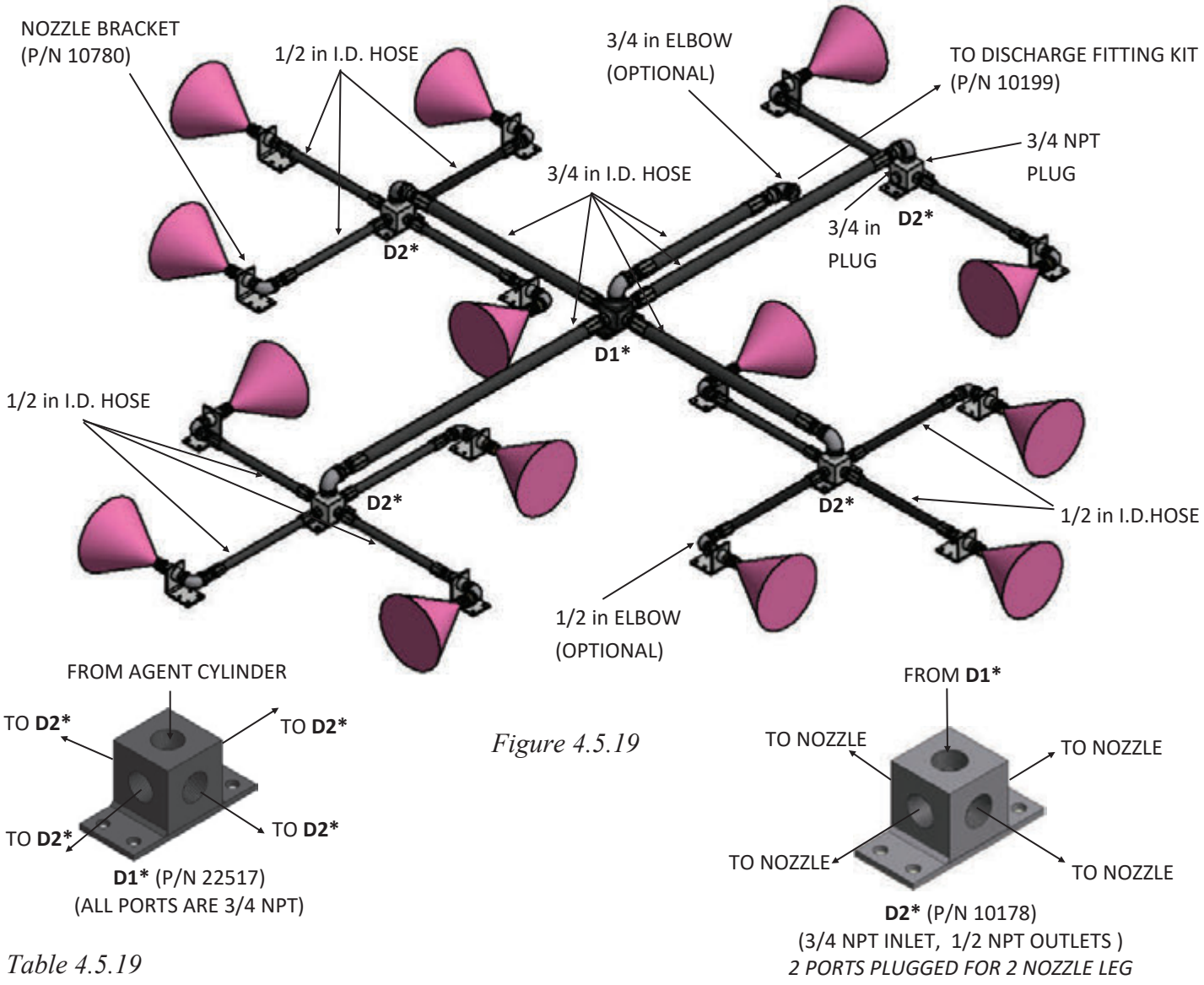


Figure 4.5.19

Table 4.5.19

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	9 (2.7)	2 (0.61)	2	0
All 1/2” hose	—	80 (24.4)	28 (8.5)	-	-
All 3/4” hose	—	60 (18.3)	10 (3.0)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.20 VS75 Agent Distribution Network with Distributor to Tees (14 Nozzles)

Figure 4.5.20

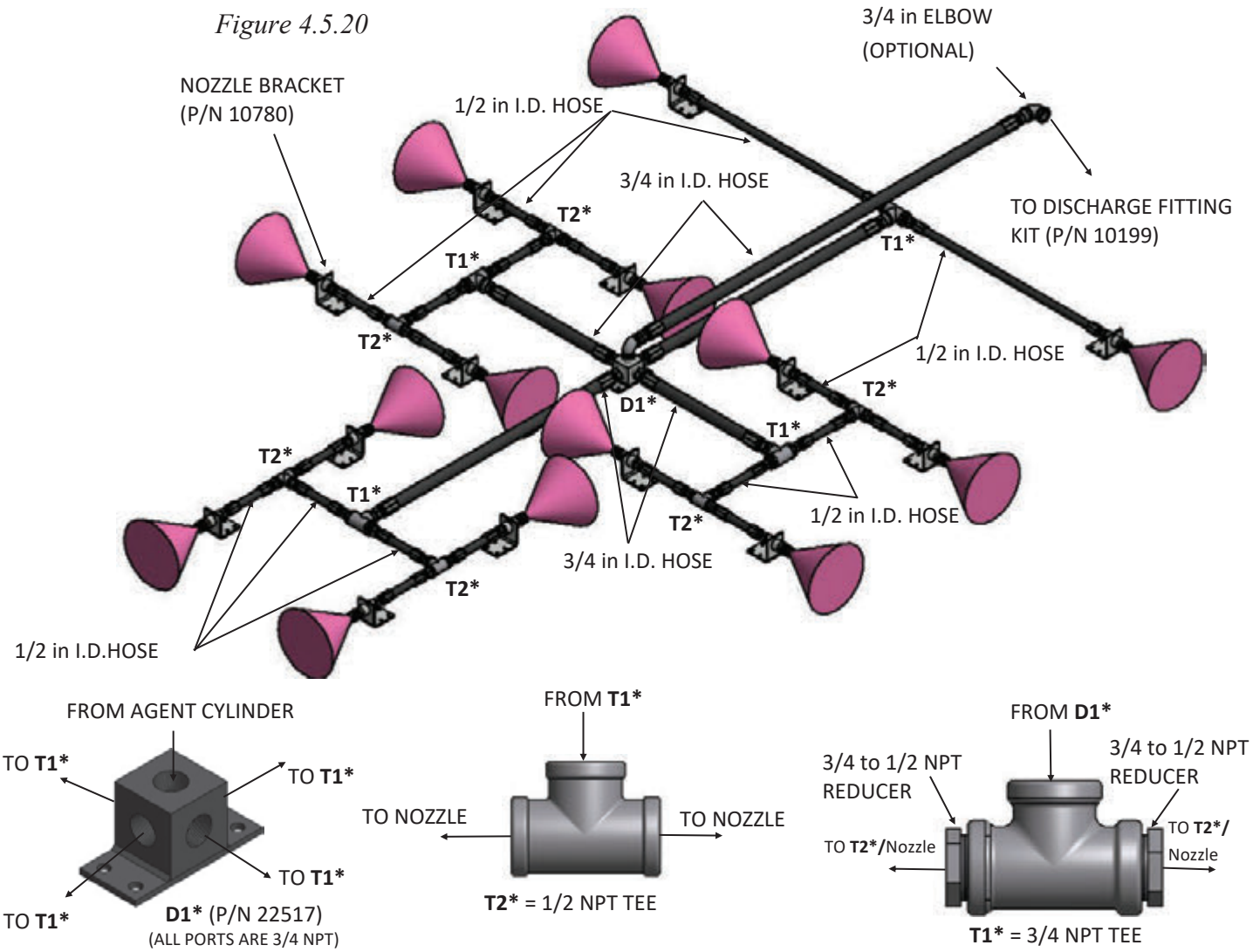


Table 4.5.20 *Reducing tees can be used in place of tees with reducing bushings. Reduction must occur at the outlet of Tee, not the inlet).

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to T1	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
T1 to T2/Nozzle	1/2 (12.7)	9 (2.7)	1 (0.91)	2	0
T2 to Nozzle	1/2 (12.7)	6 (1.8)	2 (0.61)	2	0
All 1/2” hose	—	80 (24.4)	26 (7.9)	-	-
All 3/4” hose	—	60 (18.3)	10 (3.0)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to T1, T1 to T2 or T2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (T2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.21 VS75 Agent Distribution Network with Distributor to Distributors (14 Nozzles)

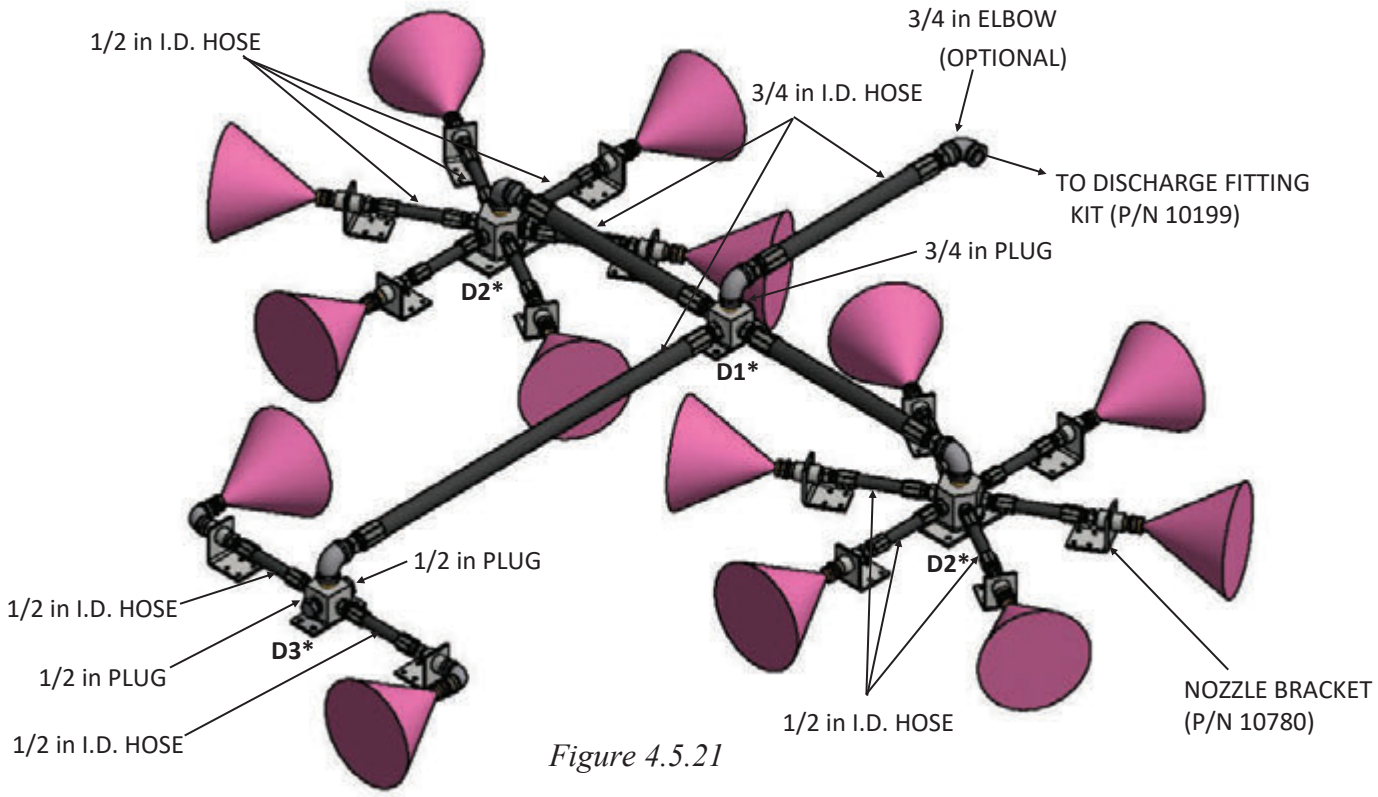
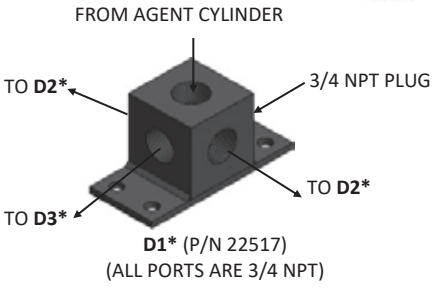
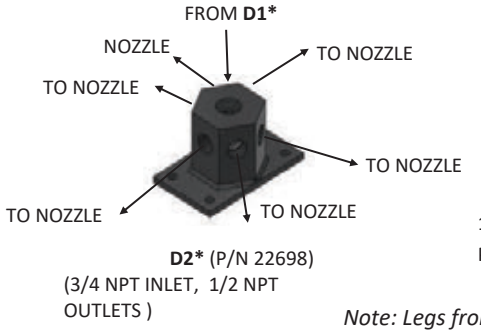
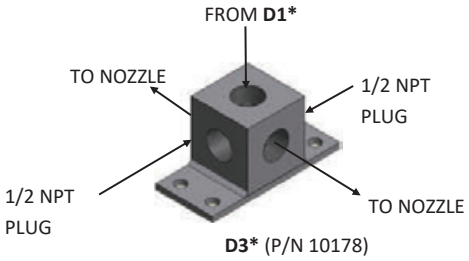


Figure 4.5.21







Note: Legs from D3 to nozzle must be routed to match Fig 4.5.21. A standard Tee can be substituted for D3 if desired.*

Table 4.5.21

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to D2/D3	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
D2/D3 to Nozzle	1/2 (12.7)	9 (2.7)	2 (0.61)	2	0
All 1/2” hose	—	80 (24.4)	28 (8.5)	-	-
All 3/4” hose	—	60 (18.3)	8 (2.4)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, D1 to D3, D2 to Nozzle, or D3 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.22 VS75 Agent Distribution Network with Distributor to Distributors (14 Nozzles)

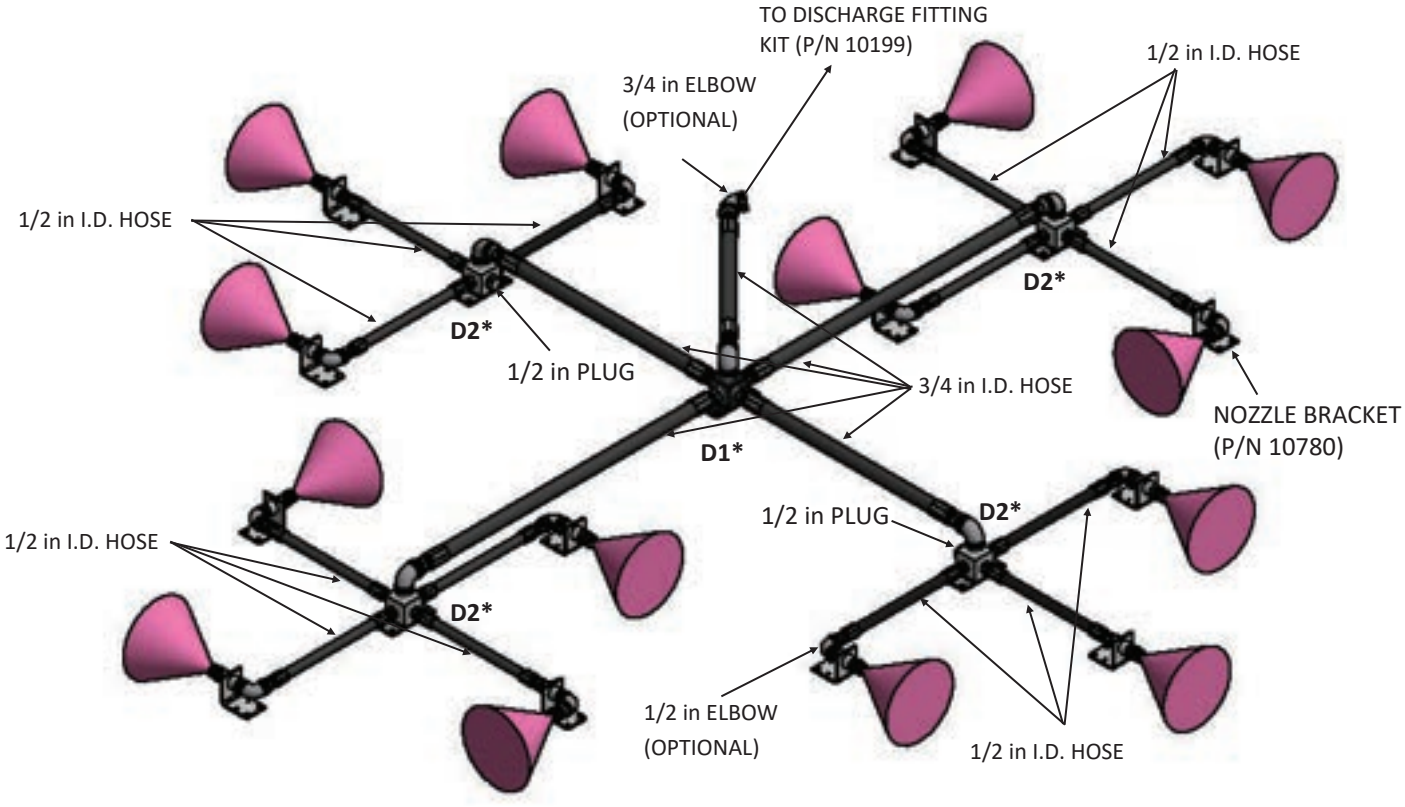
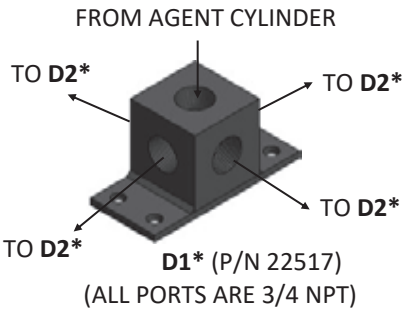


Figure 4.5.22



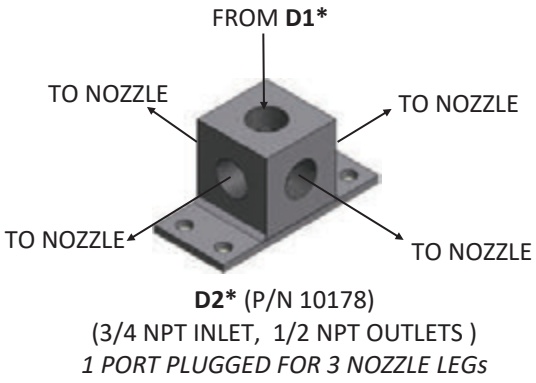


Table 4.5.22

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	9 (2.7)	2 (0.61)	2	0
All 1/2” hose	—	80 (24.4)	28 (8.5)	-	-
All 3/4” hose	—	60 (18.3)	10 (3.0)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.23 VS75 Agent Distribution Network with Distributor to Distributors (14 Nozzles)

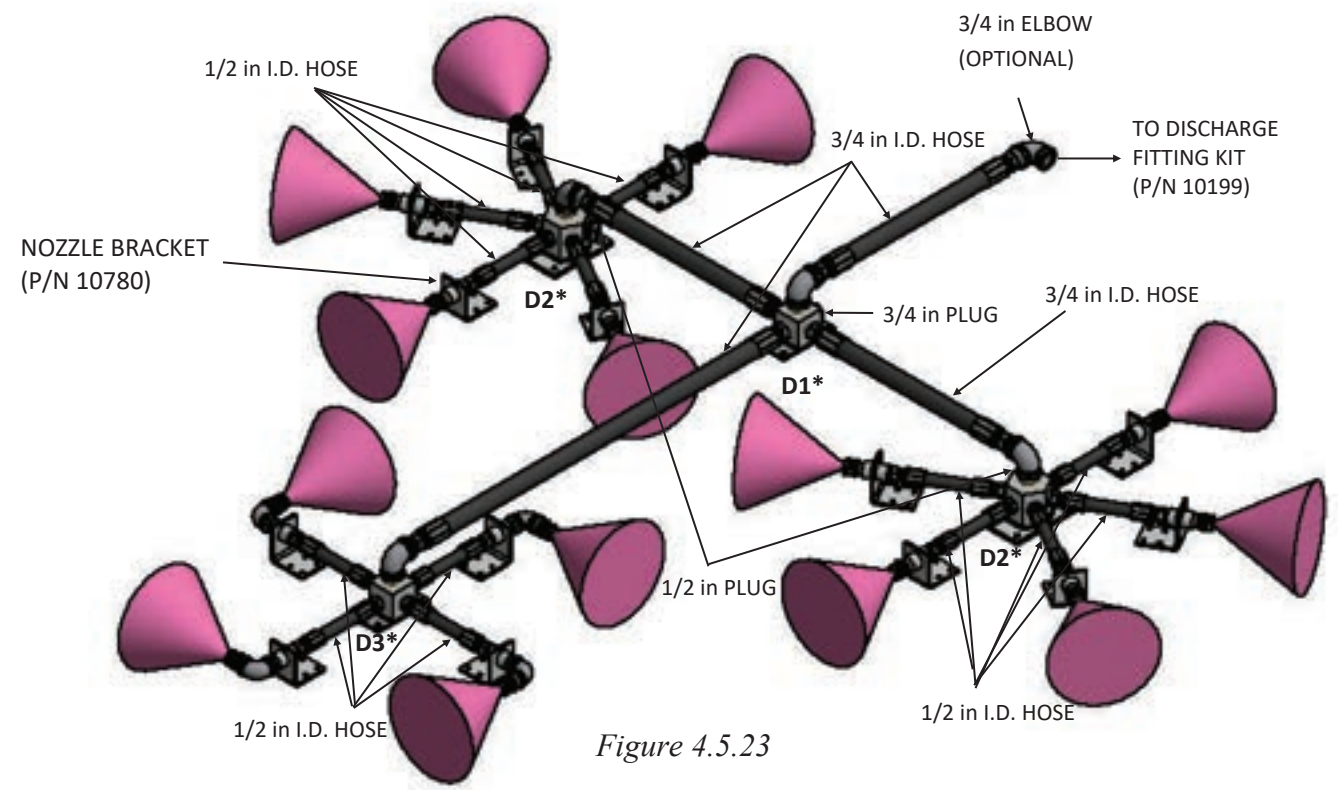


Figure 4.5.23

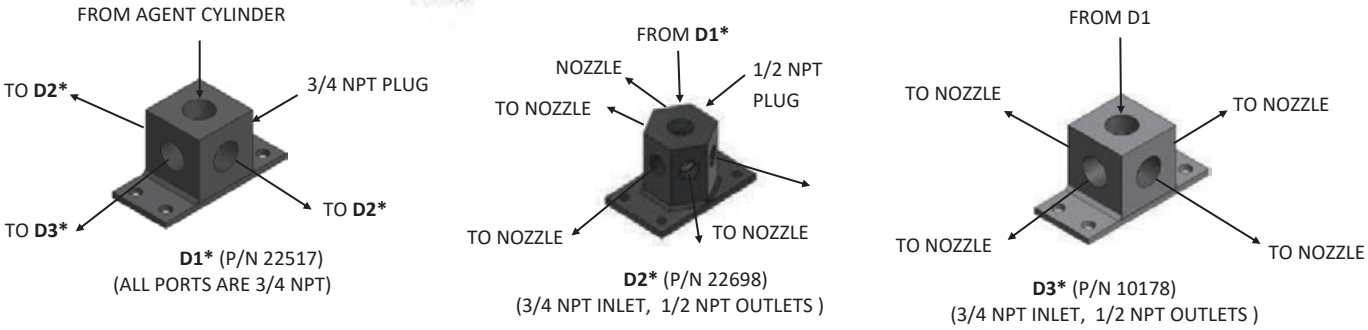


Table 4.5.23

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	3/4 (19.1)	45 (13.7)	2 (0.61)	2	0
D1 to D2/D3	3/4 (19.1)	15 (4.6)	2 (0.61)	2	0
D2/D3 to Nozzle	1/2 (12.7)	9 (2.7)	2 (0.61)	2	0
All 1/2” hose	—	80 (24.4)	28 (8.5)	-	-
All 3/4” hose	—	60 (18.3)	8 (2.4)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, D1 to D3, D2 to Nozzle, or D3 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 10 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 3.3 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.24 V250 Agent Distribution Network with Distributor to Distributors (12 Nozzles)

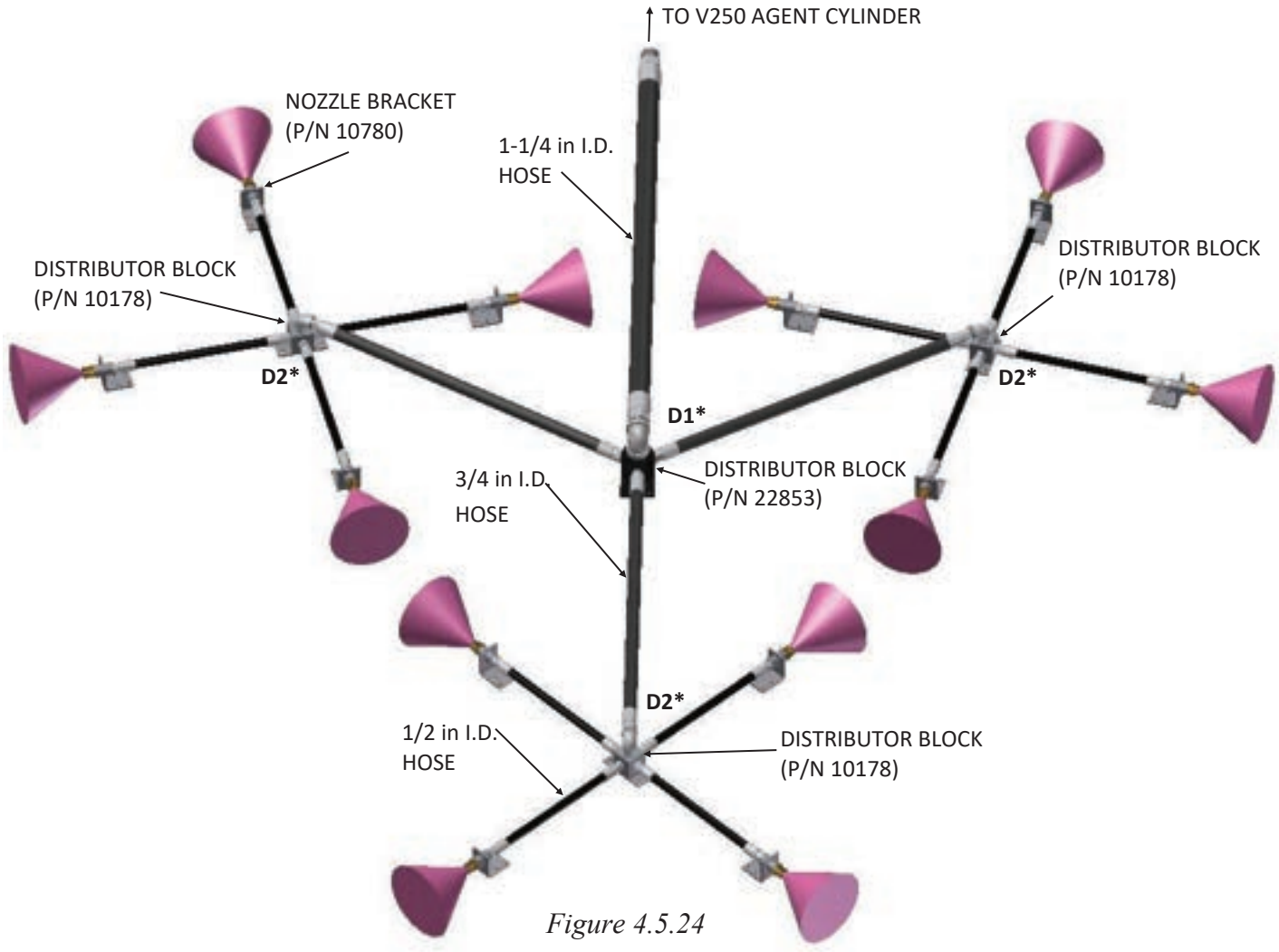


Figure 4.5.24

Table 4.5.24

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	1-1/4 (31.8)	20 (6.1)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	50 (15.2)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	30 (9.1)	2 (0.61)	2	0
Cylinder to any Nozzle	—	80 (24.4)	6 (1.8)	2	0
All 1/2” hose	—	360 (109.7)	24 (7.3)	-	-
All 3/4” hose	—	150 (45.7)	6 (1.8)	-	-
All 1-1/4” hose	—	20 (6.1)	2 (0.61)	-	-

Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 30 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 10 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.25 V250 Agent Distribution Network with Distributor to Distributors (18 Nozzles)

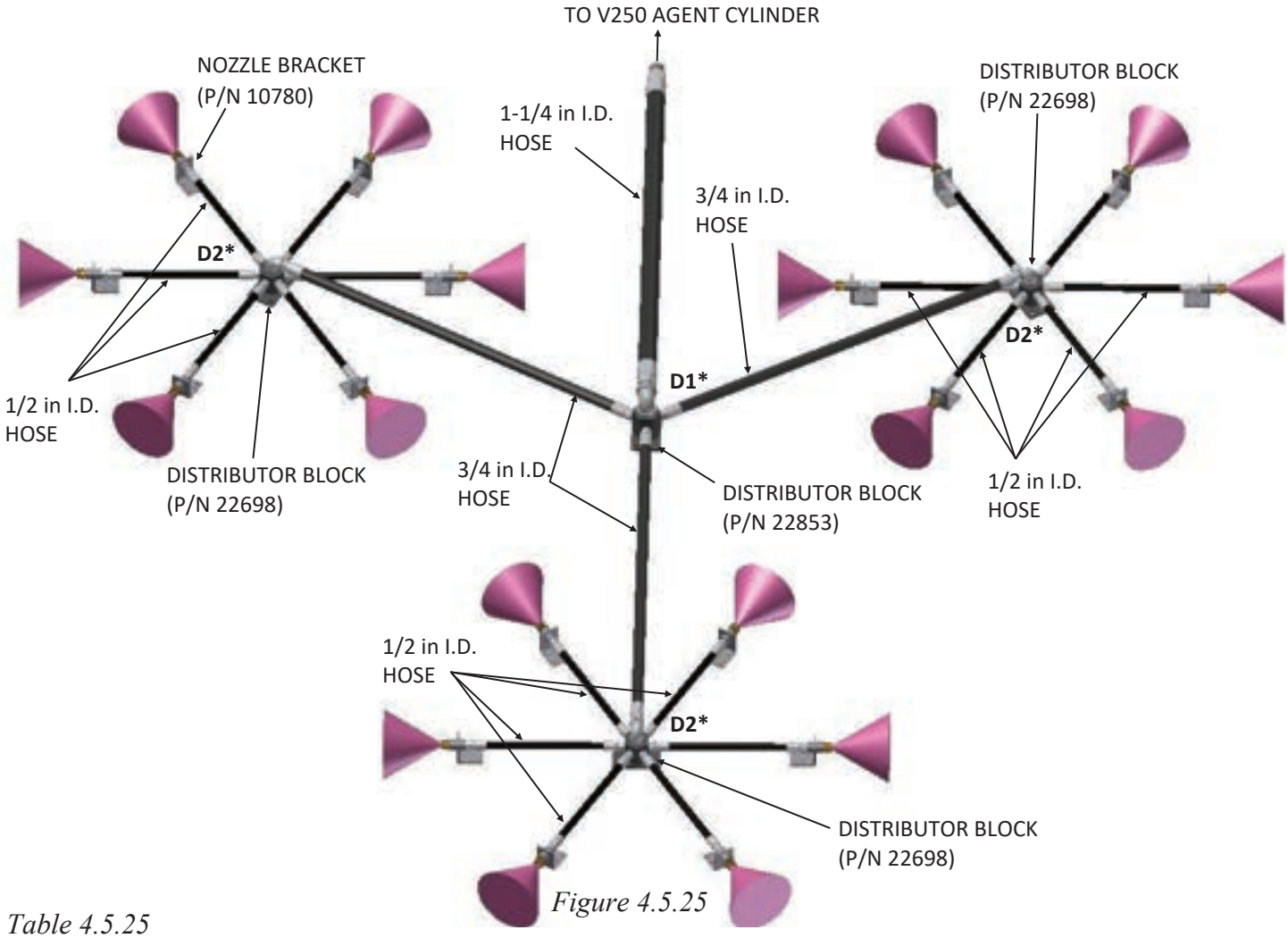


Figure 4.5.25

Table 4.5.25

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	1-1/4 (31.8)	20 (6.1)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	50 (15.2)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	30 (9.1)	2 (0.61)	2	0
Cylinder to any Nozzle	—	80 (24.4)	6 (1.8)	2	0
All 1/2” hose	—	540 (164.6)	36 (11.0)	-	-
All 3/4” hose	—	150 (45.7)	6 (1.8)	-	-
All 1-1/4” hose	—	20 (6.1)	2 (0.61)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 30 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 10 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.26 V250 Agent Distribution Network with Distributor to Distributors (24 Nozzles)

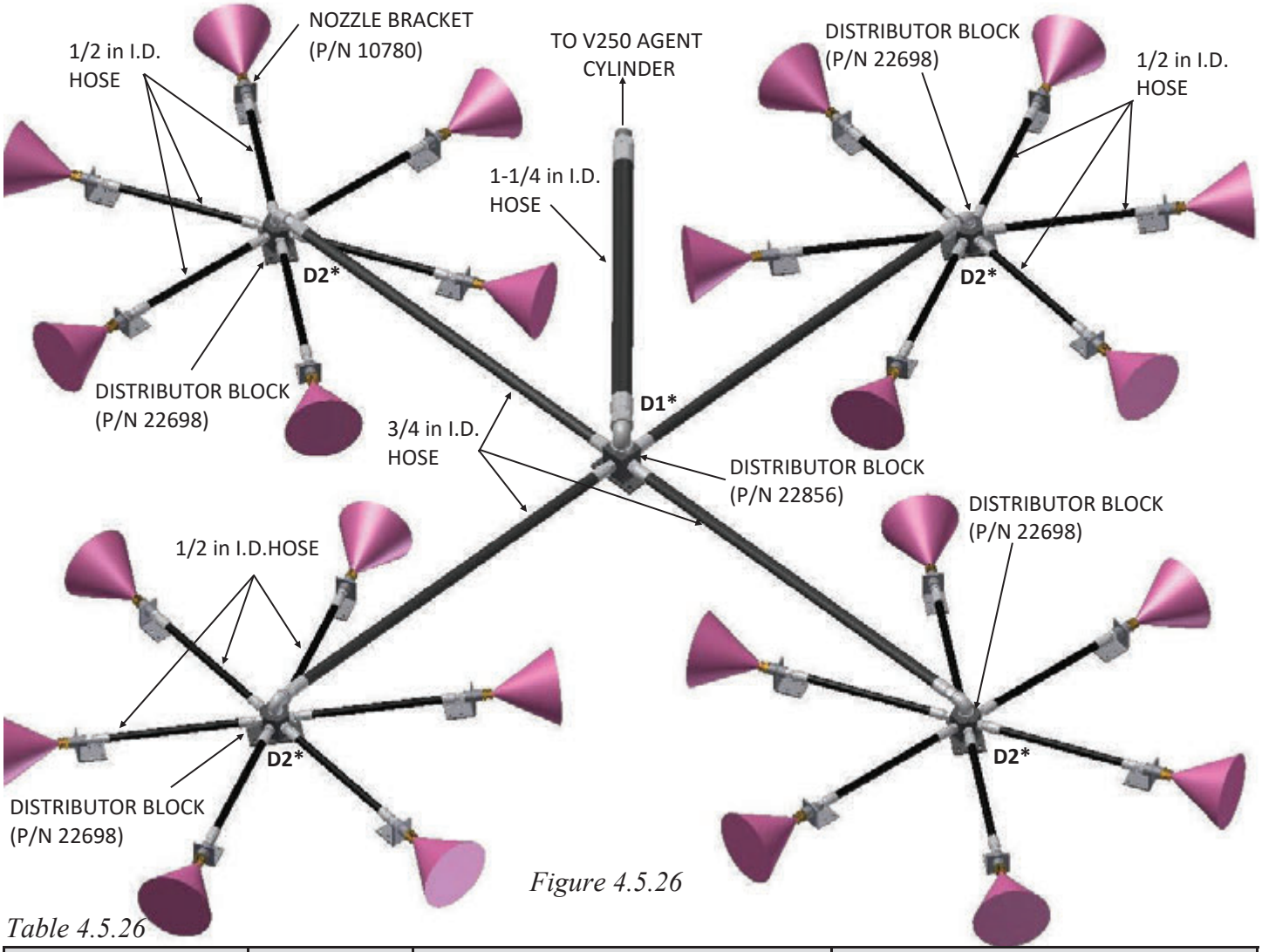


Figure 4.5.26

Table 4.5.26

LOCATION	HOSE I.D. in (mm)	HOSE LENGTH FEET (METERS)		NUMBER OF ELBOWS PER SECTION OF HOSE	
		MAXIMUM	MINIMUM	MAXIMUM	MINIMUM
Cylinder to D1	1-1/4 (31.8)	20 (6.1)	2 (0.61)	2	0
D1 to D2	3/4 (19.1)	50 (15.2)	2 (0.61)	2	0
D2 to Nozzle	1/2 (12.7)	30 (9.1)	2 (0.61)	2	0
Cylinder to any Nozzle	—	80 (24.4)	6 (1.8)	2	0
All 1/2” hose	—	720 (219.5)	48 (14.6)	-	-
All 3/4” hose	—	200 (61)	8 (2.4)	-	-
All 1-1/4” hose	—	20 (6.1)	2 (0.61)	-	-

Note: Hose length may be unbalanced in a maximum ratio of 3:1 where the Agent Distribution Network splits (D1 to D2, or D2 to Nozzle). However, this ratio must be observed for the minimum versus maximum hose length. Example: If the longest 1/2 inch I.D. hose leading from where the network splits (D2 to Nozzle) is 30 feet, the shortest 1/2 inch I.D. hose leading from the same network split location cannot be less than 10 feet, and all 1/2 inch I.D. hoses together must fall within the length specified.

4.5.27 Stainless Steel Rigid Tubing in Agent Distribution Network

The Agent Distribution Network of the Amerex Modular Dry Chemical System may be constructed using rigid stainless steel tubing in place of some sections of hose. Use of rigid stainless steel tubing in areas of a hazard area subjected to extreme heat may be necessary. To design an Agent Distribution Network using portions of rigid tubing, observe the following rules:

- Tubing shall be constructed from 304 stainless steel with a wall thickness of 0.035 in. (Welded tube and seamless tube are acceptable.)
- The design must comply fully with the specifications for overall hose lengths, hose diameters, number of elbows and imbalances shown in Section 4.5.
- Flexible hose must be connected to the Discharge Fitting Kit.
- A change from flexible hose to rigid stainless steel tubing (or from stainless steel tubing to hose) may be made only once per hose section. A hose section is defined as that length connecting any two flow dividing fittings.
- Tables for hose limitations found in Section 4.5 specify a maximum allowable imbalance of 3:1 for the lengths of sections of hose exiting from any given tee or Distributor Block. When using a combination of hose and tubing, within one network, two additional imbalance requirements must be met:
  - When transitioning from hose to tube or tube to hose, individual lengths of the same material (hose/tube) must be within the 3:1 ratio for all runs on the same section and for each section. See the illustration below for further clarification.
  - If a section of rigid tubing is used on one branch of a Distributor Block or tee, then a section of rigid tubing must be used on all branches to keep the number of flow restrictions created by the transition from flexible hose to tubing equal on all sides of the Distributor Block or tee. Each split point is its own unique split point.
- The use of "Street Elbows" or any other elbow that creates a reduction in cross-sectional area is NOT ALLOWED.
- The illustrations below shows proper observance of these rules. Figure 4.5.27.a shows an Agent Distribution Network designed for a V25 using a Distributor Block. Note the following: *The 15 ft (4.6 m) maximum length for each section has been observed. The imbalance between the longest section of 15 ft (4.6 m) and the shortest section of 5 ft (1.5 m) is within 3:1. The imbalance between the longest flexible hose section of 6 ft (1.8 m) and the shortest hose section of 2 ft (0.61 m) is within 3:1. The imbalance between the longest section of rigid tubing of 9 ft (2.7 m) and the shortest length of tubing of 3 ft (0.91 m) is also within the required 3:1 imbalance ratio.*

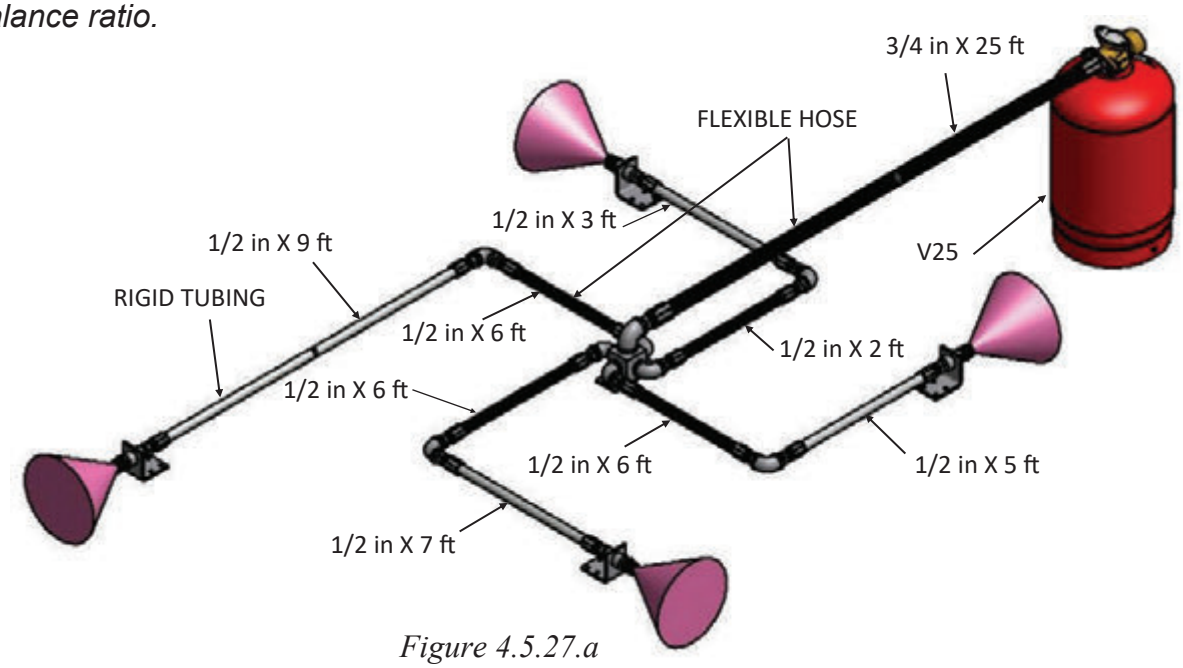


Figure 4.5.27.a

4.5.27 Con't.

Figure 4.5.27.b shows an Agent Distribution Network designed for a V50/VS50 using multiple Distributor Blocks. Note the maximum lengths for each section have been observed with respect to Table 4.5.15. Additionally, the imbalances between each corresponding section do not exceed the 3:1 ratio. The rules for hose-tube have also been considered. Since one run from D1 to D2 transitioned from tube to hose, all sections also followed the same transition. If the transition is made from tube-to-hose / hose-to-tube for one run of a section, then the transition must be made for all runs of the same section. (Ex. If one run from D2 to nozzle was tubing, then all runs from D2 to nozzle ,must be tubing. See ALL runs inside of dotted lines below).

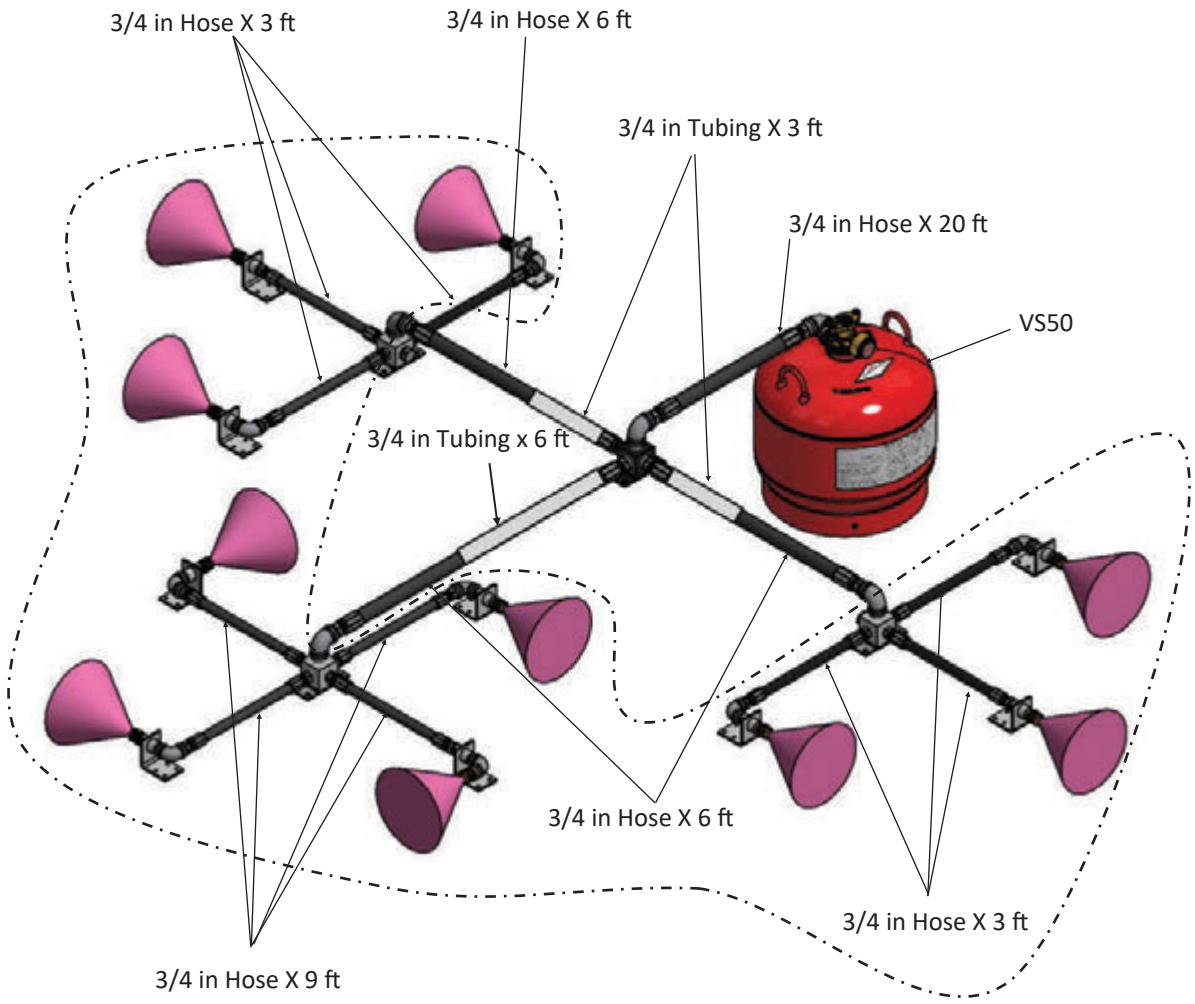


Figure 4.5.27.b

4.5.28 Distributor Block

When using an Agent Distribution Network that requires a Distributor Block, the Distributor Block can be bolted to the vehicle with a minimum of SAE Grade 5 bolts or welded to the vehicle. Do not weld on or drill into fuel tanks or vehicle Roll Over Protection System (ROPS) and Falling Object Protection Systems (FOPS). Consult equipment manufacturer and property owner prior to modification of the vehicle (See Section 2.3.3 for Distributor Block descriptions). See previous Sections in this Chapter for the proper Distributor Blocks to be used with selected Agent Distribution Networks.

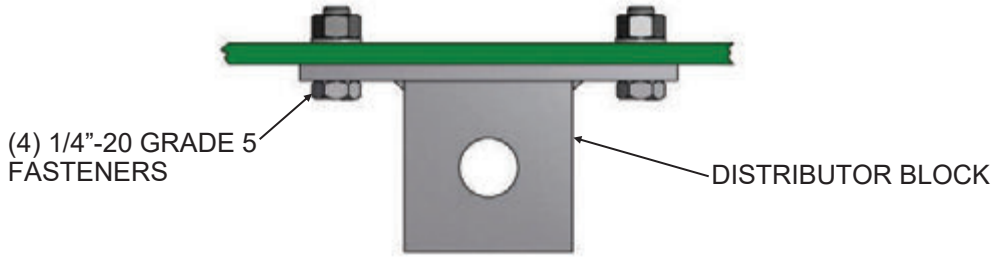


Figure 4.5.28

4.6 System Actuation Control Head Installation

The Amerex Modular Dry Chemical System has three different options available for system actuation including the Electric Control Head, the Pneumatic Control Head, and the Electric / Pneumatic Control Head. The following section explains how to install each of the options. Systems using the V250 Agent Cylinder have two options including the Pneumatic Control Head and the Electric / Pneumatic Control Head. **PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) IS REQUIRED for NPT connections on actuation network. DO NOT use PTFE Thread Tape or Pipe Dope with linear actuator (P/N 22579).** See installation notes for each component.

4.6.1 Electric Control Head (P/N 14032)

Installation:

1. Remove Shipping Plate (P/N 10099-P006) from top of Agent Cylinder Valve. Retain the (2) 5/16”-18 bolts (See Figure 2.1.a).
2. Verify that the tapered end of the stainless steel piston is loosely captive at bottom of Electric Control Head.
3. Locate Electric Control Head on top of Agent Cylinder Valve as shown.
4. Install (2) bolts retained from step 1 as shown. Use medium grade thread locking compound (for example Loctite 242) and torque to 10 ft-lbs (14 Nm).
5. Verify that Linear Actuator O-ring (P/N 17137-P015) is in place. Install Linear Actuator (P/N 22579) and tighten hand tight. **Do not over tighten. DO NOT use PTFE Thread Tape or Pipe Dope with Linear Actuator (P/N 22579). Ensure Linear Actuator body makes full contact with control head.** The Linear Actuator will be connected to the vehicle’s Amerex Modular Electronics System (See Section 4.9).
6. Secure Linear Actuator lead to the Agent Cylinder Valve body with a cable tie allowing a 1 in minimum bend radius for strain relief of the Linear Actuator lead.

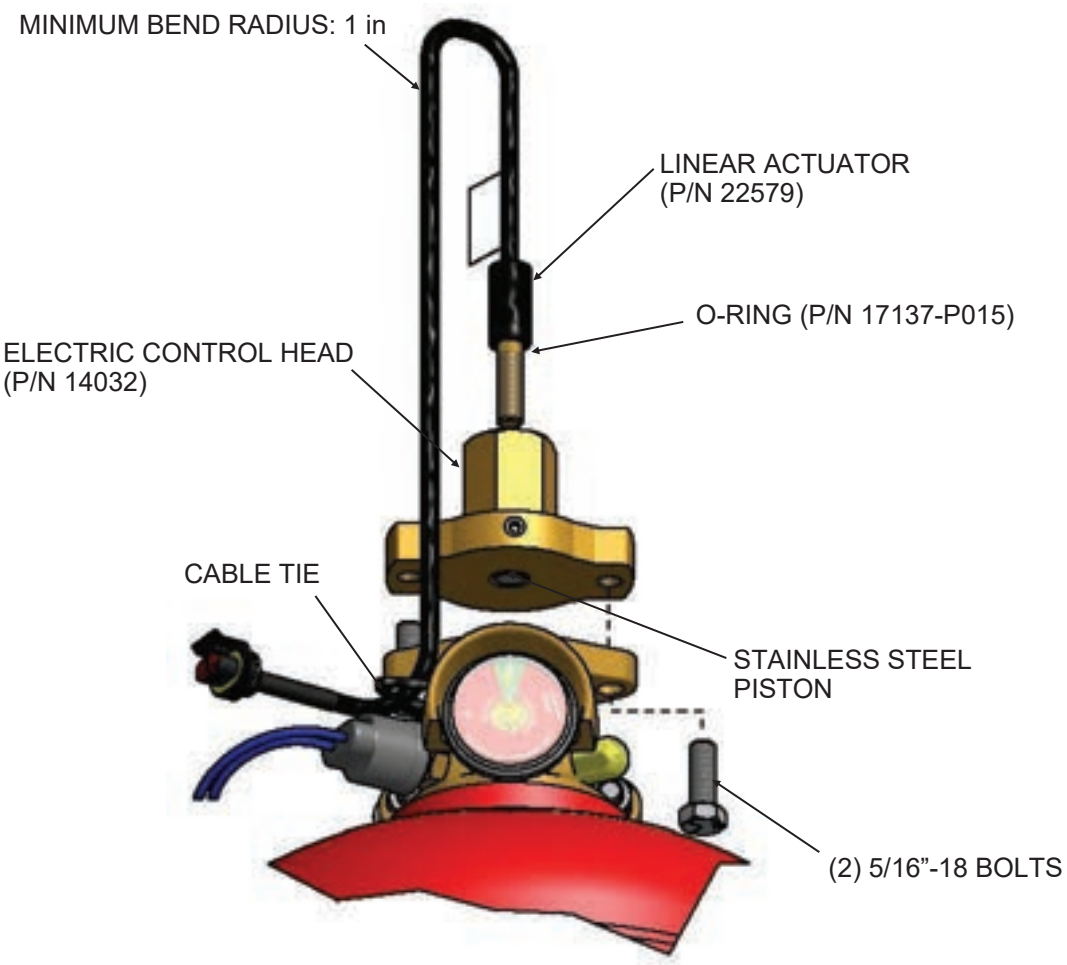


Figure 4.6.1

4.6.2 Electric / Pneumatic Control Head (P/N 17068)

Installation:

1. Remove Shipping Plate (P/N 10099-P006) from top of Agent Cylinder Valve. Retain the (2) 5/16"-18 bolts (See Figure 2.1.a).
2. Verify piston is fully recessed into Electric / Pneumatic Control Head body as shown.
3. Locate Electric / Pneumatic Control Head on top of Agent Cylinder Valve as shown.
4. Install (2) bolts retained from step 1 as shown. Use medium grade thread locking compound (for example Loctite 242) and torque to 10 ft-lbs (14 Nm).
5. Install 1/4 NPT Pneumatic Actuation Network (See Section 4.7). **PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) IS REQURED for NPT connections on actuation network.** Tighten a minimum of two turns past hand tight.
6. Install Vent Check (P/N 10173) . For multiple control heads, a Vent Check may not be required at each control head. (See Section 4.7.1 & 4.8.3). Use PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) thread tape (Max of 2 to 3 wraps). Tighten a minimum of two turns past hand tight.
7. Install Dust Cap (P/N 13761-P006) on Vent Check.
8. Verify that Linear Actuator O-ring (P/N 17137-P015) is in place. Install Linear Actuator (P/N 22579) and tighten hand tight. **Do not over tighten. DO NOT use PTFE Thread Tape or Pipe Dope with Linear Actuator (P/N 22579). Ensure Linear Actuator body makes full contact with control head.** The Linear Actuator will be connected to the vehicle's Amerex Modular Electronics System (See Section 4.9).
9. Secure the Linear Actuator lead to the Agent Cylinder Valve body with a cable tie allowing a 1 in minimum bend radius for strain relief of the Linear Actuator lead.

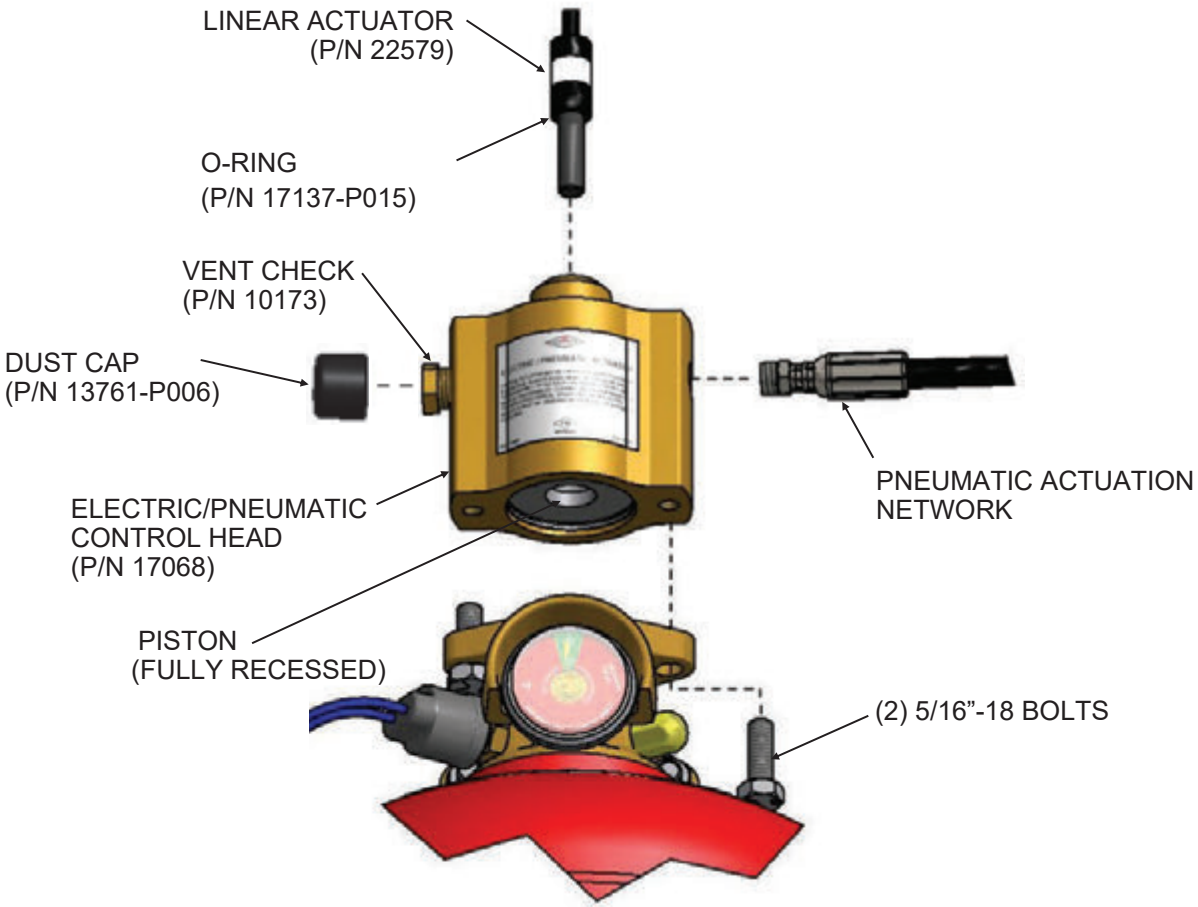


Figure 4.6.2

4.6.3 Electric / Pneumatic Control Head, V250 Agent Cylinder (P/N 22868)

Installation:

Ensure Anti-Recoil Plug (P/N 17559-P001) is in place or Agent Distribution Network is connected prior to proceeding! Protective Cap (P/N 17990-P001) must be in place anytime the Agent Cylinder is not in service and connected to a Control Head, or being recharged (See Figure 2.1.b)!

1. Remove Protective Cap (P/N 17990-P001) from top of the Agent Cylinder Valve. **WARNING: Do not depress Valve Core Stem located under Protective Cap, as a system discharge will occur (See Figure 4.6.3.a)!**
2. Verify piston is fully recessed into Electric / Pneumatic Control Head body. A fully recessed piston measures approximately 0.28 in (7.1mm) from the base of the control head (See Figure 4.6.3.b).
3. Locate Electric / Pneumatic Control Head on top of Agent Cylinder Valve as shown.
4. Screw Electric / Pneumatic Control Head onto the top of the Agent Cylinder Valve and torque to 25 ft-lbs.
5. Install 1/4 NPT Pneumatic Actuation Network hose (See Section 4.7). **PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) thread tape IS REQUIRED for NPT connections on actuation network.** Tighten a minimum of two turns past hand tight.
6. Install Vent Check (P/N 10173). For multiple Control Heads, a Vent Check may not be required at each Control Head (See Section 4.7.1 & 4.8.3). Use PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) (Max of 2 to 3 wraps). Tighten a minimum of two turns past hand tight.
7. Install Dust Cap (P/N 13761-P006) on Vent Check.
8. Verify that Linear Actuator O-ring (P/N 17137-P015) is in place. Install Linear Actuator (P/N 22579) and tighten hand tight. **Do not over tighten. DO NOT use PTFE Thread Tape or Pipe Dope on Linear Actuator. Ensure Linear Actuator body makes full contact with control head.** The Linear Actuator will be connected to the vehicle's Amerex Modular Electronics System (See Section 4.9).
9. Secure Linear Actuator wire to the valve body with a cable tie allowing a 1 in (25.4mm) minimum bend radius for strain relief of the Linear Actuator cable.

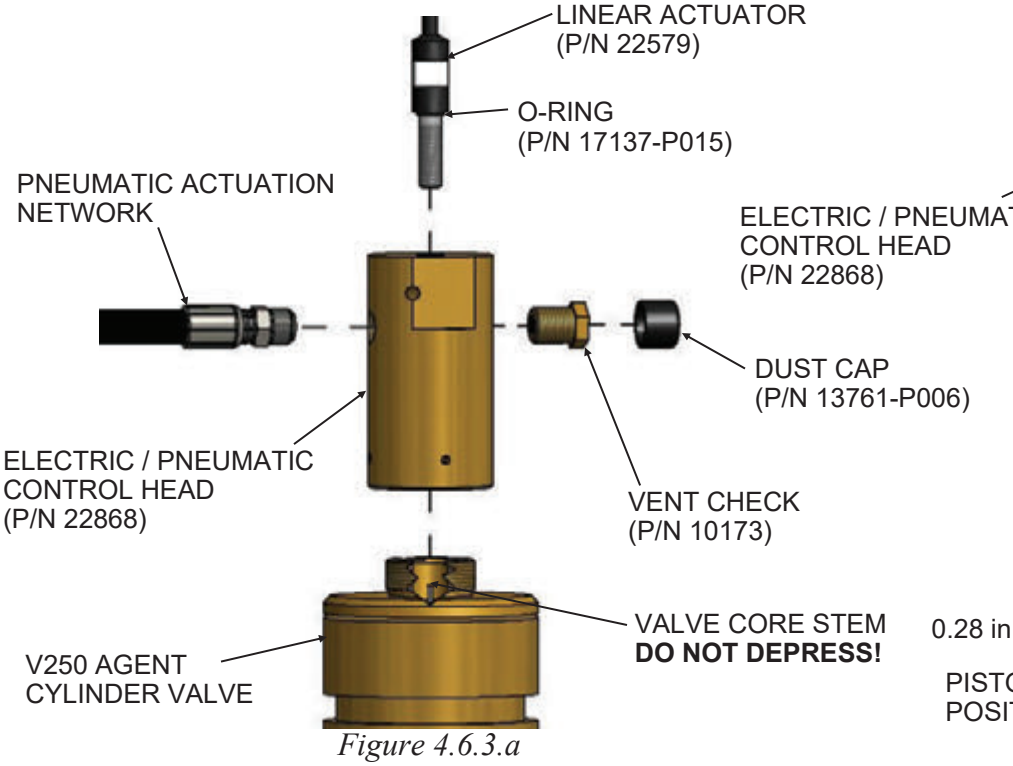


Figure 4.6.3.a

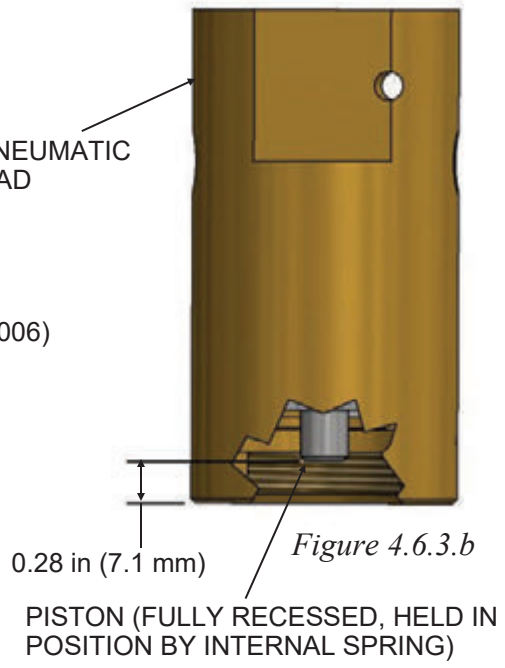


Figure 4.6.3.b

4.6.4 Pneumatic Control Head (P/N 10147)

Installation:

1. Remove Shipping Plate (P/N 10099-P006) from top of Agent Cylinder Valve. Retain the (2) 5/16”-18 bolts (See Figure 2.1.a).
2. Verify piston is fully recessed into Pneumatic Control Head body as shown.
3. Locate Pneumatic Control Head on top of Agent Cylinder Valve as shown.
4. Install (2) bolts retained from step 1 as shown. Use medium grade thread locking compound (for example Loctite 242) and torque to 10 ft-lbs (14 Nm).
5. Install 1/4 NPT Pneumatic Actuation Network (See Section 4.7). **PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) is required for NPT connections on actuation network.** Tighten a minimum of two turns past hand tight. For Pneumatic Control Heads using a Pneumatic Piston Assembly with locking Spring Plunger, a Check Valve is not required (See Note under Figure 4.6.4).
6. Install Vent Check (P/N 10173). For multiple Control Heads, a Vent Check may not be required at each Control Head. (See Section 4.7.1 & 4.8.4). Use PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) (Max of 2 to 3 wraps). Tighten a minimum of two turns past hand tight.
7. Install Dust Cap (P/N 13761-P006) on Vent Check.

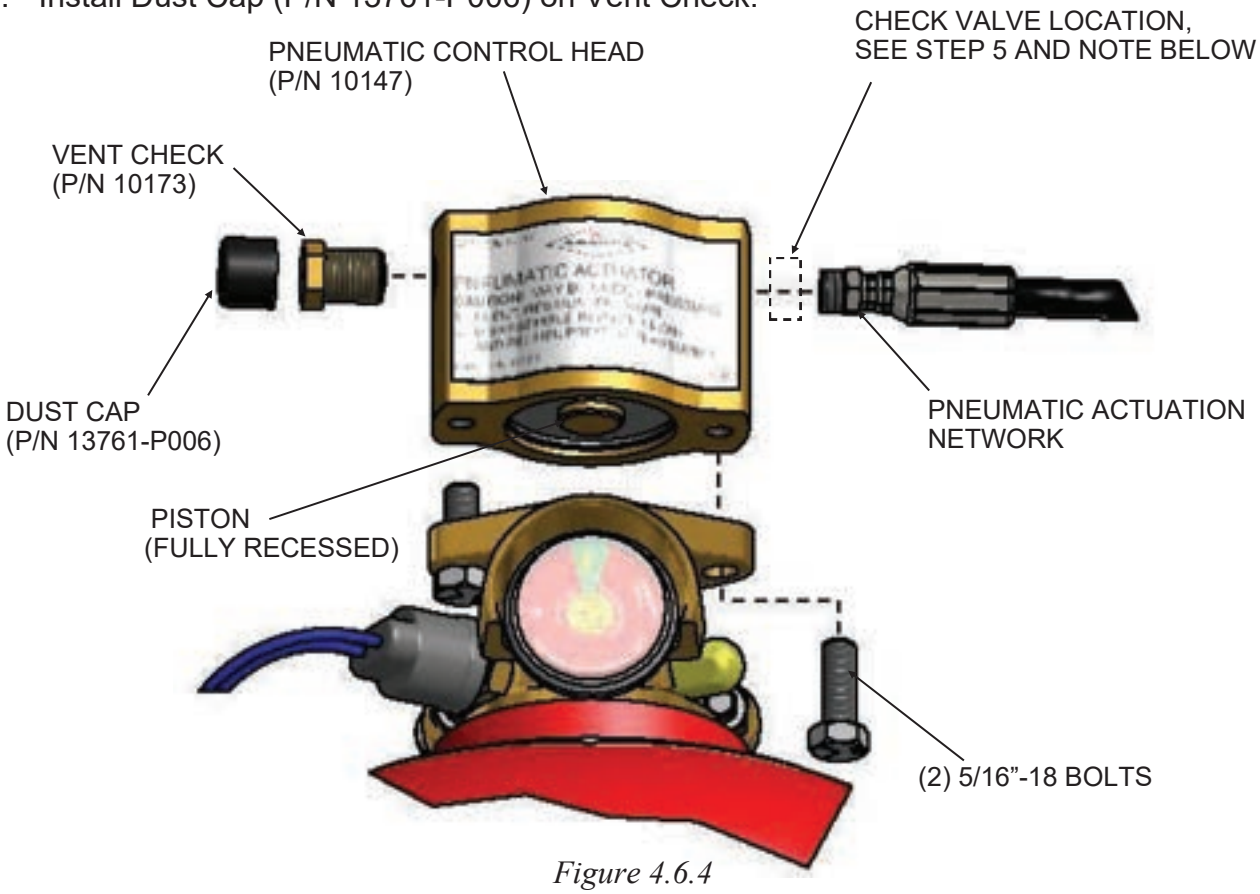


Figure 4.6.4

NOTE: Earlier versions (before year 2010) of the Pneumatic Control Heads (P/N 10147) were NOT equipped with a locking Spring Plunger on the internal Pneumatic Piston Assembly (See Figure 6.2.1.1). When using these older versions, a Check Valve (P/N 10262-P001) is required at the inlet of EVERY Pneumatic Control Head used in an Amerex Dry Chemical System where shown in Figure 4.6.4. The only way to verify that a newer version control head is being used, which contains a locking Spring Plunger, is to perform the test described in Section 6.2.1.1, Step 16. If the locking Spring Plunger exists and locks the deployed piston when performing the test, no Check Valve is required at the control head inlet.

4.6.5 Pneumatic Control Head, V250 Agent Cylinder (P/N 22869)

Installation:

Ensure Anti-Recoil Plug (P/N 17559-P001) is in place or Agent Distribution Network is connected prior to proceeding! Protective Cap (P/N 17990-P001) must be in place anytime the Agent Cylinder is not in service and connected to a Control Head, or being recharged (See Figure 2.1.b)!

1. Remove Protective Cap (P/N 17990-P001) from top of the Agent Cylinder Valve. **WARNING: Do not depress Valve Core Stem located under Protective Cap, as a system discharge will occur (See Figure 4.6.5.a)!**
2. Verify piston is fully recessed into Pneumatic Control Head body. A fully recessed piston measures approximately 0.28 in (7.1mm) from the base of the control head (See Figure 4.6.5.b).
3. Locate Pneumatic Control Head on top of Agent Cylinder Valve as shown.
4. Screw Pneumatic Control Head onto the top of the Agent Cylinder Valve and torque to 25 ft-lbs (34 Nm).
5. Install 1/4 NPT Pneumatic Actuation Network (See Section 4.7). **PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) is required for NPT connections on actuation network.** Tighten a minimum of two turns past hand tight.
6. Install Vent Check (P/N 10173). For multiple Control Heads, a Vent Check may not be required at each Control Head (See Section 4.7.1 & 4.8.4). Use PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) (Max of 2 to 3 wraps). Tighten a minimum of two turns past hand tight.
7. Install Dust Cap (P/N 13761-P006) on Vent Check.

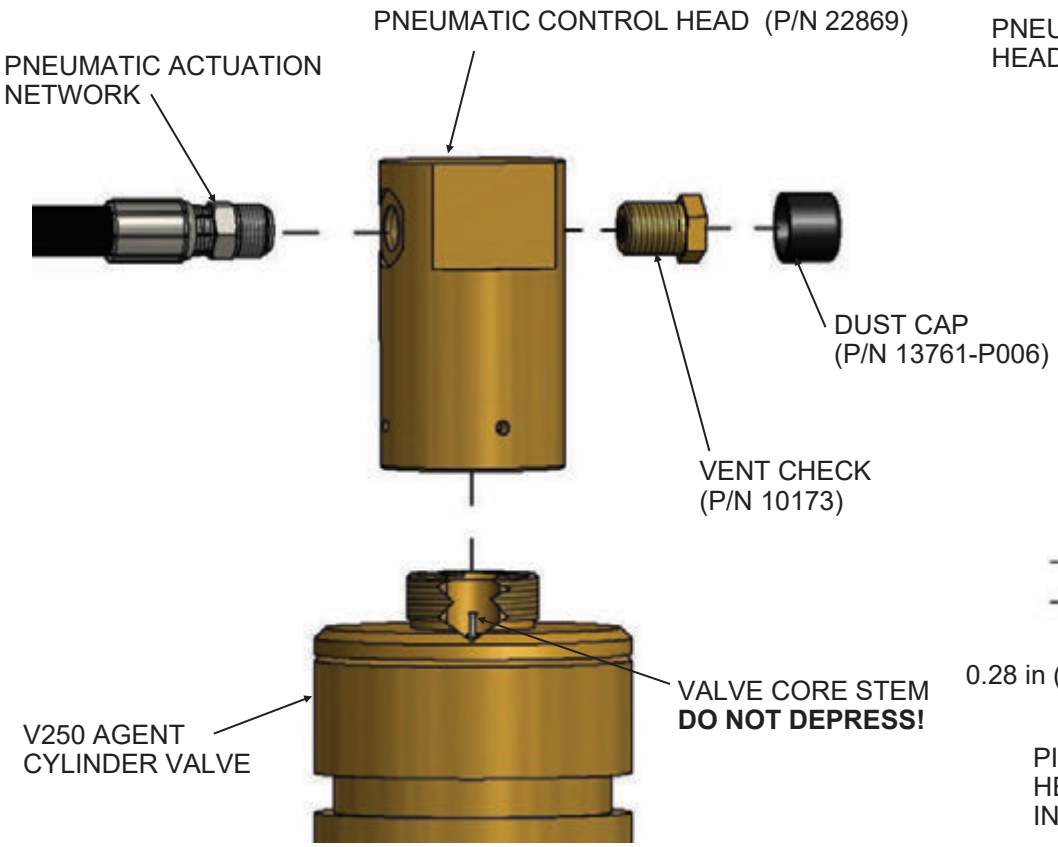


Figure 4.6.5.a

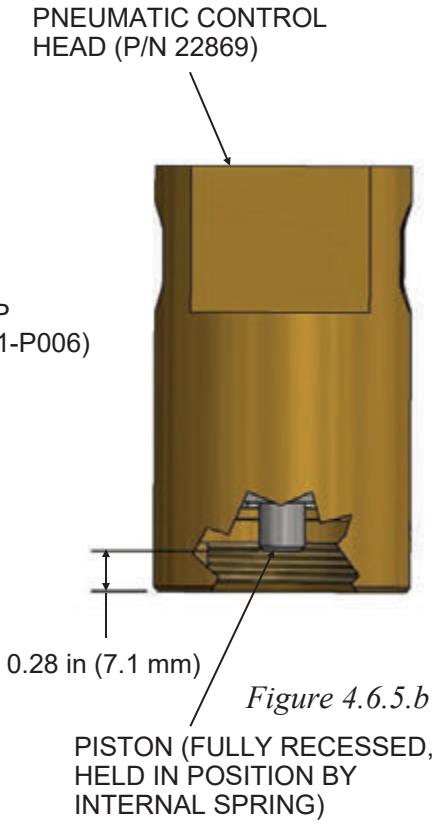


Figure 4.6.5.b

4.7 Pneumatic Actuation Network Installation

If the Amerex Modular Dry Chemical System requires a Pneumatic Control Head or Electric / Pneumatic Control Head for system actuation, a Pneumatic Actuation Network must be installed. The Pneumatic Actuation Network is a series of high pressure 1/4 in (6.4 mm) I.D. hydraulic hoses used to carry nitrogen pressure from a Nitrogen Cylinder (P/N 09956) equipped with a Manual Actuator (P/N 10210), Electric Nitrogen Actuator (P/N 20775), or Manual/Electric Actuator (P/N 23600) to the control head located on the Agent Cylinder Valve. A basic Pneumatic Actuation Network is explained in Section 4.7.1. The use of multiple actuators and/or control heads is allowed and explained in Section 4.8. Use the following requirements for constructing the Pneumatic Actuation Network. **After the Pneumatic Actuation Network is complete and assembled, test the network per instructions in Section 6.2.8 for functionality.**

- All actuation hose sections must be 1/4 in (6.4 mm) I.D. hose. All hoses used must meet or exceed SAE 100 R5 or 100 R1 (minimum) hose specifications. In addition to the SAE hose specification requirements, hoses used for underground mining applications must meet USBM specified flame resistance acceptance.
- The installer must be aware of ambient temperature range for hose selection and not to exceed those temperature ratings.
- All hose termination fittings must be 1/4 NPT and all hose end fittings must be only those specified by the hose manufacturer.
- Purge each hose section with dry air or nitrogen before assembly to remove any debris from inside each hose.
- All adapters used to connect network hoses shall be rated for use at 1800 psi (12410 kPa) minimum.
- The hose length along a direct path from any actuator to the last Control Head must not exceed 125 ft (38 meters).
- The installer SHOULD AVOID routing Pneumatic Actuation Hoses through hazard areas when possible. If unavoidable, the 1/4” actuation hose MAY be routed through the hazard area ONLY IF the hose is properly protected using the Amerex supplied fire sleeve for Pneumatic Actuation Hoses (P/N 28334).
- The installer MUST AVOID routing any additional components related to the Pneumatic Actuation Network through hazard areas.
- The installer must comply with minimum hose bend radius requirements. Avoid pinch points or possible chafing of Pneumatic Actuation Network.
- The Pneumatic Actuation Network must be secured to the vehicle with the use of padded “P” clamps or other approved methods by the hose size and manufacturer. Consult the hose manufacturer’s specifications for best mounting practices.
- The Pneumatic Actuation Network must be routed in such a manner that the network does not interfere with routine vehicle maintenance.
- The installer must not exceed the hose network limitations as shown in this section or Section 4.8 for multiple actuators or Agent Cylinders.
- **PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) thread tape IS REQUIRED for NPT connections on actuation network** (Max of 2 to 3 wraps).
- Elbows may be used in a 45° or 90° configuration.
- The following list of appropriate standards is for reference:
  - SAE J1273
  - SAE J516

4.7.1 Pneumatic Actuation Network

The Pneumatic Actuation Network contains a Nitrogen Cylinder (P/N 09956) equipped with a Manual Actuator (P/N 10210), Electric Nitrogen Actuator (P/N 20775) or Manual/Electric Actuator (P/N 23600). These components are attached to vehicle structure using the Indoor Actuator Bracket (P/N 10355) or Outdoor Actuator Bracket (P/N 10354). The 1/4 in I.D. hydraulic hose(s) connect(s) the actuator to the control head. A Vent Check (P/N 10173) must be used on the control head. When Manual Actuators are used, a 50 psi Switch is used to indicate that a manual actuation has occurred by providing an electrical contact closure (See Section 4.7.2). Figure 4.7.1.a shows a basic Pneumatic Actuation Network using a single actuator and control head. The use of multiple actuators and/or control heads is allowed and explained in Section 4.8. The following sections describe the installation of each component in the Pneumatic Actuation Network.

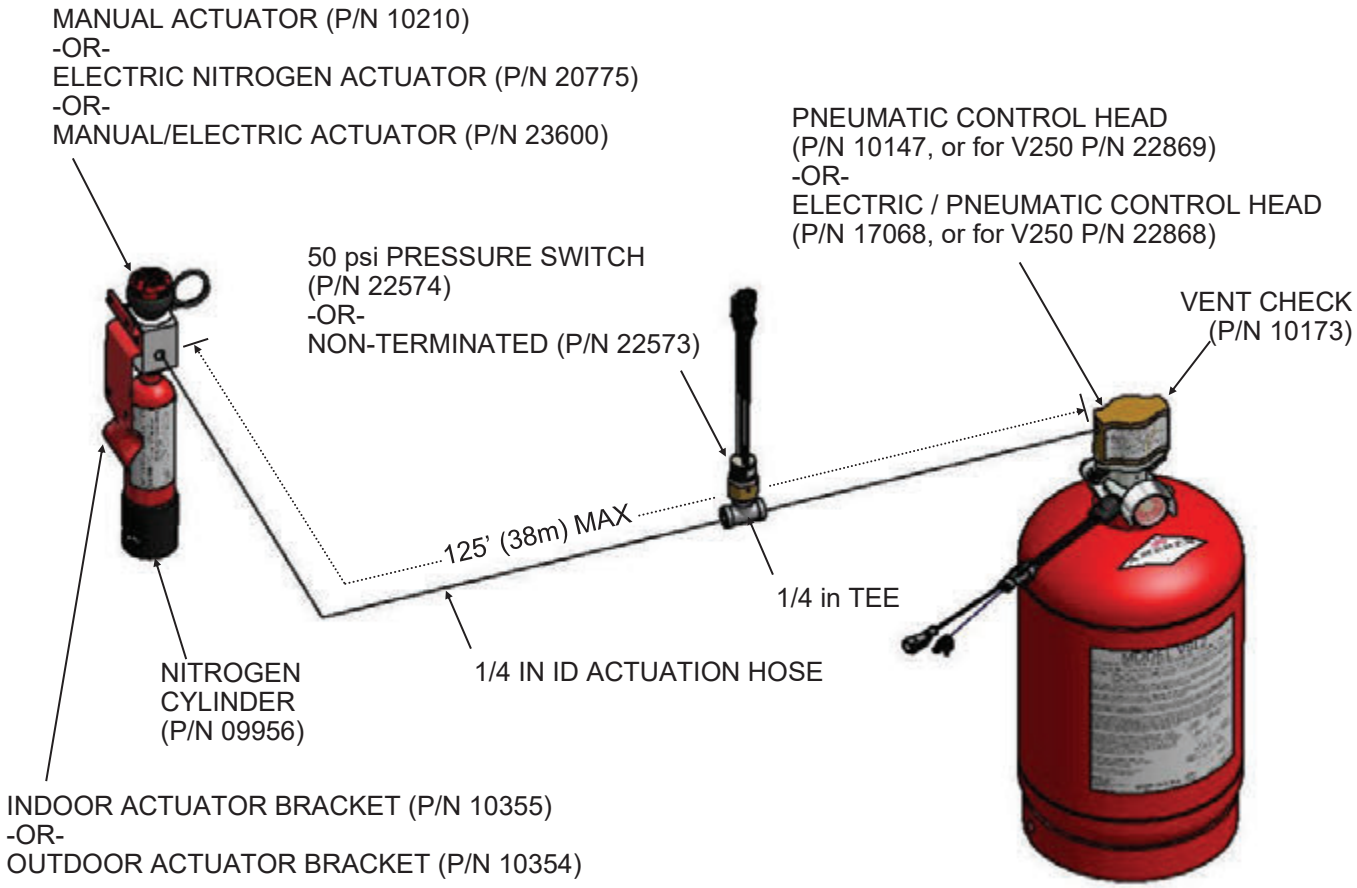


Figure 4.7.1.a

Pneumatic Actuation Hoses may be routed through the hazard area ONLY IF the hose is properly protected using the Amerex supplied fire sleeve (P/N 28334). Cut the Fire Sleeve to appropriate length. Slide Fire Sleeve over the Actuation Hose. Slide worm-drive hose clamps one on each end of the hose. Torque hose clamps between 15 to 30 in-lbs (1.69 to 3.39 Nm). Refer to Fig 4.7.1.b for an exploded view and Fig 4.7.1.c for a collapsed view of the hose assembly.

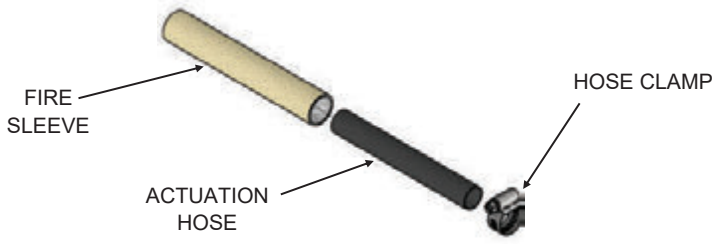


Figure 4.7.1.b

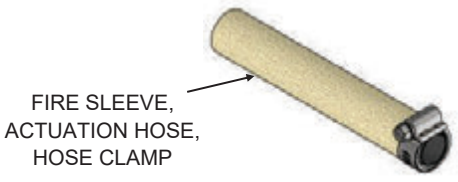


Figure 4.7.1.c

4.7.1 Pneumatic Actuation Network

The Pneumatic Actuation Network contains a Nitrogen Cylinder (P/N 09956) equipped with a Manual Actuator (P/N 10210), Electric Nitrogen Actuator (P/N 20775) or Manual/Electric Actuator (P/N 23600). These components are attached to vehicle structure using the Indoor Actuator Bracket (P/N 10355) or Outdoor Actuator Bracket (P/N 10354). The 1/4 in I.D. hydraulic hose(s) connect(s) the actuator to the control head. A Vent Check (P/N 10173) must be used on the control head. When Manual Actuators are used, a 50 psi Switch is used to indicate that a manual actuation has occurred by providing an electrical contact closure (See Section 4.7.2). Figure 4.7.1 shows a basic Pneumatic Actuation Network using a single actuator and control head. The use of multiple actuators and/or control heads is allowed and explained in Section 4.8. The following sections describe the installation of each component in the Pneumatic Actuation Network.

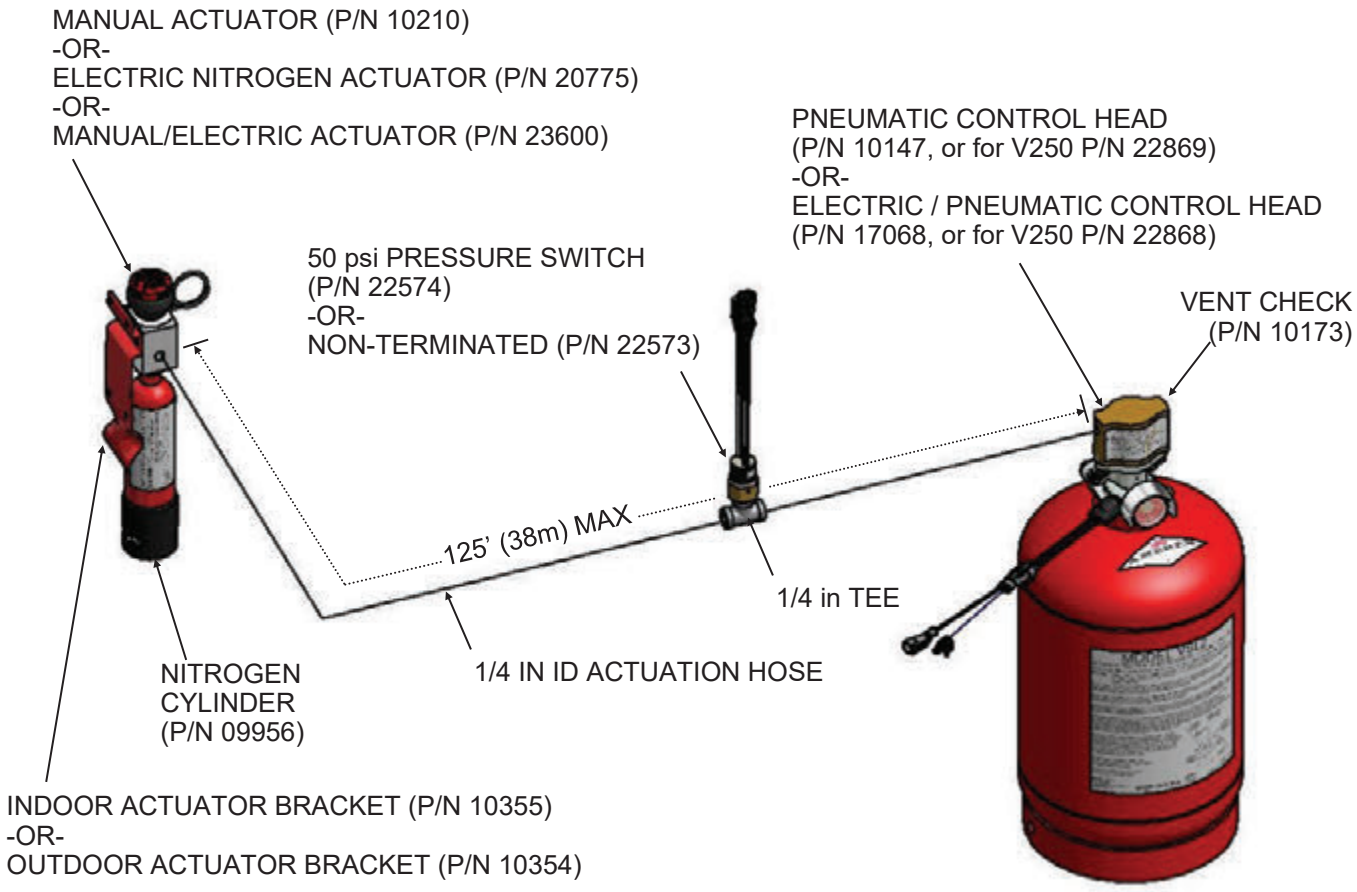


Figure 4.7.1

4.7.2 50 psi Pressure Switch Installation (P/N 22573, 22574)

The 50 psi Pressure Switch is installed using an installer supplied 1/4 NPT tee in the Pneumatic Actuation Network just before the first Pneumatic Control Head or Electric / Pneumatic Control Head (See Figure 4.7.2) and after ALL check valves. A 50 psi Terminated Pressure Switch (P/N 22574) is available with mating connectors for use with the vehicle's Amerex Modular Electronics System (See Section 4.9) to indicate that a manual actuation has occurred. An Unterminated Pressure Switch (P/N 22573) is also available. Use PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) thread tape on all connections at the tee. The 50 psi Pressure Switch has a temperature rating of –40ºF to +150ºF (-40ºC to +65ºC) and must be located accordingly.

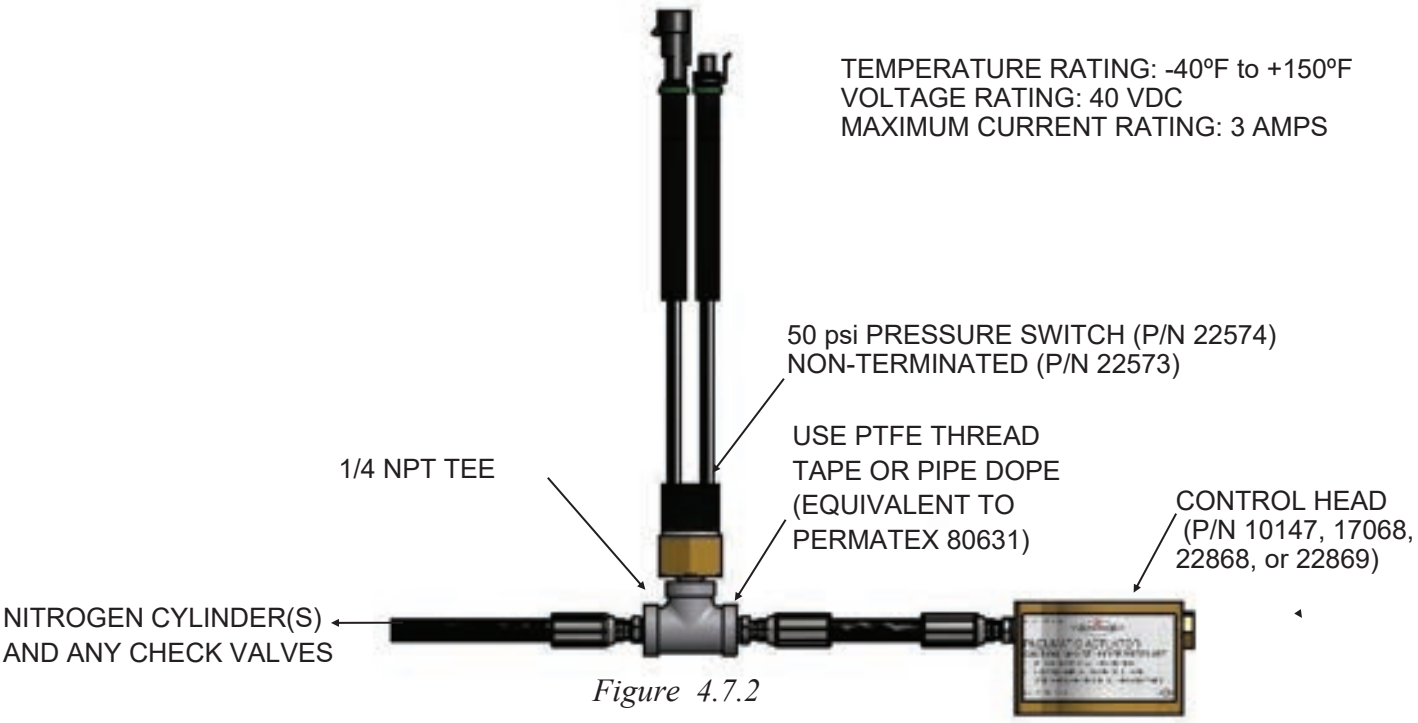


Figure 4.7.2

4.7.3 Actuator Bracket Installation, Indoor & Outdoor (P/N 10355 & 10354)

Find a surface suitable for support of the Indoor or Outdoor Actuator Bracket and all components located away from any hazard area. This location must be easily accessible for maintenance and Nitrogen Cylinder pressure gauge visibility. If a Manual Actuator (P/N 10210) or Manual/Electric Actuator (P/N 23600) is used, it must be easily reached. The Indoor Actuator Bracket (See Figure 4.7.4.a) and Outdoor Actuator Bracket Back (See Figure 4.7.4.b) can be secured to a mounting surface in 3 ways:

- Qty 4 (for Indoor Bracket) or Qty 6 (for Outdoor Bracket) 1/4 in SAE Grade 8 bolts and Nylock (locking) nuts installed in through holes in mounting surface
- Qty 4 (for Indoor Bracket) or Qty 6 (for Outdoor Bracket) 1/4 in SAE Grade 8 bolts installed with locking washers into blind tapped holes in mounting surface
- The Indoor Bracket or Outdoor Bracket Back can be welded to mounting surface.

Do not weld on or drill into fuel tanks or vehicle Roll Over Protection System (ROPS) and Falling Object Protection Systems (FOPS). Consult equipment manufacturer and property owner prior to modification of the vehicle. If an Outdoor Actuator Bracket is used, install the actuator and components per Section 4.7.4 prior to installing the Bracket Cover. Then, install (4) Bracket Screws (P/N 10567-P012) through mounting holes securing the Bracket Cover over the actuator/Nitrogen Cylinder to the Bracket Back.

4.7.4 Actuator Installation (P/N 10210, 20775 & 23600)

The Actuator (Manual, Electric Nitrogen, or Manual/Electric) is installed on the Actuator Bracket per the following instructions (See Figure 4.7.4.a for Indoor Bracket or Figure 4.7.4.b for Outdoor Bracket).

For Manual Actuator (P/N 10210):

1. Install (2) Mounting Screws (P/N 10573-P012) securing Manual Actuator to Bracket.
2. Ensure the Safety Pin is inserted into the actuator and the Tamper Seal (P/N 01387-P100/500) is installed to hold the Safety Pin in place.
3. Install Nitrogen Cylinder (P/N 09956) into the Manual Actuator and torque to hand tight.
4. Install Pneumatic Actuation Network into 1/4 NPT nitrogen outlet port (See Section 4.7.1) located on the side of the actuator. Use PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) to seal connection.

For Electric Nitrogen Actuator (P/N 20775):

1. Install (2) Mounting Screws (P/N 10573-P012) securing Electric Nitrogen Actuator to Bracket.
2. Verify Puncture Stem Assembly inside Electric Nitrogen Actuator is fully retracted (See Figure 6.2.7.2). Install Nitrogen Cylinder (P/N 09956) into the Electric Nitrogen Actuator and torque to hand tight.
3. Verify that Linear Actuator O-ring (P/N 17137-P015) is in place. Install Linear Actuator (P/N 22579) and tighten hand tight. **Do not over tighten. DO NOT use PTFE Thread Tape or Pipe Dope with Linear Actuator. Ensure Linear Actuator body makes full contact with Electric Nitrogen Actuator.**
4. Secure the Linear Actuator lead with included cable tie where shown.
5. Install Pneumatic Actuation Network into 1/4 NPT nitrogen outlet port (See Section 4.7.1) located on the side of the actuator. Use PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) to seal connection.

For Manual/Electric Actuator (P/N 23600):

1. Install (2) Mounting Screws (P/N 10573-P012) securing Manual/Electric Actuator to Bracket.
2. Ensure the Safety Pin is inserted into the actuator and the Tamper Seal (P/N 01387-P100/500) is installed to hold the Safety Pin in place.
3. See Figure 4.7.4.c. Unscrew and remove Upper Piston from Lower Piston. Verify that Linear Actuator O-ring (P/N 17137-P015) is in place. Slide Linear Actuator (P/N 22579) through Upper Piston slot on either side. Install Linear Actuator in Lower Piston and tighten hand tight. **Do not over tighten. DO NOT use PTFE Thread Tape or Pipe Dope with Linear Actuator. Ensure Linear Actuator body makes full contact with mating surface using sight hole in Lower Piston.** Reinstall Upper Piston onto Lower Piston hand tight until fully bottomed. Tighten Set Screw in Upper Piston.
4. Secure the Linear Actuator lead with included cable tie where shown.
5. Verify Puncture Stem Assembly inside Manual/Electric Actuator is fully retracted (See Figure 6.2.7.3). Install Nitrogen Cylinder (P/N 09956) into the Manual/Electric Actuator and torque to hand tight.
6. Install Pneumatic Actuation Network into 1/4 NPT nitrogen outlet port (See Section 4.7.1) located on the side of the actuator. Use PTFE Thread Tape or Pipe Dope (equivalent to Permatex 80631) to seal connection.

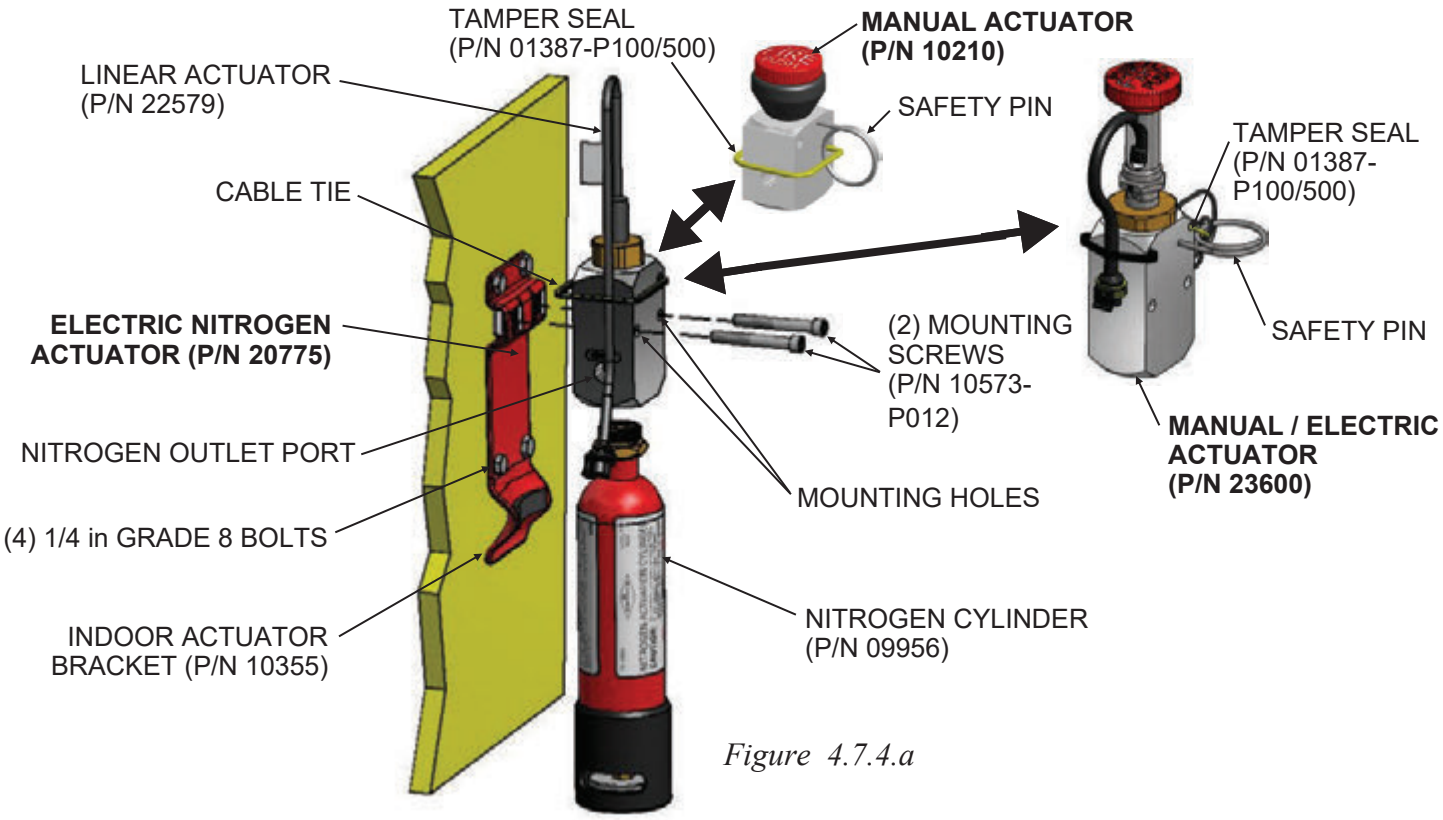


Figure 4.7.4.a

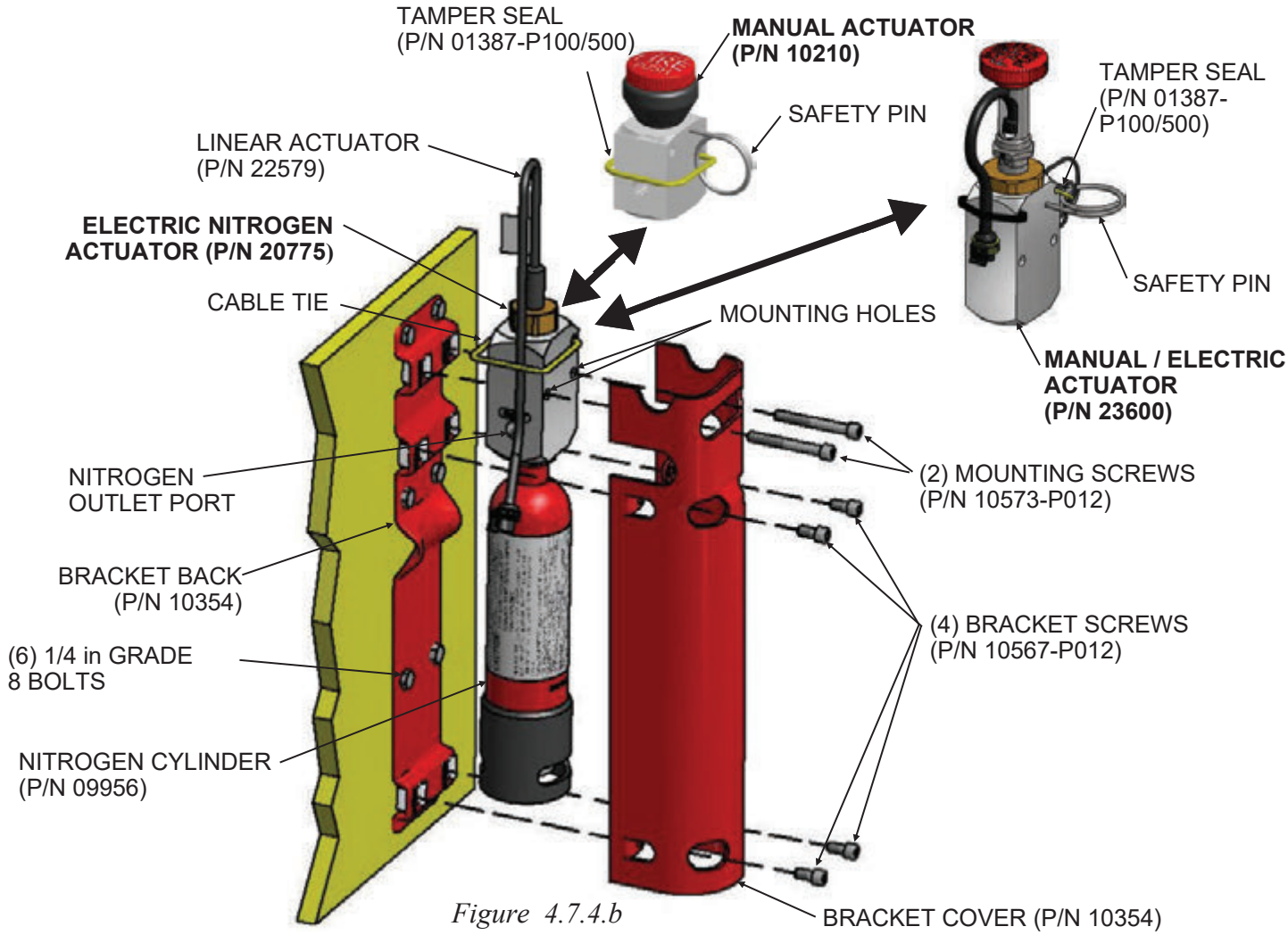


Figure 4.7.4.b

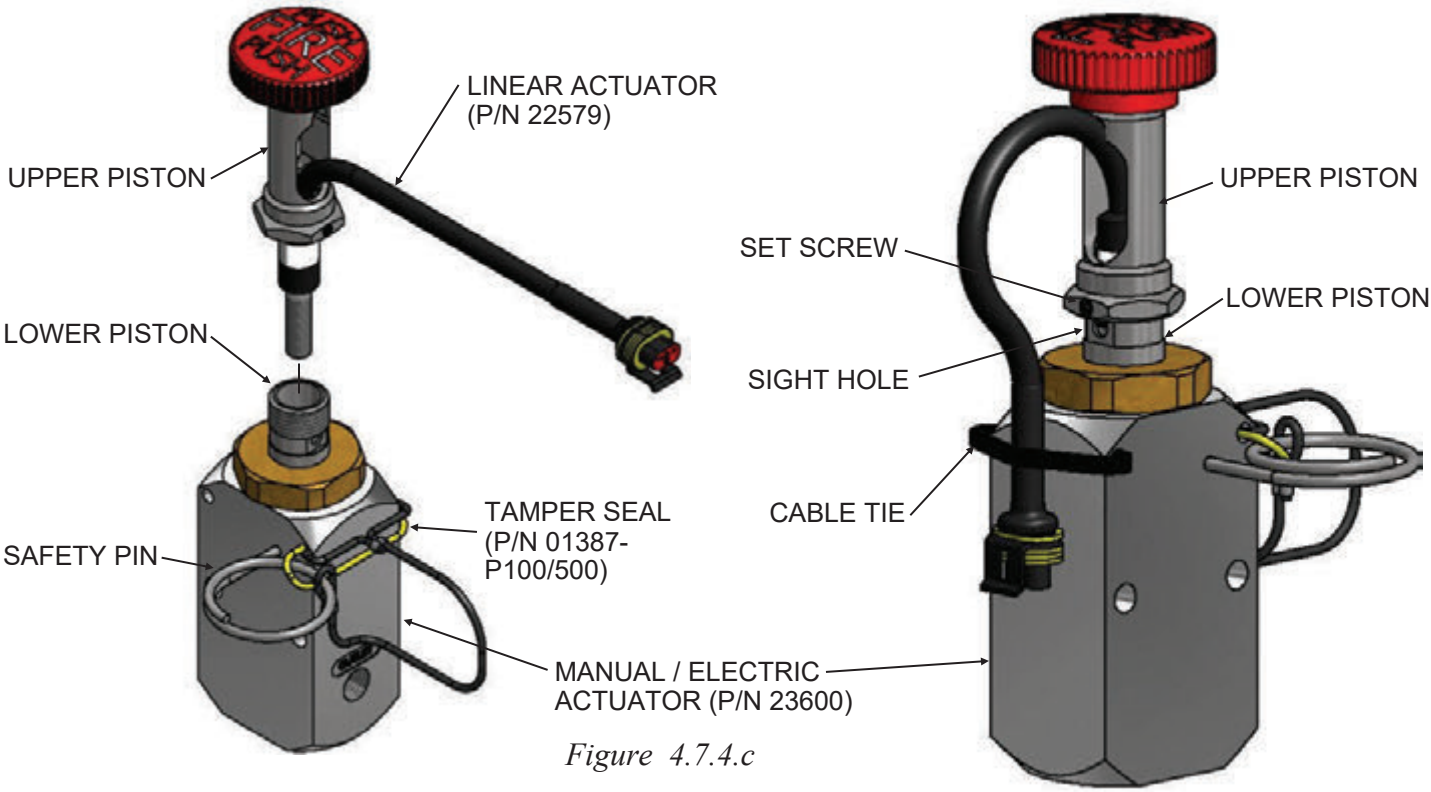


Figure 4.7.4.c

4.8 Multiple Agent Cylinder and/or Nitrogen Cylinder Networks

The size of the vehicle and its hazards often require that more than one Agent Cylinder and/or Nitrogen Cylinder to be used. All of the Amerex Modular Dry Chemical System cylinders can be used in multiples and in any combination. The number of Agent Cylinders allowed depends on the type of control head that is used as specified in Table 4.8. Regardless, the following rules must be strictly observed:

- The Agent Distribution Network for each individual Agent Cylinder must be installed completely independent of all other Agent Distribution Networks, and each must comply with the hose limitations as specified in Section 4.5.
- All Pneumatic Actuation Networks must meet the requirements of Section 4.7.
- If a Pneumatic Actuation Network is used in a multiple Agent Cylinder application, the hose length in the network along a direct path from any one actuator to the last Control Head must not exceed 125 ft (38 meters). A Vent Check (P/N 10173) is installed in only the last Control Head in the network.
- For multiple Nitrogen Cylinder applications, each path of nitrogen from either a Manual Actuator, Electric Nitrogen Actuator or Manual/Electric Actuator must be independent of any other path. The use of Check Valves (P/N 10262-P001) is required at tees to join paths for independence as described in Section 4.8.1.
- For Electrically actuated applications, see the applicable electronics manual located on the Amerex website at www.amerex-fire.com.

Table 4.8

Control Head Used	Maximum # of Agent Cylinders Used in a System	Reference
Electric (P/N 14032)	4	Section 4.8.2
Electric / Pneumatic (P/N 17068 or 22868)	4	Section 4.8.3
Pneumatic (P/N 10147 or 22869)	8	Section 4.8.4

4.8.1 Multiple Nitrogen Cylinder Pneumatic Actuation Networks

When constructing a Pneumatic Actuation Network using more than one Nitrogen Cylinder (P/N 09956), the following guidelines must be observed (See Figure 4.8.1):

- The Manual Actuator (P/N 10210), Electric Nitrogen Actuator (P/N 20775) or Manual/Electric Actuator (P/N 23600) can be used in multiples or in combination with each other in the Pneumatic Actuation Network. Each actuator shall be independently routed to a junction location consisting of 1/4 NPT tee that leads to the control head. If more than two actuators are used, each additional actuator shall also be routed to a junction tee that connects that actuator to the previous junction tee and also to the control head.
- A Check Valve (P/N 10262-P001) shall be used at each inlet only of any junction tee from two actuators or any previous junction. This ensures that only the direct route from an actuator to the control head is pressurized by the activated Nitrogen Cylinder. Without the check valves, the entire Pneumatic Actuation Network would have to be pressurized before the control head (s) could activate the Agent Cylinder(s).
- The total hose length from any one actuator to the control head must not exceed 125 ft (38 meters). If multiple agent cylinders are used, the total hose length from any one actuator to the last control head in the Pneumatic Actuation Network must not exceed 125 ft (38 meters).
- If a 50 psi Pressure Switch (P/N 22573, 22574) is used in the Pneumatic Actuation Network, it must be located between the last junction tee and the first control head. This will ensure that the switch will be pressurized regardless of which actuator/Nitrogen Cylinder is activated.

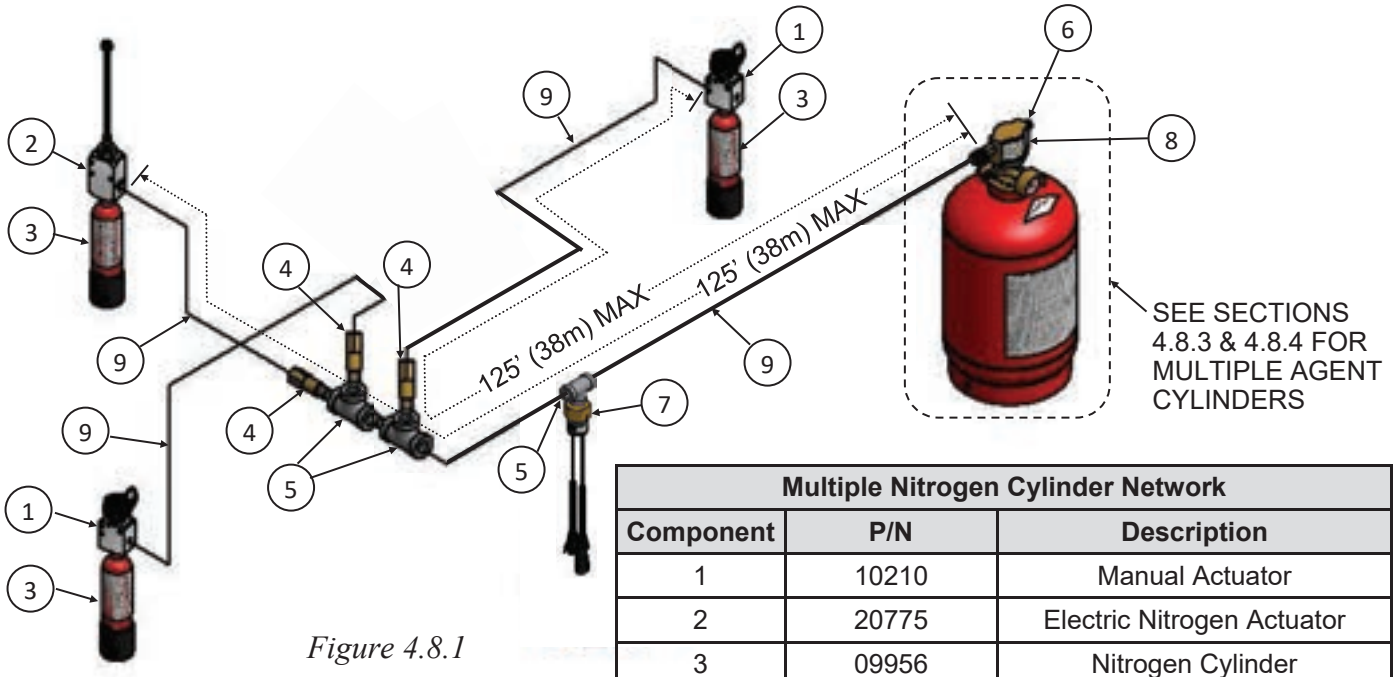


Figure 4.8.1

Multiple Nitrogen Cylinder Network		
Component	**P/N**	**Description**
1	10210	Manual Actuator
2	20775	Electric Nitrogen Actuator
3	09956	Nitrogen Cylinder
4	10262-P001	Check Valve
5	-	1/4 NPT Tee
6	10173	Vent Check
7	22574, 22573	50 psi Pressure Switch
8	10147,17068, 22868, or 22869	Control Head
9	-	Pneumatic Actuation Network

4.8.2 Multiple Agent Cylinder Networks Using Electric Control Heads (P/N 14032)

For multiple Agent Cylinder networks using Electric Control Heads (P/N 14032), a maximum of (4) four Agent Cylinders may be used in a single system. Each Linear Actuator (P/N 22579) in each control head will be connected to the vehicle's Amerex Modular Electronics System (See Section 4.9).

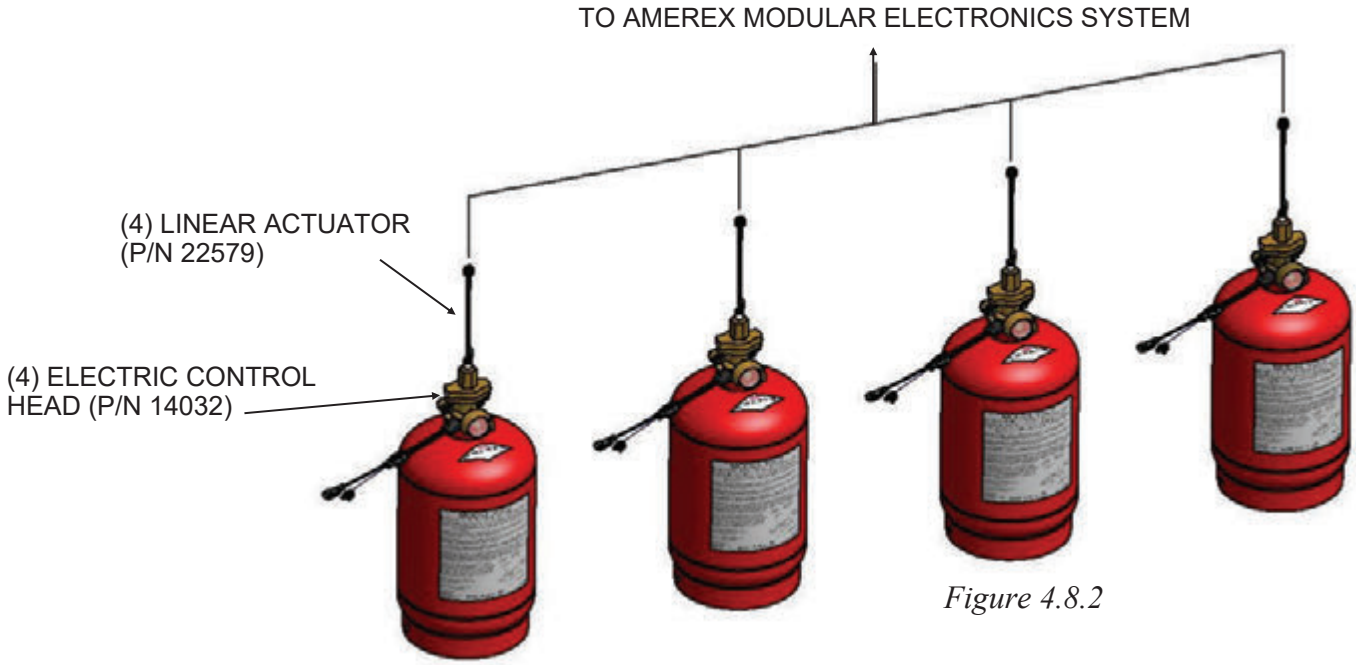


Figure 4.8.2

4.8.3 Multiple Agent Cylinder Networks Using Electric / Pneumatic Control Heads (P/N 17068 or 22868)

For multiple Agent Cylinder networks using Electric / Pneumatic Control Heads (P/N 17068 or 22868), a maximum of (4) Linear Actuators may be used in a single system. However, Amerex recommends that only (2) Agent Cylinders be used for maximum efficiency. Each control head will be connected in series to the Pneumatic Actuation Network. The last control head will contain the Vent Check (P/N 10173). Each Linear Actuator (P/N 22579) in each control head will be connected to the vehicle's Amerex Modular Electronics System (See Section 4.9).

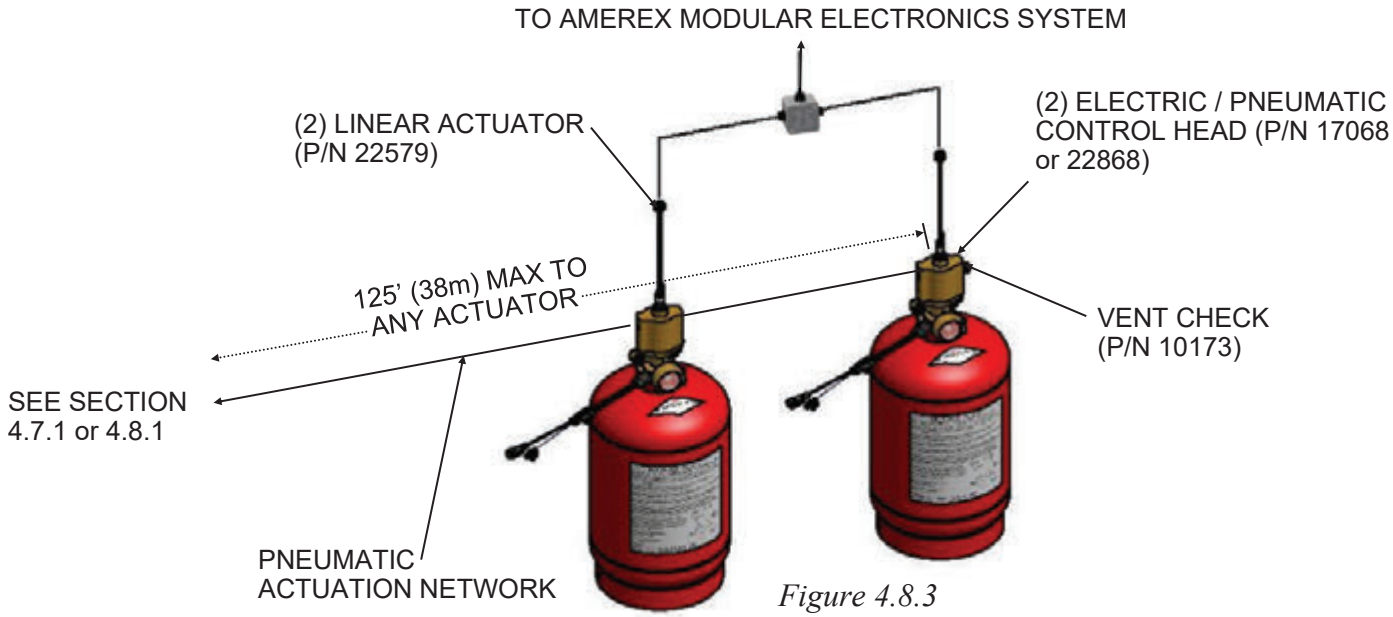


Figure 4.8.3

4.8.4 Multiple Agent Cylinder Networks Using Pneumatic Control Heads (P/N 10147 or 22869)

For multiple Agent Cylinder networks using Pneumatic Control Heads (P/N 10147 or 22869), a maximum of (8) eight cylinders may be used in a single system. Each control head will be connected in a "series" (Figure 4.8.4.a) or "parallel" (Figure 4.8.4.b) arrangement to the Pneumatic Actuation Network. "Parallel" arrangements will be connected using a 1/4 NPT tee. The last control head in each leg of the circuit will contain the Vent Check(s) (P/N 10173).

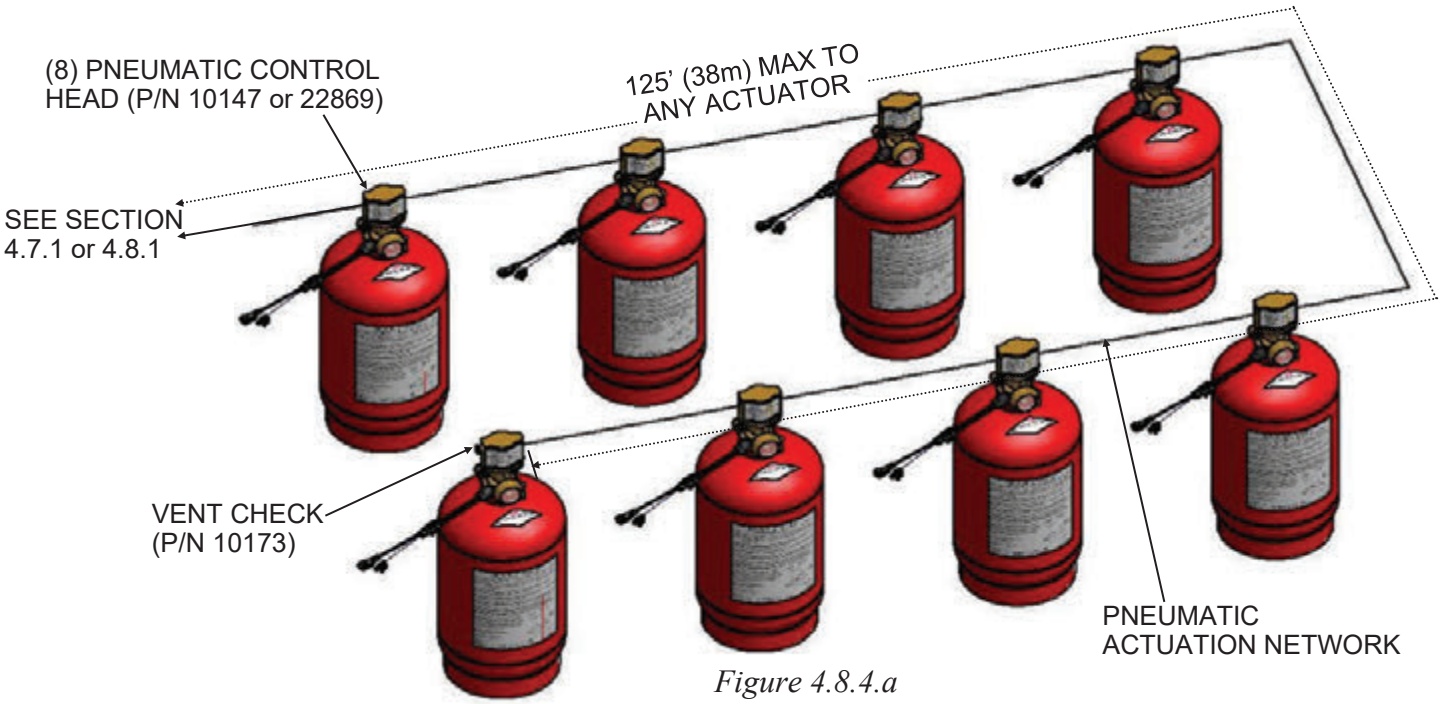


Figure 4.8.4.a

For "parallel" arrangements (Figure 4.8.4.b), the Pneumatic Actuation Network total length including each leg (LEG A & LEG B) of the arrangement plus the length from the tee to any actuator (LEG C) must not exceed 125 ft (38 meters).

(LEG A +LEG B + LEG C ≤ 125 ft)

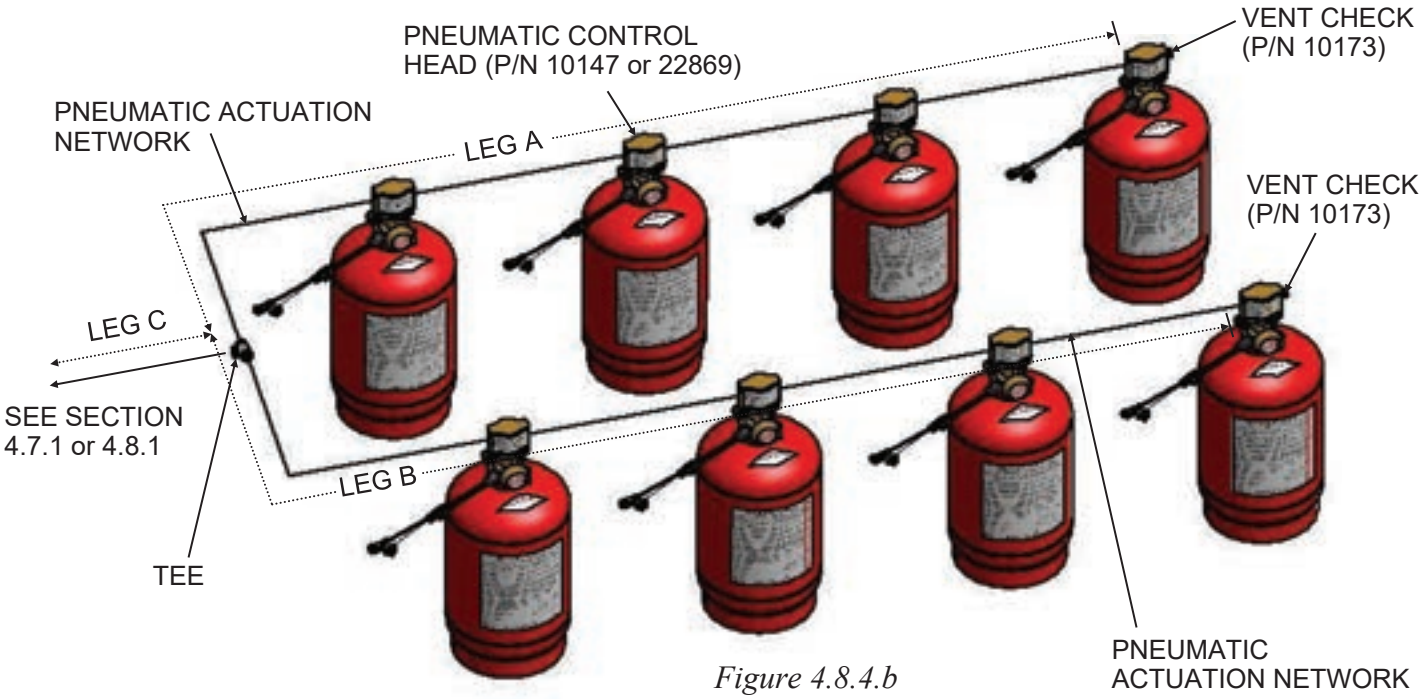


Figure 4.8.4.b

4.9 Placing the System in Service

Once the installation instructions from the previous Sections are complete, perform the following steps in order to place the Amerex Modular Dry Chemical System into working service:

- See section 6.1.3 for purging the agent distribution network.
- Connect any Agent Distribution Networks to Agent Cylinder(s) and Nozzles.
- Connect any Pneumatic Actuation Network(s).
- Locate any Agent Cylinder Low Pressure Switches if applicable. Each Switch will be connected to the vehicle's Amerex Modular Electronics System. See the applicable electronics manual located on the Amerex website at www.amerex-fire.com for connection instructions.
- Locate any other electrical components used in the system including any Linear Actuators (P/N 22579) used in actuators or control heads and any 50 psi Pressure Switches (P/N 22573, 22574) used in a Pneumatic Actuation Network. Each component will be connected to the vehicle's Amerex Modular Electronics System. See the applicable electronics manual located on the Amerex website at www.amerex-fire.com for connection instructions.
- Test electrical networks in accordance with the type of electronics selected and used in the vehicle's Amerex Modular Electronics System. See the applicable electronics manual located on the Amerex website at www.amerex-fire.com.
- Make final documentation confirming all details of the complete installation compared to the hazard analysis from Chapter 3.
- Perform the monthly inspection as described in Chapter 5.

4.10 Provide Owner / Operator Training

The Owner's Manual (shipped with each Agent Cylinder) contains operating instructions, system descriptions, housekeeping requirements, and system routine inspection requirements. It is the Amerex installer's / servicing distributor's responsibility to explain those details to the owner / operator.

After finishing a system installation, the installer must do an installation review with the equipment owner and operator. This review should include:

- Disclose all system components and functionality of each component.
- Disclose all hazard/high risk areas and emphasize the necessity of good house keeping measures for those areas.
- Explain how the system can activate automatically (if automatic detection is used), and how to use any manual actuation stations.
- If the system is connected through a relay that powers the engine down, explain the details to the vehicle operator.
- Give a brief explanation of role play for daily and monthly inspection requirements for the vehicle owner / operator.
- Complete the warranty registration with the equipment owner. Explain the terms and conditions of the warranty and the service that must be performed on the system in order to keep the warranty valid.

Chapter 5: Inspection & Maintenance

Amerex Modular Dry Chemical Systems require periodic care to provide maximum assurance that the system will operate effectively and safely. Inspection frequency should be based on the requirements of the equipment on which the fire suppression system will operate. Inspection and maintenance schedules are shown in this manual and must be followed to ensure reliable system performance. Equipment operating continually and/or in harsh environments will require more frequent inspection and maintenance.

The latest revisions of any Amerex Installation, Operation, and Maintenance Manuals referenced as well as Safety Data Sheets in this Chapter can be found at www.amerex-fire.com.

5.1 Daily Inspection: OPERATOR / OWNER

- On systems with electronic display panels, verify that a green "OK" status LED is illuminated.

5.2 Monthly Inspection: OPERATOR/ OWNER

- Verify that all components are present and in their original location and securely fastened. Discharge nozzles should be secure and positioned in accordance with the accepted system design.
- Verify that ring pins are in place and secured with proper break away tamper indicator seals.
- Verify that all mechanical actuation devices are unobstructed by vehicle modifications or clutter.



Figure 5.2.a

- Verify that the maintenance tag or certificate is in place and up to date. Record the date of inspection and initials of inspector.
- Verify the physical condition of all components. Inspect for damage or conditions that may prevent operation. Brackets should be free of damage, cracks, welds, etc.
- Inspect the Agent Cylinder Pressure Gauge(s). Check for low pressure in cylinders by referring to Appendix G. The yellow pointer on the Agent Cylinder Pressure Gauge must be in the green pie area (See Figure 5.2.a).
- Inspect any Nitrogen Cylinders and Gauge(s). Check for low pressure in nitrogen cylinders by referring to Appendix H. The yellow pointer on the pressure gauge of the Nitrogen Cylinder must be in the green pie area (See Figure 5.2.b).
- Verify that Dust Cap (P/N 25685-P012 or 22973-P006) is installed on safety Rupture Disc on Agent Cylinder or Valve (See Figure 2.1.a or 2.1.b).
- All Protective Caps must be in place on Nozzle tips. Nozzle outlets must be unobstructed and properly aimed at the hazard(s) which are intended to be protected.
- Verify that all "IN CASE OF FIRE" instruction labels and Nitrogen Cylinder labels are intact, clean and legible.


Figure 5.2.b

- Discharge nozzles have not been painted, unless done by the manufacturer.
- HDME protection system remains within the accepted system design and that no modifications have been made to the system or the equipment being protected that would impair performance.
- System actuators are installed and connected to the discharge valve.

- No penetrations in enclosures that may affect the ability to maintain the accepted total flooding concentration.
- Check for missing body panels that are needed to enclose the engine compartment.

If any service is required as a result of monthly inspections, it should be done only by an Amerex Certified and Authorized Servicing Technician. No unauthorized system component substitutions allowed.

5.3 Semi-Annual Maintenance : AUTHORIZED AMEREX TECHNICIAN

The Amerex Modular Dry Chemical System must be serviced by an Authorized Amerex Technician that is trained and certified on the Amerex Modular Dry Chemical System and in accordance with NFPA and any federal, state, and/or local code requirements. Service and maintenance shall be done at intervals of six (6) months or more frequent if deemed necessary.

- Perform the monthly inspection procedure.
- Verify that hazards have not changed. Look for changes in vehicle operation or cleaning procedures that may have increased the hazard. Compare with the original vehicle hazard analysis.
- Examine and test all heat detection devices per guidelines in the latest version of applicable Amerex Installation, Operation and Maintenance Manual found at the Amerex website (www.amerex-fire.com).
- Inspect the Agent Cylinder(s) and Nitrogen Cylinder(s) on systems so equipped. If Pressure Gauge is bent or damaged, depressurize Cylinder(s) and replace. Clean Cylinder(s) to remove dirt, grease and foreign material. Make sure that instruction nameplates are securely fastened and legible. Inspect the Cylinder(s) for corrosion, abrasion, and dents or damage. Replace Nitrogen Cylinder(s) and hydro-test Agent Cylinder(s) if any of these conditions are found. If Agent Cylinder(s) are found to be faulty, replace.
- Remove and inspect control heads for damaged, missing, or substituted parts. Instructions for control head (P/N 10147, 14032, 22868, 22869, or 17068) disassembly, cleaning and reassembly can be found in Chapter 6.
- Inspect and clean the top of the Agent Cylinder Valve.
- Disconnect Discharge Fitting Kit or Agent Distribution Network (V250 only) from Agent Cylinder Valve (**make sure that actuation method(s) are removed or disabled when performing this step!**). Inspect Agent Cylinder Valve discharge port for contaminants and clean if necessary. Note: Chemical residue found in the Agent Cylinder Valve discharge port can be a sign of an unreported system discharge. If a system has discharged, go to appropriate section for recharge procedures in Chapter 6.
- Examine the Agent Distribution Network. Look for signs of wear or chafing on network hoses. Replace any damaged hose sections.
- Examine Nozzles (P/N 10250) and protective Dust Caps (P/N 10167-P006/P025). If protective Dust Caps are missing from Nozzles, replace with new dust caps.
- Purge the Agent Distribution Network with air or nitrogen only (See Sections 6.1.3, 6.1.4, & 6.2.2).
- If a Pneumatic Actuation Network is used, unscrew Nitrogen Cylinders from actuators. Cycle each actuator several times verifying free travel of Puncture Stem Assembly inside of each

5.4 (6) Six Year Maintenance: AUTHORIZED AMEREX TECHNICIAN

- Perform semi-annual inspection.
- Per NFPA 17 guidelines, stored pressure Dry Chemical Agent Cylinders must be de-pressurized for inspecting the inside of the Agent Cylinder, and the Agent. Agent must be free flowing. Inspect Agent Cylinders for damage, dents, abrasions or corrosion. If any of these conditions are found, replace the Agent Cylinder. See Chapter 6 for recharge instructions.
- Inspect the inside of adapters and hose end fittings of the Agent Distribution Network(s) and on so equipped Pneumatic Actuation Network(s). Replace any corroded adapters and hose end fittings.
- Replace Linear Actuators if in service for 6 years.

5.5 (12) Twelve Year Maintenance: AUTHORIZED AMEREX TECHNICIAN

- Perform (6) six year maintenance.
- The Agent Cylinder and all hose assemblies must be hydrostatically tested at a minimum of every 12 years in accordance with CGA Pamphlet C-6, NFPA 17, and DOT requirements. Test pressure can be found either in the latest version of 13980 Installation Operation, and Maintenance Manual (See Section 2.1), or on the Agent Cylinder nameplate. Date of Agent Cylinder manufacture is stamped on the Agent Cylinder dome. **Hydrostatic testing may only be done by individuals certified to perform hydrostatic testing by those having jurisdiction in the particular area.**

When hydrostatically testing Agent Cylinders, replace Agent Cylinder Valve with the Hydrotest Adapter (P/N 05152 or 23450). Connect a pressurization hose or network rated at or above the test pressure to the Hydrotest Adapter (See Section 6.1.2). Note: For V250 Agent Cylinders, the Rupture Disc (P/N 21793-P001), located on the Agent Cylinder dome, must be removed and replaced with a 1/2 NPT plug rated at or above the test pressure (See Figure 6.1.2.b). After hydrostatic testing is complete, a new Rupture Disc (P/N 21793-P001) MUST be reinstalled in its original location. Seal threads with a 24 hour 2-Part Epoxy (such as DP460 by 3M). Let cure for 72 hours; Reinstall Dust Cap (P/N 22973-P006) over Rupture Disc.

Chapter 6: Recharge

6.1 Service / Recharge Tools

Service and Recharge of Amerex Modular Dry Chemical Systems should only be performed by Amerex Factory Trained technicians using only genuine Amerex service/recharge tools. Proper protective equipment must be used (safety glasses, steel toe shoes, hard hats… etc.) when servicing or recharging Amerex Modular Dry Chemical Systems.

6.1.1 Recharge Adapter (P/N 10136)

The Recharge Adapter is used to pressurize the Agent Cylinder after a discharge or maintenance and is used in conjunction with Tee Handle (P/N 10134) (See Section 6.1.5).

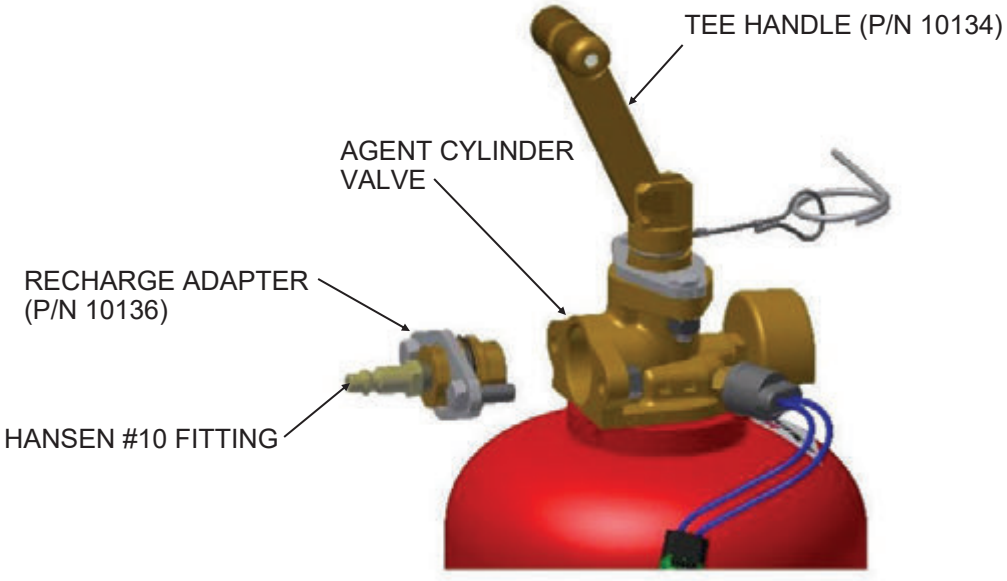


Figure 6.1.1

6.1.2 Hydrotest Adapters (P/N 05152 & P/N 23450)

The Hydrotest Adapter is used to pressurize the Agent Cylinder to perform DOT requirements for (12) year maintenance (See Section 5.5). V13 through VS75 Agent Cylinders use P/N 05152 (See Figure 6.1.2.a) and V250 Agent Cylinder use P/N 23450 (See Figure 6.1.2.b).

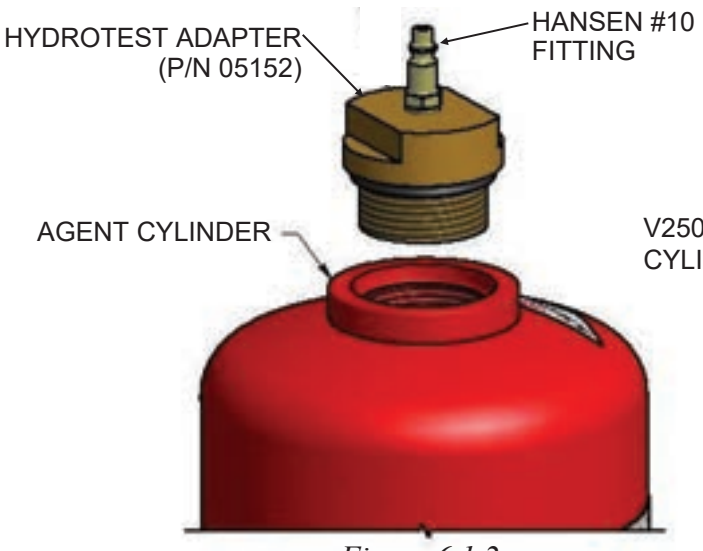


Figure 6.1.2.a

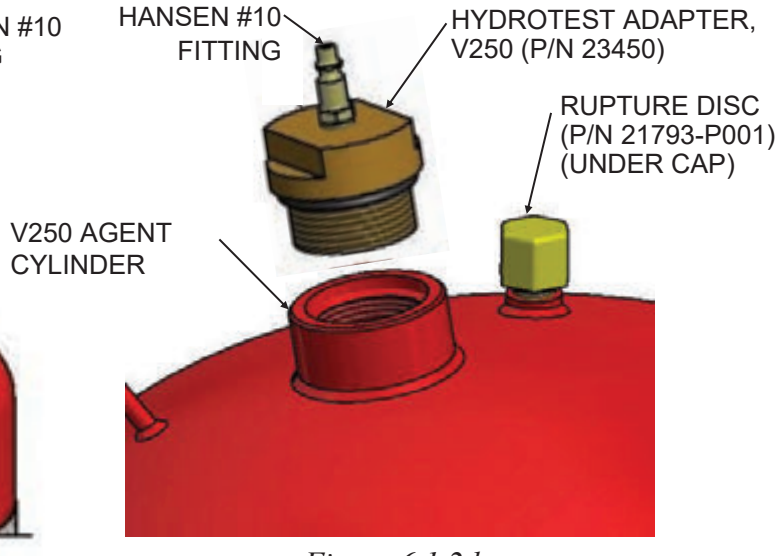


Figure 6.1.2.b

6.1.3 Distribution Hose Blowout Adapter (P/N 12129)

When commissioning the Amerex Modular Dry Chemical System, upon initial installation, and at each (6) six month service, the Agent Distribution Network must be purged with dry air or nitrogen at a minimum of 90 psi (620 kPa) by using the Distribution Hose Blowout Adapter.

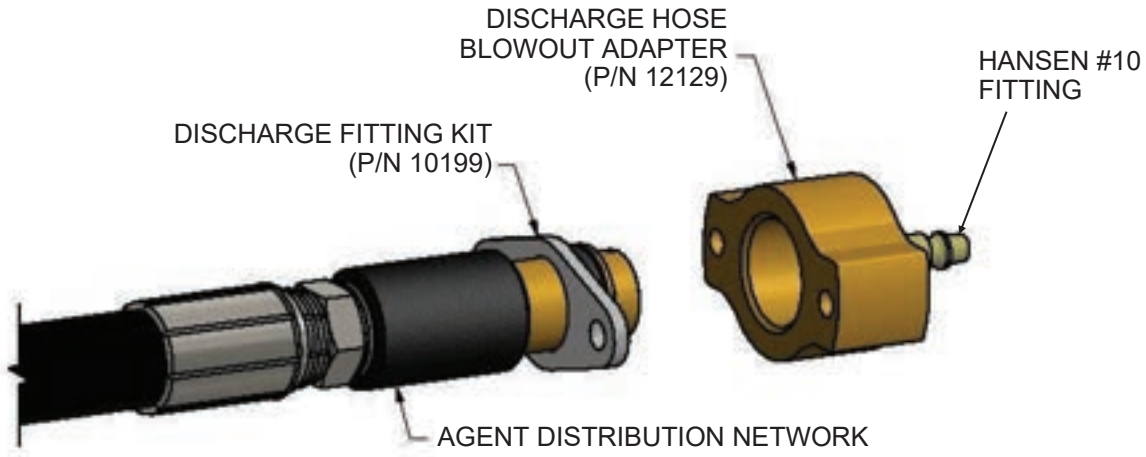


Figure 6.1.3

6.1.4 Distribution Hose Blowout Adapter 1-1/4 in (P/N 22999) & Distribution Hose Blowout Adapter 3/4 in(P/N 23001), V250 Agent Cylinder

When commissioning the Amerex Modular Dry Chemical System, upon initial installation, and at each (6) six month service, the V250 Agent Distribution Network must be purged with dry air or nitrogen at approximately 90 psi using the Distribution Hose Blowout Adapters.

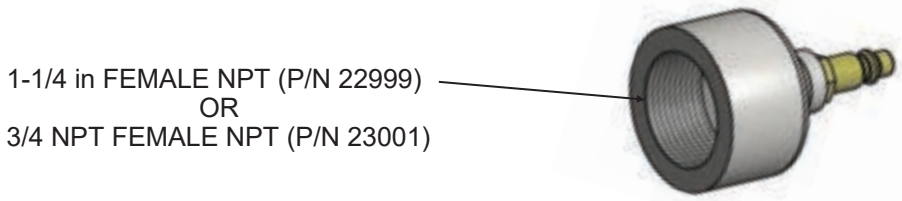


Figure 6.1.4

6.1.5 Tee Handle (P/N 10134)

The Tee Handle is used to manually actuate the Agent Cylinder. The Tee Handle is also used to open the Agent Cylinder Valve for recharging.

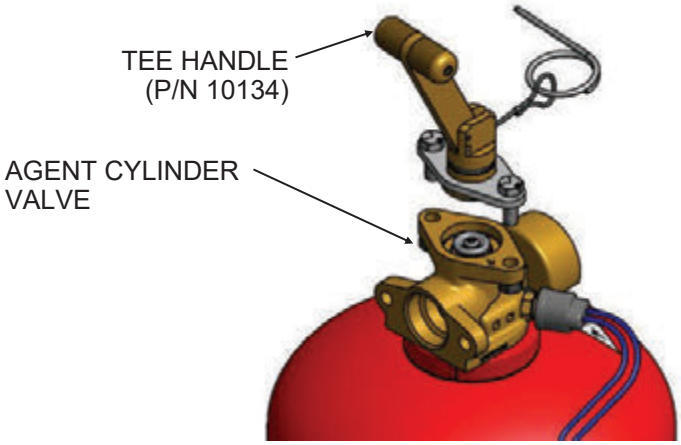


Figure 6.1.5

6.1.6 2-½ in Tight-Clearance Open End Pump Wrench

The 2-½ in TCOEP Wrench is used to remove or reinstall the Agent Cylinder Valve In the Agent Cylinder. It can be purchased from McMaster-Carr (P/N 5551A58) or other hardware supply stores. The Pump Wrench should be less than 0.30 in (7.6 mm) thickness for proper fit on the Agent Cylinder Valve.

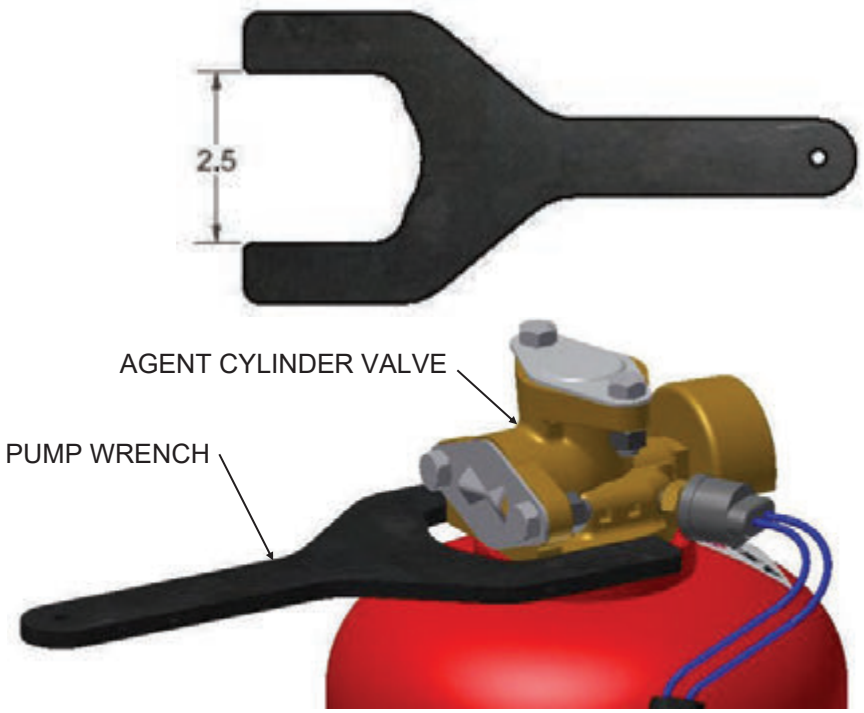


Figure 6.1.6

6.1.7 Pneumatic Actuation Network Test Adapter (P/N 10895)

The Actuation Network Test Adapter is used in place of a Nitrogen Cylinder to purge the Pneumatic Actuation Network with dry air or nitrogen at each Manual Actuator, Electric Nitrogen, or Manual/ Electric Actuator location. It is also use to leak check the actuation network and to verify that the control heads will activate as designed.

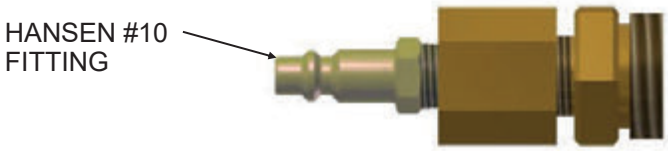


Figure 6.1.7

6.1.8 Recharge Adapter, V250 Agent Cylinder (P/N 23065)

The V250 Recharge Adapter is used to pressurize the V250 Agent Cylinder after a discharge or maintenance.

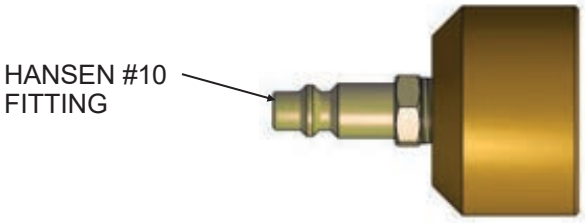


Figure 6.1.8

6.2 Recharge Instructions

WARNING! BEFORE ATTEMPTING ANY RECHARGE PROCEDURES, FIRST CONFIRM THE REASON FOR THE DISCHARGE AND CORRECT ANY CONDITIONS THAT CAUSED THE SYSTEM TO DISCHARGE. IF RECHARGE CANNOT BE ACCOMPLISHED IMMEDIATELY, DO NOT LEAVE THE SYSTEM INCAPACITATED FOR ANY REASON WITHOUT GIVING WRITTEN NOTIFICATION TO THE OWNER, OWNER'S AGENT, AND OR LOCAL AHJ. ALSO, DOCUMENT THE INCIDENT IN THE PERMANENT JOB FILE BEFORE LEAVING THE SCENE. ANY SYSTEM COMPONENTS SUBJECTED TO FIRE OR OVERHEAT CONDITIONS MUST BE REPLACED, INCLUDING, BUT NOT LIMITED TO CYLINDERS, BRACKETS, DETECTORS, DETECTOR CIRCUITS, NOZZLES, AND AGENT DISTRIBUTION NETWORKS AND PNEUMATIC ACTUATION NETWORKS.

WARNING! ENSURE THAT ALL PRESSURE HAS BEEN RELIEVED FROM AGENT CYLINDER BEFORE PROCEEDING. CONSULT SAFETY DATA SHEET (SDS) FOUND ON AMEREX WEBSITE WWW.AMEREX-FIRE.COM.

Remove all sources of power that are involved with the fire suppression system. Immediately clean all surfaces contacted by Dry Chemical Agent. Methods for cleaning:

1. If the Dry Chemical Agent has not been heated to its melting point, it may be swept and vacuumed from all surfaces it has contacted.
2. Use shop air to blow residual chemical away from surfaces. Note: Amerex Dry Chemical Agent is considered a nuisance dust and is non-toxic. See SDS on Amerex website at www.amerex-fire.com.
3. Additionally, power spraying or steam cleaning can be done to remove any additional Dry Chemical Agent. Mild soapy water can sometimes be utilized. Contact vehicle owner/operator for permission to use water prior to taking this step.

6.2.1 Agent Cylinder Control Head Removal & Cleaning

Reference the appropriate subsection for control head removal, disassembly, cleaning and reassembly instructions.

6.2.1.1 For Systems Using Pneumatic Control Head (P/N 10147)

For systems using a Pneumatic Control Head (P/N 10147) along with a Pneumatic Actuation Network, perform the following steps. The Control Head must be disassembled, cleaned, and reassembled after each use.

Control Head Removal (See Figure 4.6.4):

1. Relieve any residual nitrogen pressure in the Pneumatic Actuation Network by slowly unseating the Vent Check (P/N 10173). Remove Vent Check.
2. Remove Pneumatic Actuation Network at Control Head inlet/exit.
3. Carefully remove Pneumatic Control Head from Agent Cylinder Valve by removing (2) 5/16"-18 bolts.
4. Install Shipping Plate (P/N 10099-P006) in place of Pneumatic Control Head (See Figure 2.1.a)

Control Head Disassembly (See Figure 6.2.1.1):

5. Use retaining ring pliers to remove the Retaining Ring (P/N 10149-P012) (Note: Always use eye protection when doing this step).
6. Remove the Safety Lock Washer and Pneumatic Piston Assembly with O-ring (P/N 10148-P006).

7. In order to remove the Safety Lock Washer from the Pneumatic Piston Assembly, use a flat head screwdriver to depress the Spring Plunger located on the piston shaft.

Control Head Cleaning (See Figure 6.2.1.1):

8. Inspect and clean the inner bore of Control Head Body. If any scarring or damage has occurred in the inner bore, replace the Control Head Body.
9. Inspect and clean the Pneumatic Piston Assembly, the O-ring (P/N 10148-P006), the Safety Lock Washer, and the Retaining Ring (P/N 10149-P012). Inspect the O-Ring (P/N 10148-P006) for any cuts/nicks. Replace any damaged components.
10. Make sure the Spring Plunger is spring-loaded and can be forced in and out of the piston shaft. Note: Do not remove Spring Plunger from Piston! If this part is compromised, replace the entire Pneumatic Piston Assembly.

Control Head Reassembly (See Figure 6.2.1.1 & 4.6.4):

11. Lubrication: O-Ring (P/N 10148-P006) must be lightly lubricated with Visilox Bluestar V711 or equivalent silicone style lubricant. Inner bore of the Control Head Body is to be lightly lubricated as well.
12. Insert Pneumatic Piston Assembly with O-Ring (P/N 10148-P006) into Control Head Body. Make sure piston is fully recessed.
13. Insert Safety Lock Washer. Do not insert past Spring Plunger!
14. Reinstall Retaining Ring (P/N 10149-P012) (Note: Always use eye protection when performing this step).
15. Reinstall Vent Check (P/N 10173).
16. Test the assembly by using 70-90 psi at the inlet of the 1/4 NPT port opposite of the Vent Check port to force the piston through the Safety Lock Washer. After it is acknowledged that the piston locks, use a flathead screwdriver to depress the Spring Plunger so that the Pneumatic Piston Assembly can be fully recessed into the Control Head Body again.

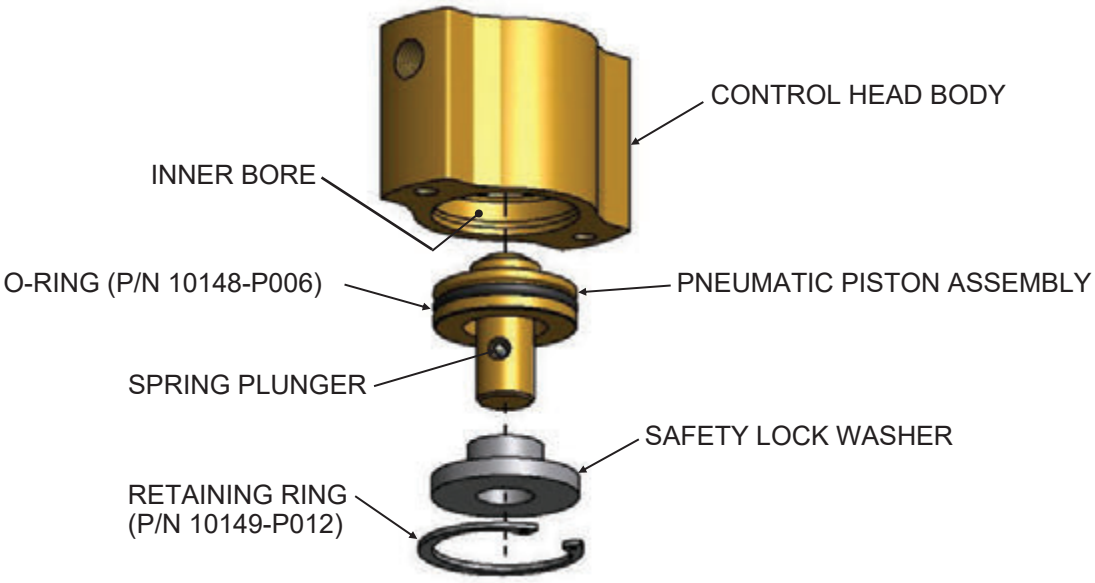


Figure 6.2.1.1

6.2.1.2 For Systems Using Electric / Pneumatic Control Head (P/N 17068)

For systems using an Electric / Pneumatic Control Head (P/N 17068) along with a Pneumatic Actuation Network, perform the following steps. The control head must be disassembled, cleaned, and reassembled after each use.

Control Head Removal (See Figure 4.6.2):

1. Relieve any residual nitrogen pressure in the Pneumatic Actuation Network by slowly unseating the Vent Check (P/N 10173). Remove Vent Check.
2. Remove Pneumatic Actuation Network at Control Head inlet/exit.
3. Unplug Linear Actuator (P/N 22579) from Linear Actuator circuit and unscrew Linear Actuator from Control Head Body.
4. Carefully remove Electric / Pneumatic Control Head from Agent Cylinder Valve by removing (2) 5/16”-18 bolts.
5. Install Shipping Plate (P/N 10099-P006) in place of Electric / Pneumatic Control Head (See Figure 2.1.a)

Control Head Disassembly (See Figure 6.2.1.2):

6. Use retaining ring pliers to remove the Retaining Ring (P/N 10149-P012) (Note: Always use eye protection when performing this step).
7. Remove the Safety Lock Washer and Electric / Pneumatic Piston Assembly with O-ring (P/N 10148-P006).
8. In order to remove the Safety Lock Washer from the Electric / Pneumatic Piston Assembly, use a flat head screwdriver to depress the Spring Plunger located on the piston shaft.

Control Head Cleaning (See Figure 6.2.1.2):

9. Inspect and clean the inner bore of Control Head Body. If any scarring or damage has occurred in the inner bore, replace the Control Head Body. Stainless steel disc punched from spent Linear Actuator (P/N 22579) must always be removed in the event of an automatic actuation.
10. Inspect and clean the Electric / Pneumatic Piston Assembly, the O-ring (P/N 10148-P006), the Safety Lock Washer, and the Retaining Ring (P/N 10149-P012). Inspect the O-Ring (P/N 10148-P006) for any cuts/nicks. Replace any damaged components.
11. Make sure the Spring Plunger is spring-loaded and can be forced in and out of the piston shaft. Note: Do not remove Spring Plunger from Piston! If this part is compromised, replace the entire Electric / Pneumatic Piston Assembly.

Control Head Reassembly (See Figure 6.2.1.2 & 4.6.2):

12. Lubrication: O-Ring (P/N 10148-P006) must be lightly lubricated with Visilox Bluestar V711 or equivalent silicone style lubricant. Inner bore of the Control Head Body is to be lightly lubricated as well.
13. Insert Electric / Pneumatic Piston Assembly with O-Ring (P/N 10148-P006) into Control Head Body. Make sure piston is fully recessed.
14. Insert Safety Lock Washer. Do not insert past Spring Plunger!
15. Reinstall Retaining Ring (P/N 10149-P012) (Note: Always use eye protection when performing this step).
16. Reinstall Vent Check (P/N 10173).
17. Carefully test the assembly by using a Phillips head screwdriver inserted through the Linear Actuator port to force the piston through the Safety Lock Washer. After it is acknowledged that the piston locks, use a flathead screwdriver to depress the Spring Plunger so that the Electric / Pneumatic Piston Assembly can be fully recessed into the Control Head Body again.

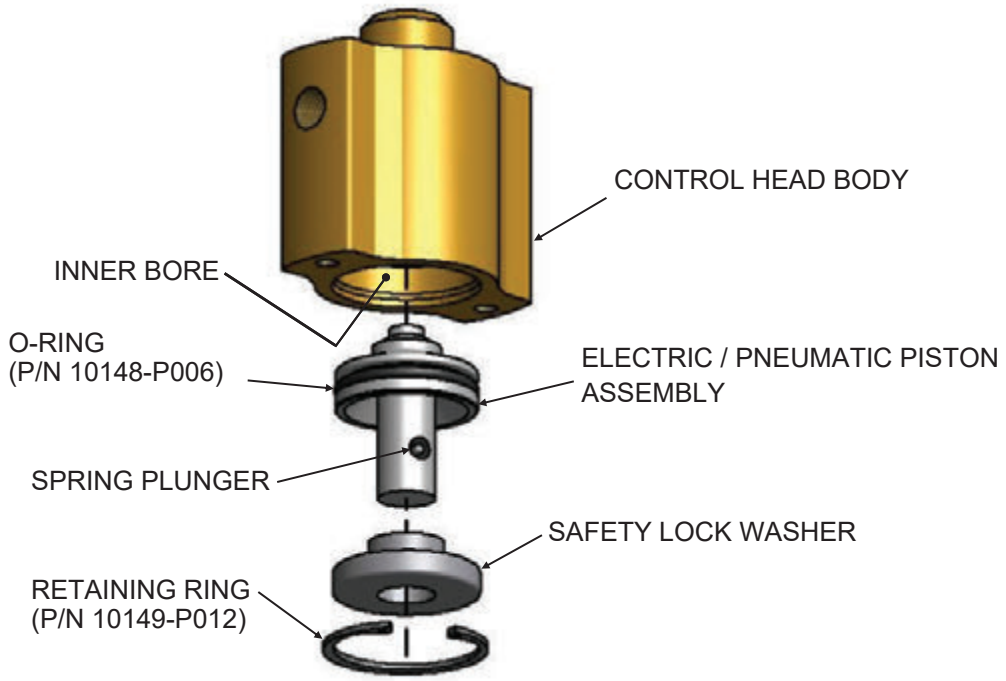


Figure 6.2.1.2

6.2.1.3 For Systems Using Electric Control Head (P/N 14032):

For systems using an Electric Control Head (P/N 14032), perform the following steps. The control head must be disassembled, cleaned, and reassembled after each use.

Control Head Removal (See Figure 4.6.2):

1. Unplug Linear Actuator (P/N 22579) from Linear Actuator circuit and unscrew Linear Actuator from Control Head Body.
2. Carefully remove Electric Control Head from Agent Cylinder Valve by removing (2) 5/16”-18 bolts.
3. Install Shipping Plate (P/N 10099-P006) in place of Electric Control Head (See Figure 2.1.a).

Control Head Disassembly (See Figure 6.2.1.3):

4. Remove the Set Screw (P/N 14038-P012) from Base using a 1/8 in Allen Head wrench.
5. Unscrew the Body from Base.
6. Remove the Piston (P/N 14035-P001) and Retaining Ring (P/N 14037-P012). Remove the Retaining Ring from the Piston groove.

Control Head Cleaning (See Figure *6.2.1.3)*:

7. Inspect and clean all components of the Control Head. If any scarring or damage has occurred, replace the component. Stainless steel disc punched from spent Linear Actuator (P/N 22579) must always be removed in the event of an automatic actuation.

Control Head Reassembly (See Figure 6.2.1.3):

8. Place Retaining Ring (P/N 14037-P012) into Base, followed by the Piston (P/N 14035-P001) in orientation shown.
9. Before adding any thread lock, screw the Body into Base and test the assembly by using a Phillips head screwdriver inserted through the Linear Actuator port to force the Piston through the Retaining Ring. Verify the Retaining Ring locks into the Piston groove.
10. After testing the control head, disassemble the components by repeating steps 5 and 6. Repeat step 8.

11. Apply one drop of medium grade thread lock (for example Loctite 242) to threads of the Body. Torque Body into Base to 200 in-lb (17 ft-lb or 23 Nm).
12. Apply one drop of medium grade thread lock (for example Loctite 242) to threads of the Set Screw (P/N 14038-P012). Thread screw into Base until resistance is met. Do not over-tighten!
13. Invert assembly and confirm that the piston floats freely within the assembly. Ensure the Retaining Ring (P/N 14037-P012) is not pinched between the Body and Base.

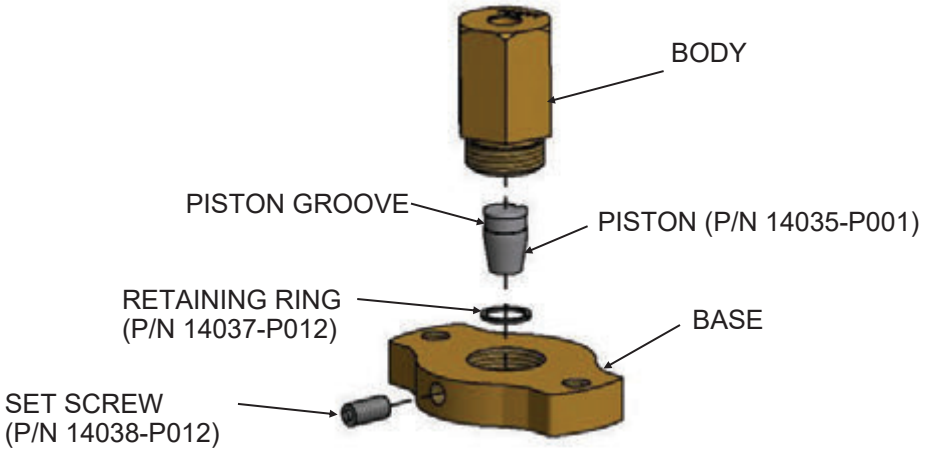


Figure 6.2.1.3

6.2.1.4 For Systems Using Pneumatic Control Head (P/N 22869), V250 Agent Cylinder

For V250 systems using a Pneumatic Control Head (P/N 22869) along with a Pneumatic Actuation Network, perform the following steps. The Control Head must be disassembled, cleaned, and reassembled after each use.

Control Head Removal (See Figure 4.6.5.a):

1. Relieve any residual nitrogen pressure in the Pneumatic Actuation Network by slowly unseating the Vent Check (P/N 10173). Remove Vent Check.
2. Remove Pneumatic Actuation Network at Control Head inlet/exit.
3. Carefully remove Pneumatic Control Head from Agent Cylinder Valve by unscrewing it from the top of the Valve.
4. Install Protective Cap (P/N 17990-P001) in place of Pneumatic Control Head (See Figure 2.1.b)

Control Head Disassembly (See Figure 6.2.1.4):

5. Use retaining ring pliers to remove the Retaining Ring (P/N 17020-P006) (Note: Always use eye protection when performing this step).
6. Remove the Washer (P/N 22864-P001), Spring (P/N 22865-P003) and Piston (P/N 22863-P001) with O-ring (P/N 17018-P006).

Control Head Cleaning (See Figure 6.2.1.4):

7. Inspect and clean the inner bore of Control Head Body. If any scarring or damage has occurred in the inner bore, replace the entire control head.
8. Inspect and clean the Piston (P/N 22863-P001), O-ring (P/N 17018-P006), Washer (P/N 22864-P001), Spring (P/N 22865-P003) and the Retaining Ring (P/N 17020-P006). Replace any damaged components.

Control Head Reassembly (See Figure 6.2.1.4 & 4.6.5.b):

9. Lubrication: O-Ring (P/N 17018-P006) must be lightly lubricated with Visilox Bluestar V711 or equivalent silicone style lubricant. Inner bore of the Control Head Body is to be lightly lubricated as well.
10. Insert Piston (P/N 22863-P001) with O-Ring (P/N 17018-P006) into Control Head Body. Make sure piston is fully recessed.

11. Insert Spring (P/N 22865-P003).
12. Insert Washer (P/N 22864-P001) in the direction as shown on Figure 6.2.1.4.
13. Reinstall Retaining Ring (P/N 17020-P006)
    (Note: Always use eye protection when performing this step).

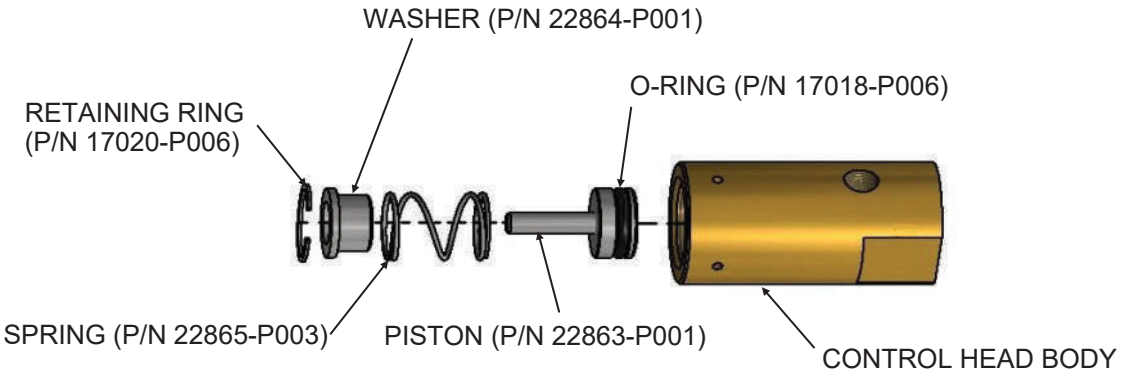


Figure 6.2.1.4

6.2.1.5 For Systems Using Electric / Pneumatic Control Head (P/N 22868), V250 Agent Cylinder

For V250 systems using an Electric / Pneumatic Control Head (P/N 22868) with a Pneumatic Actuation Network, perform the following steps. The Control Head must be disassembled, cleaned, and reassembled after each use.

Control Head Removal (See Figure 4.6.3.a):

1. Relieve any residual nitrogen pressure in the Pneumatic Actuation Network by slowly unseating the Vent Check (P/N 10173). Remove Vent Check.

2. Remove Pneumatic Actuation Network at Control Head inlet/exit.

3. Unplug Linear Actuator (P/N 22579) from Linear Actuator circuit and unscrew it from the Control Head Body.

4. Carefully remove Electric / Pneumatic Control Head from Agent Cylinder Valve by unscrewing it from the top of the Valve..

5. Install Protective Cap (P/N 17990-P001) in place of Electric / Pneumatic Control Head (See Figure 2.1.b)

Control Head Disassembly (See Figure 6.2.1.5):

6. Use retaining ring pliers to remove the Retaining Ring (P/N 17020-P006) (Note: Always use eye protection when performing this step).

7. Remove the Washer (P/N 22864-P001), Spring (P/N 22865-P003) and Piston (P/N 22863-P001) with O-ring (P/N 17018-P006).

Control Head Cleaning (See Figure 6.2.1.5):

8. Inspect and clean the inner bore of Control Head Body. If any scarring or damage has occurred to inner bore, replace the entire Control Head. Stainless steel disc punched from spent Linear Actuator (P/N 22579) must always be removed in the event of an automatic actuation.

9. Inspect and clean the Piston (P/N 22863-P001), O-ring (P/N 17018-P006), Washer (P/N 22864-P001), Spring (P/N 22865-P003) and Retaining Ring (P/N 17020-P006). Replace any damaged components.

Control Head Reassembly (See Figure 6.2.1.5 & 4.6.3.b):

10. Lubrication: O-Ring (P/N 17018-P006) must be lightly lubricated with Visilox Bluestar V711 or equivalent silicone style lubricant. Inner bore of the Control Head Body is to be lightly lubricated as well.

11. Insert Piston (P/N 22863-P001) with O-Ring (P/N 17018-P006) into Control Head Body. Make sure piston is fully recessed.

12. Insert Spring (P/N 22865-P003).

13. Insert Washer (P/N 22864-P001) in the direction as shown on Figure 6.2.1.6.

14. Reinstall Retaining Ring (P/N 17020-P006) (Note: Always use eye protection when performing this step).

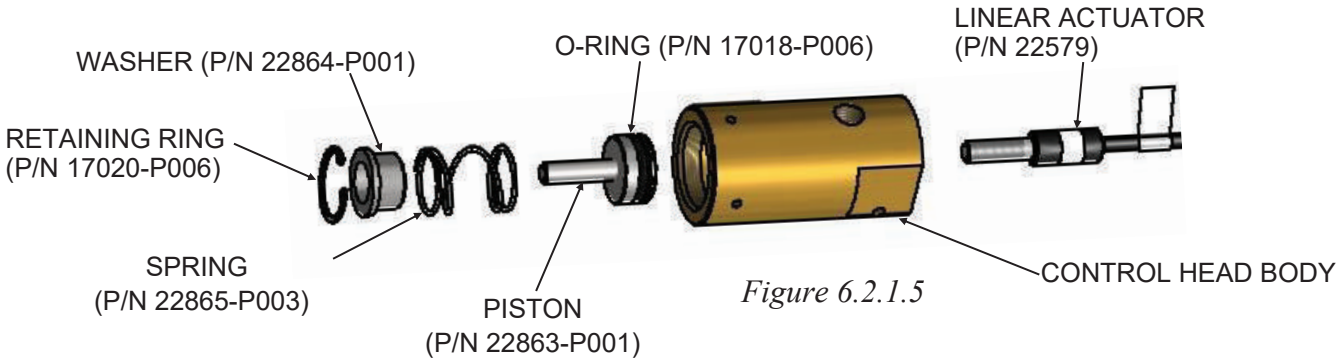


Figure 6.2.1.5

6.2.2 Purging the Agent Distribution Network:

Reference the appropriate subsection for Agent Distribution Network purging instructions. The Agent Distribution Network must be purged following a system discharge or during routine maintenance.

6.2.2.1 Purging the Agent Distribution Network, V13 thru VS75 Agent Cylinder

1. Remove the Discharge Fitting Kit (P/N 10199) from the Agent Cylinder Valve (See Figure 4.5.1). Install Anti-Recoil Plate (P/N 10646-P006) in place of Discharge Fitting Kit (See Figure 2.1.a).

2. Inspect and clean the Discharge Fitting Kit (P/N 10199). Inspect O-ring for cuts/nicks. Replace the entire Discharge Fitting Kit if any damage is found.

3. Attach the Discharge Hose Blowout Adapter (P/N 12129) to the Discharge Fitting Kit using 1/4 in or 5/16 in bolts/nuts (See Figure 6.1.3). Purge the Agent Distribution Network with dry air or nitrogen at a minimum of 90 psi (620 kPa). Continue to purge the system until all Dry Chemical Agent or any debris is free from the network and only air or nitrogen is free flowing from each Nozzle in the network. If any section is found to be blocked, disconnect and either unblock obstructions or replace the section of the Agent Distribution Network.

4. Reinstall all Protective Nozzle Blow Off Caps (P/N 10167-P006/P025).

6.2.2.2 Purging the Agent Distribution Network, V250 Agent Cylinder

Reference Section 4.5.24 thru 4.5.26 for V250 Agent Distribution Network Configurations.

1. Disconnect the 1-1/4 in I.D. hose from the Agent Cylinder Valve and install Anti-Recoil Plug (P/N 17559-P001) on valve (See Figure 2.1.b).

2. Disconnect the 1-1/4 in I.D. hose from the first Distributor (D1) in the Agent Distribution Network (See Figure 6.2.2.2).

3. Install Distribution Hose Blowout Adapter 1-1/4 in (P/N 22999) into inlet of the 1-1/4 in hose (See Figure 6.2.2.2). Purge the 1-1/4 in I.D. hose with dry air or nitrogen at a minimum of 90 psi (620 kPa). Continue to purge the 1-1/4 in I.D. hose until all Dry Chemical Agent or any debris is free from the hose and only air or nitrogen is free flowing from the opposite hose end.

4. Disconnect each of the 3/4 in I.D. hoses from the first Distributor (D1) (See Figure 6.2.2.2).

5. Install Distribution Hose Blowout Adapter 3/4 in (P/N 23001) in one of the 3/4 in ID hoses that is disconnected from the first Distributor (D1) in the network. Purge the network section with dry air or nitrogen at a minimum of 90 psi (620 kPa). Continue to purge the section of the network until all Dry Chemical Agent or any debris is free from the hose section and only air or nitrogen is free flowing from each Nozzle in that network section. If any section is found to be blocked, disconnect and either unblock obstructions or replace the section of the Agent Distribution Network.

6. Repeat step 5 for all remaining 3/4 in I.D. network sections that were disconnected in step 4.

7. Reinstall all Protective Nozzle Blow Off Caps (P/N 10167-P006/P025).

8. Reconnect all hoses and distributors in the Agent Distribution Network.

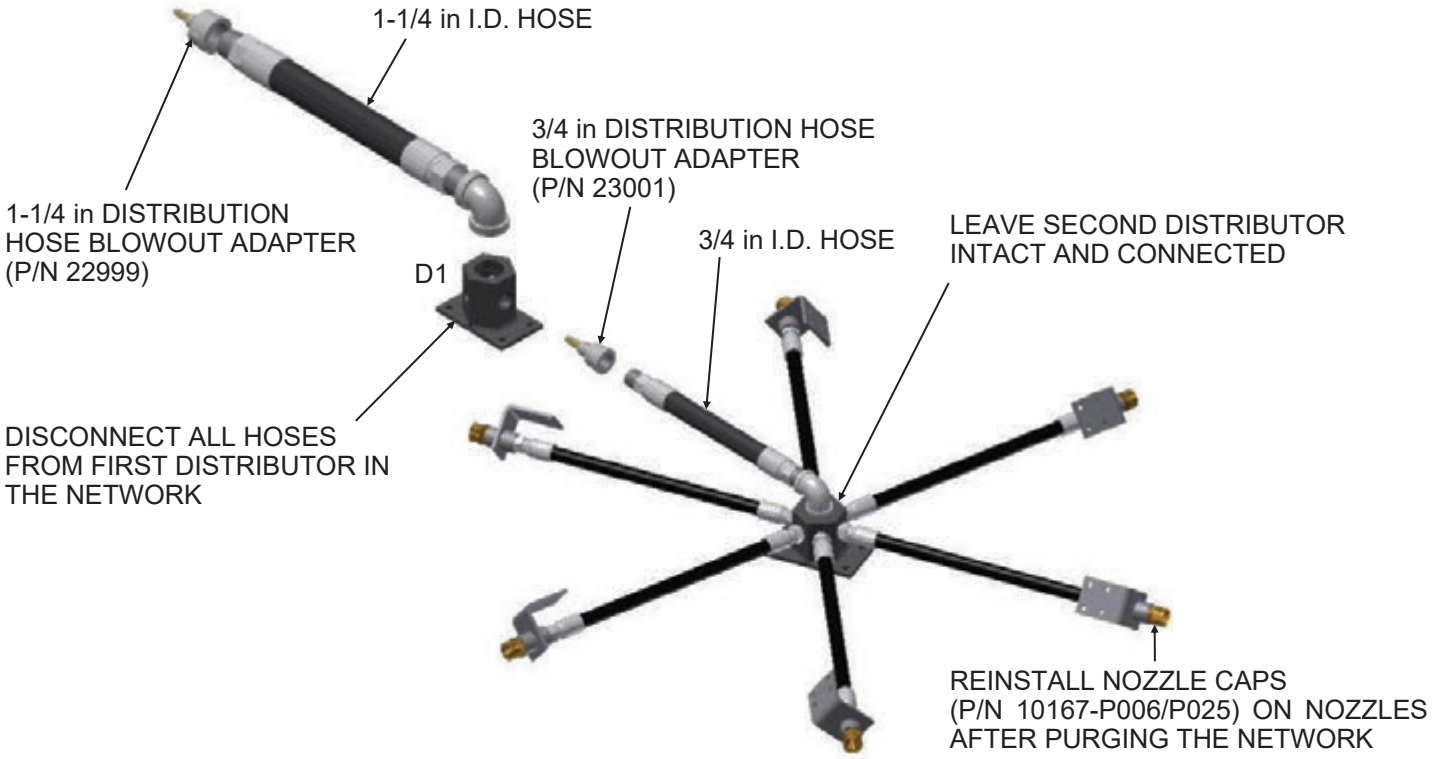


Figure 6.2.2.2

6.2.3 Agent Cylinder Removal

1. If a Low Pressure Switch is used, disconnect it from the Agent Cylinder Valve (See Figures 2.1.a and 2.1.b). Do not attempt to remove Low Pressure Switch from Agent Cylinder Valve.

2.Ensure Shipping and Anti-Recoil Plates are installed on Agent Cylinder Valve. For V250 Agent Cylinders, ensure Protective Cap and Anti-Recoil Plug (P/N 17559-P001) are installed on Agent Cylinder Valve. (See Figures 2.1.a and 2.1.b).

3.Remove Agent Cylinder from its Cylinder Bracket or Weld Ring.

4.Cap Agent Distribution Network to prevent contamination if the recharge can not be done immediately.

6.2.4 Agent Cylinder Valve Removal & Cleaning

Reference the appropriate subsection for Agent Cylinder Valve removal, disassembly, cleaning, and reassembly instructions.

6.2.4.1 Agent Cylinder Valve Removal & Cleaning, V13 thru VS75 Agent Cylinder

Valve Removal:

1.If any pressure remains, depressurize the Agent Cylinder by slowly unscrewing the Agent Cylinder Valve using the 2-½ in Pump Wrench until the collar O-ring seal releases (See Figure 6.1.6).

2.After any pressure in the Agent Cylinder is relieved, finish removing the Agent Cylinder Valve from the Agent Cylinder.

3.Empty the Agent Cylinder of any remaining Dry Chemical Agent.

4.Vacuum any remaining Dry Chemical Agent from the inside bottom and sidewalls of the Agent Cylinder.

5.Inspect the Agent Cylinder and Agent Cylinder threads for any damage.

Valve Disassembly (See Figure 6.2.4.1.a):

6. Unscrew and remove Downtube from Agent Cylinder Valve using a 1-½ in open end wrench on hex section of Downtube.
7. Using a 5/16 in open end wrench to hold the Valve Stem Cup on bottom, carefully remove the Valve Stem (P/N 10095-P003/P010) by unscrewing the Valve Stem Screw (P/N 10732-P012) on top using a 1/8 inch hex wrench. Use caution, as the Valve Stem Screw and Washer are spring loaded.
8. Inspect and clean the Spring (P/N 10097-P006), Valve Stem Screw (P/N 10732-P012), and Washer (P/N 10102-P012). Replace any damaged components.
9. Remove and discard Valve Stem. Replace with a new Valve Stem (P/N 10095-P003/P010).
10. Clean and rinse entire Agent Cylinder Valve with water and dry all parts.

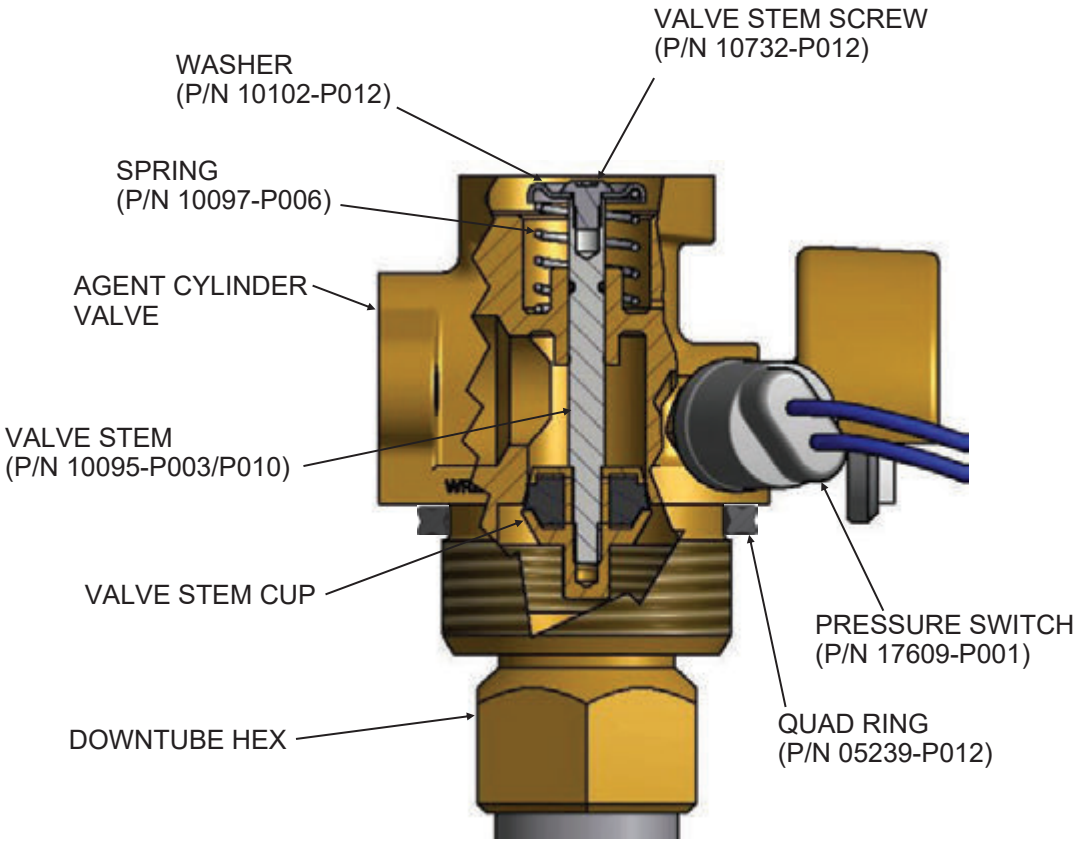


Figure 6.2.4.1.a

11. Inspect all external components of the Agent Cylinder Valve including the Pressure Gauge (P/N 08714-P001), Gauge Guard (P/N 08680-P001), Pressure Switch (P/N 17609-P001), and Rupture Disc (P/N 26816-P001) (See Figure 6.2.4.1.b). If any components are damaged, remove and replace. Seal threads with a 24 hour 2-Part Epoxy (such as DP460 by 3M).

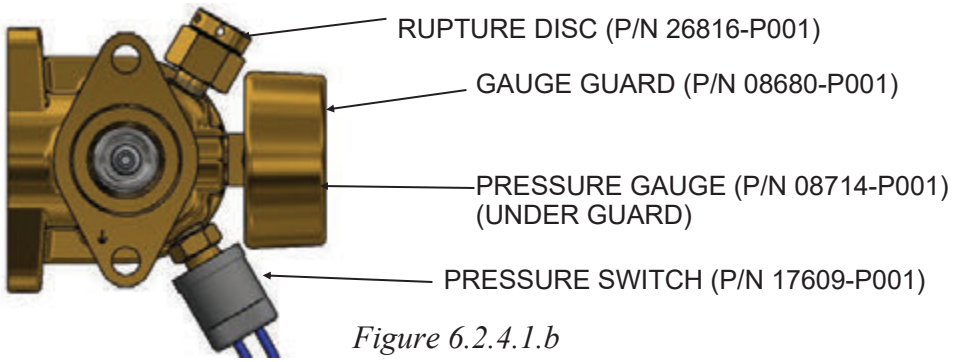


Figure 6.2.4.1.b

Valve Reassembly:

12. On new Valve Stem (P/N 10095-P003/P010), lubricate the small O-ring with Visilox Bluestar V711 or equivalent silicone style lubricant (See Figure 6.2.4.1.c).

WARNING: Do NOT lubricate the Valve Stem seal!

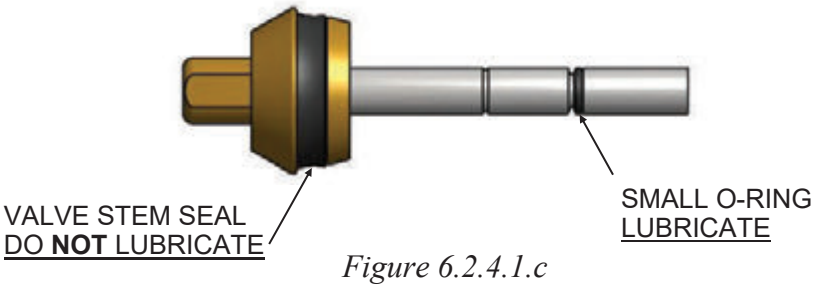


Figure 6.2.4.1.c

13. Reinstall Valve Stem, Spring (P/N 10097-P006) and Washer (P/N 10102-P012) (See Figure 6.2.4.1.a). Apply one drop of medium grade thread locking compound (for example Loctite 242) to Screw threads (P/N 10732-P012). Compress washer well below top of Agent Cylinder Valve while holding the bottom of the Valve Stem Cup with a 5/16 in open end wrench and install Valve Stem Screw using a 1/8 inch hex wrench. Release spring and washer and torque Valve Stem Screw securely to 25 in-lbs (2.8 Nm). Press down on the stem assembly verifying that it travels freely to open/close the Agent Cylinder Valve.

14. Reinstall Downtube into Agent Cylinder Valve:

A. For Vertical Agent Cylinder Downtubes (See Section 2.1.1), apply medium grade thread locking compound (for example Loctite 242) to Downtube retainer threads. Thread the Downtube retainer into the valve and torque to 75 ft-lbs (101.7 Nm).

B. For Horizontal Agent Cylinder Downtubes (See Section 2.1.2), apply medium grade thread locking compound (for example Loctite 242) to Downtube retainer threads. Thread the Downtube retainer into the Agent Cylinder Valve and torque to 130 ft-lbs (176.3 Nm). Alignment of downtube and Agent Cylinder Valve must be as shown (See Figure 6.2.4.1.d) with pickup opening facing away from the green pie area in Pressure Gauge, and Downtube alignment arrows (stamped on side of Downtube and under valve discharge opening) pointing to each other. If Downtube and valve alignment is not correct, loosen Downtube nut, realign downtube as specified, and retighten Downtube nut into Downtube retainer to 120 ft-lbs (162.7 Nm).

15. Remove Quad Ring (P/N 05239-P012) and replace with a new one. Lubricate the Quad Ring with Visilox Bluestar V711 or equivalent silicone style lubricant (See Figure 6.2.4.1.a).

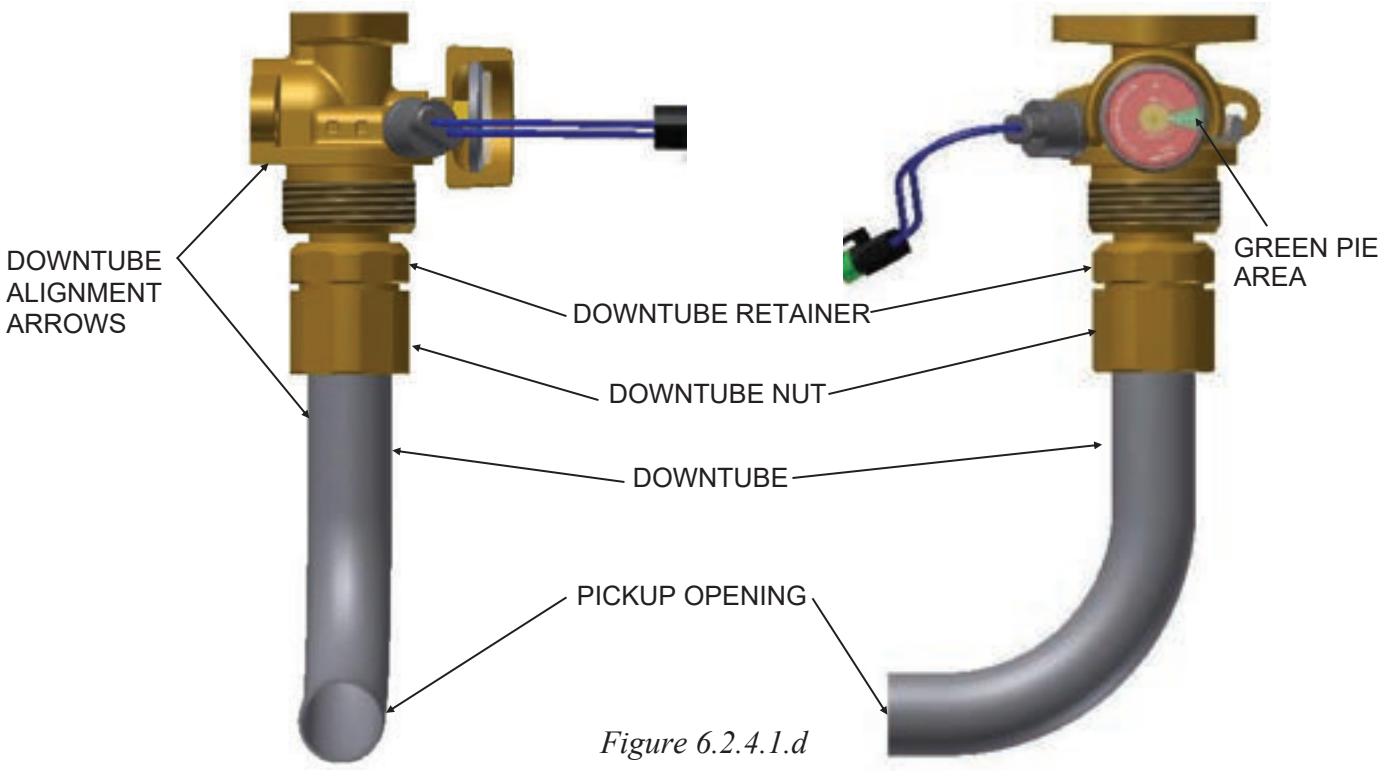


Figure 6.2.4.1.d

6.2.4.2 Agent Cylinder Valve Removal & Cleaning, V250 Agent Cylinder

WARNING! Check the pressure gauge and tank weight to verify the tank is empty and at atmospheric pressure before attempting to remove the Agent Cylinder Valve. Failure to comply could result in personal injury or death from violent tank movement!

The V250 Recharge Kit (P/N 23009) will be required for recharge of the V250 Agent Cylinder Valve.

Valve Removal:

1. If pressure remains in Agent Cylinder, the Agent Cylinder must be secured to a horizontal surface using the 8 bolts and Foot Ring (See Section 4.4.3).

2. Leave the Protective Cap (P/N 17990-P001) and Anti-Recoil Plug (P/N 17559-P001) installed on top of the Agent Cylinder Valve.

3. **Do not depress the Valve Core Stem located on top of the Agent Cylinder Valve!** Relieve any pressure from the Agent Cylinder by removing the Schrader Valve Cap and depressing the Schrader Valve (P/N 28277-001) located on the side of the valve (See Figure 6.2.4.2.a).

4. After all pressure in the Agent Cylinder is relieved, slowly remove the Anti-Recoil Plug

(P/N 17559-P001).

5. Install a 1-1/4 in I.D. by approximately 12 in long NPT nipple into the Agent Cylinder Valve outlet in place of Anti-Recoil Plug (P/N 17559-P001) (See Figure 6.2.4.2.a).

6. Using a mallet or hammer to strike the pipe nipple, unscrew the Agent Cylinder Valve counterclockwise until loosened from the Agent Cylinder.

7. Remove the Fill Cap and discard Fill Cap O-Ring (a new one will be supplied with V250 Recharge Kit (P/N 23009), See Figure 6.2.6.2).

8. Empty the Agent Cylinder of any remaining Dry Chemical Agent. Vacuum any remaining Dry Chemical from the inside bottom and sidewalls of the Agent Cylinder.

9. Inspect the Agent Cylinder and Agent Cylinder threads for any damage. If damaged, replace entire Agent Cylinder.

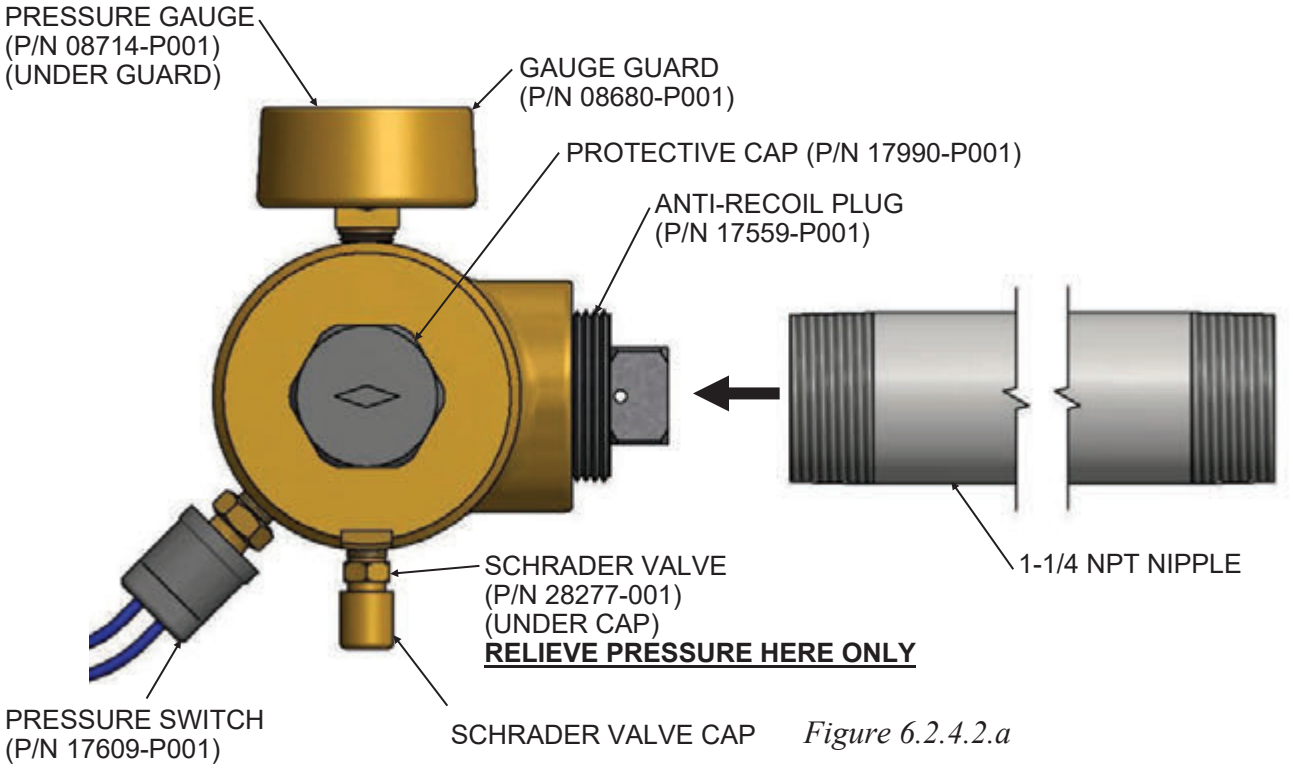


Figure 6.2.4.2.a

Valve Disassembly:

10. Remove and discard the Collar O-Ring (See Figure 6.2.4.2.b).

11. Remove Protective Cap (P/N 17990-P001) from top of Agent Cylinder Valve. Unscrew and remove the Top Cap using a spanner wrench. Remove and discard Top Cap O-Ring (See Figure 6.2.4.2.b).

12. Remove and discard the Valve Core from the Top Cap using a Schrader valve removal tool (See Figure 6.2.4.2.d).

13. Slide the Piston Assembly up and out of the top of the Agent Cylinder Valve body using the (2)

8-32 threaded rods supplied in V250 Recharge Kit (P/N 23009). The Piston Assembly has two female 8-32 threaded holes into which the rods can be threaded (See Figure 6.2.4.2.c). Discard the entire Piston Assembly.

14. If any Agent Cylinder pressure was relieved through the Schrader Valve (P/N 28277-001) from step 3, replace Schrader Valve (See Figure 6.2.4.2.a). Seal threads with a 24 Hour 2-Part Epoxy (such as DP460 by 3M).

15. Inspect all external components of the valve including the Pressure Gauge (P/N 08714-P001), Gauge Guard (P/N 08680-P001), Pressure Switch (P/N 17609-P001), and Schrader Valve (P/N 28277-001) (See Figure 6.2.4.2.a). If any components are damaged, remove and replace. Seal threads with a 24 hour 2-Part Epoxy (such as DP460 by 3M).

16. Clean all internal valve surfaces using caution not to scratch or nick the internal surfaces (See Figure 6.2.4.2.e). Remove any Dry Chemical Agent or lubricant residue from all internal surfaces.

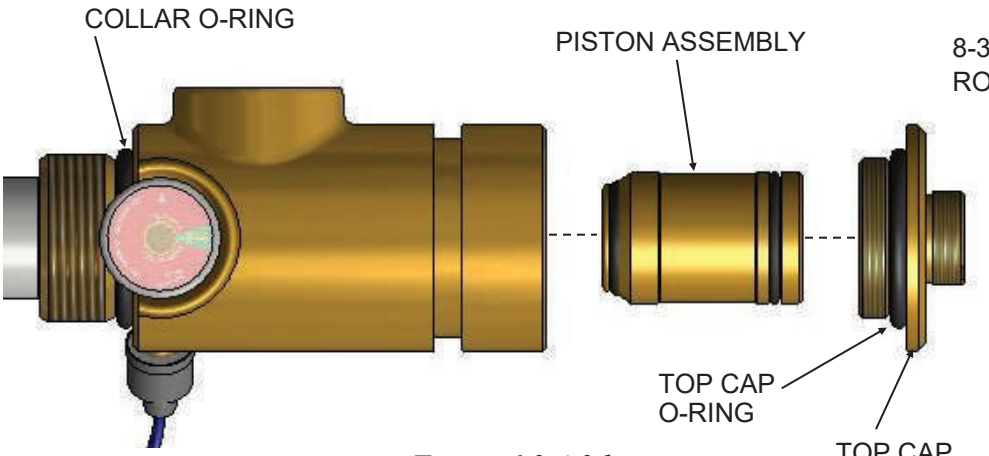


Figure 6.2.4.2.b

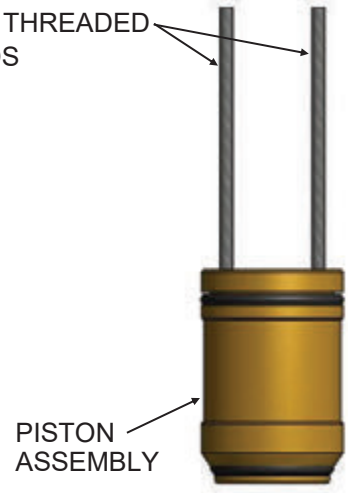


Figure 6.2.4.2.c

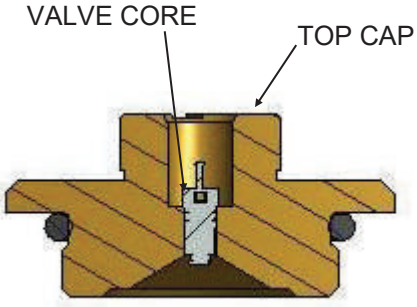


Figure 6.2.4.2.d

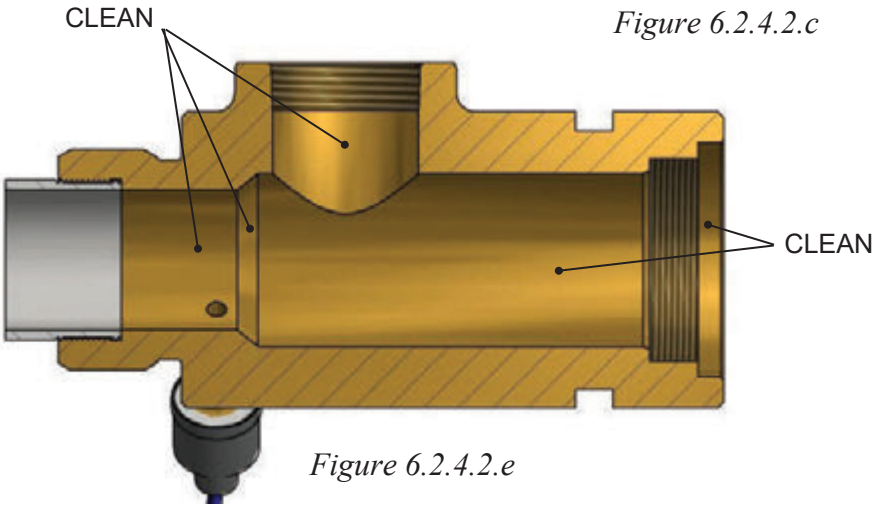


Figure 6.2.4.2.e

Valve Reassembly:

All parts required for valve reassembly are supplied in a V250 Recharge Kit (P/N 23009) including O-Rings, Piston Assembly, and Valve Core.

17. Lightly lubricate the new upper Piston Assembly O-Ring and piston top with Dow Corning No. 4 or equivalent as shown. Use the (2) 8-32 threaded rods also included in the V250 Recharge Kit to hold the Piston Assembly for lubrication (See Figure 6.2.4.2.g). **DO NOT lubricate the bottom O-Ring!**

18. Holding the (2) threaded rods from the previous step, insert Piston Assembly into the top of Agent Cylinder Valve body pushing it all the way down to the Agent Cylinder Valve sealing surface, which is the fully seated position. (See Figure 6.2.4.2.f).

19. Lightly but thoroughly lubricate internal Agent Cylinder Valve bore above the Piston Assembly and Top Cap sealing surface (See Figure 6.2.4.2.f).

20. Lightly lubricate the upper, larger Valve Core O-ring. Install the new Valve Core into the Top Cap and torque to 8 inch-pounds (0.9 Nm) (See Figure 6.2.4.2.h).

21. Lightly lubricate new Top Cap O-Ring with Visilox Bluestar V711 or equivalent. Install O-Ring on Top Cap. To prevent damage during installation, use masking tape on threads of the Top Cap. After O-Ring is in place, remove masking tape and clean threads (See Figure 6.2.4.2.h).

22. Carefully thread the Top Cap into the Agent Cylinder Valve and tighten securely using a spanner wrench.

23. Lightly lubricate new Collar O-ring with Dow Corning No. 4 or equivalent. Install Collar O-Ring. To prevent damage during installation, use masking tape on threads of the Agent Cylinder Valve collar. After O-Ring is in place, remove masking tape and clean Agent Cylinder Valve collar threads (See Figure 6.2.4.2.f).

24. Reinstall the Protective Cap (P/N 17990-P001) on Top Cap.

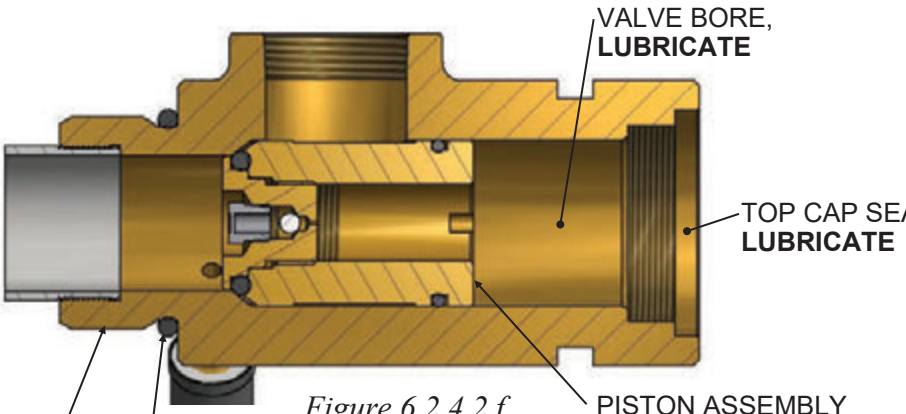


Figure 6.2.4.2.f

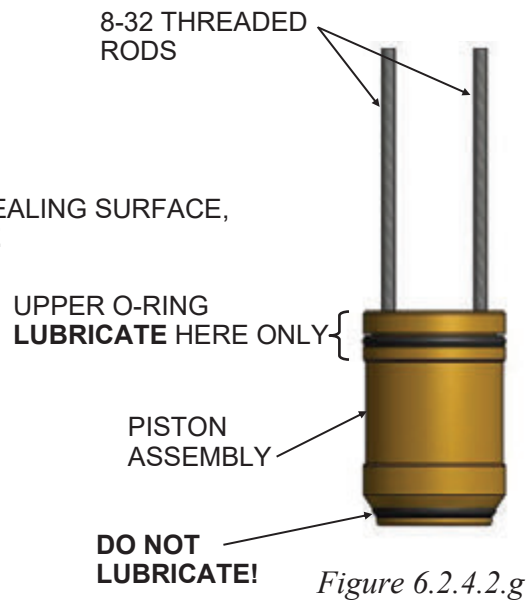


Figure 6.2.4.2.g

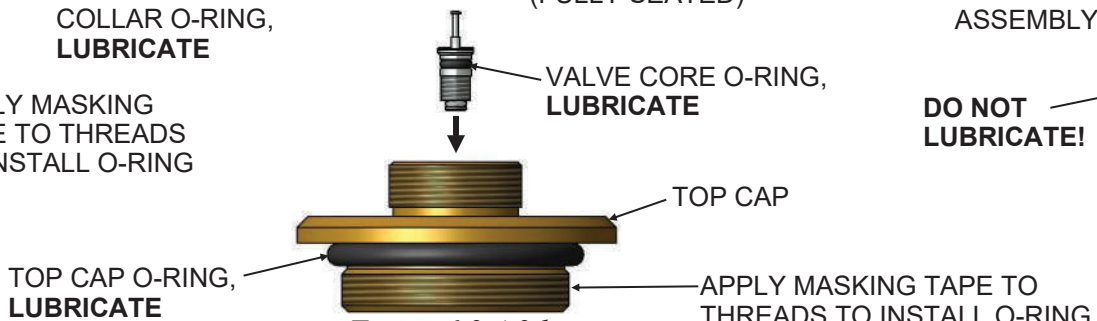


Figure 6.2.4.2.h

6.2.5 Agent Cylinder Refill

DO NOT MIX FIRE SUPPRESSION AGENTS WITH EACH OTHER OR WITH ANY OTHER AGENTS OR CHEMICALS! FAILURE TO FOLLOW THESE GUIDELINES COULD RESULT IN ADVERSE SYSTEM PERFORMANCE, PROPERTY DAMAGE, SERIOUS BODILY INJURY AND POSSIBLE DEATH! CONSULT SAFETY DATA SHEET (SDS) FOUND ON AMEREX WEBSITE WWW.AMEREX-FIRE.COM FOR THE PARTICULAR AGENT BEING USED.

After completely emptying and vacuuming the Agent Cylinder (See Section 6.2.4), fill the Agent Cylinder with the appropriate volume of Dry Chemical Agent (See Table 2.1.1 and 2.1.2). Fill only with amount shown in these tables! ABC Dry Chemical Recharge Pail (P/N 09781) and Purple K Recharge Pail (P/N 04214) are approximately 50 pounds each in weight and should be used for Agent Cylinder refill. Filling operation depends on the type of Agent Cylinder used:

•Vertical Agent Cylinders (See Figure 2.1.1.a): Vertical Agent Cylinders must be filled through the Agent Cylinder Collar.

•Horizontal Agent Cylinders (See Figure 2.1.2): Agent Cylinders must have the Agent Cylinder Valve installed prior to refill. Perform step 1 of Section 6.2.6.1 prior to refill. Horizontal Agent Cylinders must be filled through the Fill Port on opposite side of Agent Cylinder (See Figure 2.1.2). After refilling Agent Cylinder with the appropriate amount of Dry Chemical, clean any residual Dry Chemical from the Fill Port. Reinstall brass Fill Cap in Fill Port. Ensure that a new, lubricated Quad Ring (P/N 05239-P012) is in place on Fill Cap. Torque Fill Cap to 30-40 ft-lbs (41-54 Nm).

•V250 Agent Cylinders (See Figure 2.1.1.b): Agent Cylinders must have the Agent Cylinder Valve installed prior refill. Perform step 1 of Section 6.2.6.2 prior to refill. The V250 Agent Cylinder can be filled through the Fill Port (See Figure 6.2.6.2).

6.2.6 Agent Cylinder Valve Installation & Agent Cylinder Charging

Reference the appropriate subsection for Agent Cylinder Valve installation and Agent Cylinder charging instructions. See Appendix G for temperature vs pressure correlations.

6.2.6.1 Agent Cylinder Valve Installation & Agent Cylinder Charging, V13 thru VS75 Agent Cylinder

1. Clean any residual Dry Chemical from the Agent Cylinder Collar. Reinstall the reworked and assembled Agent Cylinder Valve into the Agent Cylinder with use of the 2-½" Pump Wrench (See Section 6.1.6). Ensure that a new, lubricated Quad Ring (P/N 05239-P012) is in place on bottom of Agent Cylinder Valve. Torque Agent Cylinder Valve to 30-40 ft-lbs (41-54 Nm).

2. Remove the Anti-Recoil Plate (P/N 10646-P006) from the Agent Cylinder Valve discharge port (See Figure 2.1.a). Attach the Recharge Adapter (P/N 10136) in its place using same bolts/nuts (See Figure 6.1.1).

3. Remove the Shipping Plate (P/N 10099-P006) from the top of the Agent Cylinder Valve (See Figure 2.1.a). Attach the Tee Handle (P/N 10134) in its place using same bolts/nuts (See Figure 6.1.5).

4. Connect the Recharge Adapter to a regulated source of nitrogen. NOTE: Nitrogen used for pressurizing must be dry with a dew point of -70°F (-57°C) or lower. Depress the Valve Stem by pulling the Tee Handle down into its locked position. Pressurize Agent Cylinder with a regulated nitrogen source to 350 psi (2413 kPa) @ 70°F. *For charging in conditions where the temperature is NOT 70°F, reference Appendix G for equivalent charge pressure as a function of temperature.* Confirm proper pressurization by using a calibrated pressure gauge on the low pressure side of the pressure regulator. Verify that the valve Pressure Gauge is reading in the green pie. After correct pressure is reached, raise the Tee Handle, closing the Agent Cylinder Valve. Relieve the pressure in the nitrogen source and disconnect the nitrogen source from the Recharge Adapter. Remove the Recharge Adapter and Tee Handle from the Agent Cylinder Valve.

5. Use leak detect fluid to check for any leaks.

6. Reinstall Shipping Plate and Anti-Recoil Plate (See Figure 2.1.a) until the Agent Cylinder can be placed back into service.

6.2.6.2 Agent Cylinder Valve Installation & Agent Cylinder Charging, V250 Agent Cylinder

(See Figure 6.2.6.2)

1. Clean any residual Dry Chemical from the Valve Collar and lubricate the Valve O-Ring groove with Dow Corning No. 4 or equivalent lubricant. Reinstall the reworked, assembled Agent Cylinder Valve into the Agent Cylinder. Ensure that a new, lubricated Collar O-Ring is in place on bottom of Agent Cylinder Valve. Torque Agent Cylinder Valve to 40 ft-lbs (54 Nm).

2. After refilling the V250 Agent Cylinder with the appropriate amount of Dry Chemical, clean any residual Dry Chemical from the Fill Port and lubricate O-Ring groove with Dow Corning No. 4 or equivalent lubricant.

3. Lightly lubricate new Fill Cap O-Ring included in V250 Recharge Kit (P/N 23009) with Dow Corning No. 4 or equivalent. Install new Fill Cap O-Ring on Fill Cap. To prevent damage during installation, use masking tape on threads of the Fill Cap. After O-Ring is in place, remove masking tape and clean Fill Cap threads.

4. Install Fill Cap into Fill Port and torque securely.

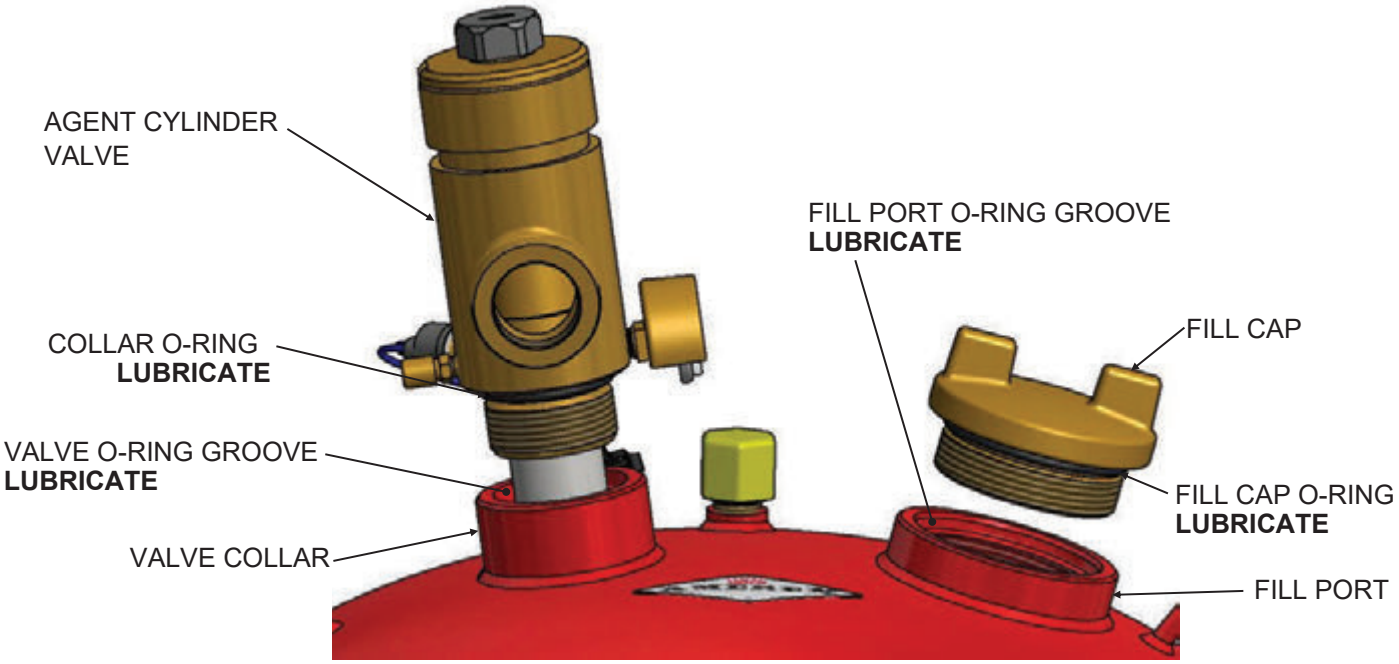


Figure 6.2.6.2

5. Install a 1-1/4 NPT plug in the discharge outlet of the Agent Cylinder Valve and tighten securely.

6. Remove Protective Cap (P/N 17990-P001) from top of Agent Cylinder Valve and replace with V250 Recharge Adapter (P/N 23065). Torque to hand tight.

7. Connect the V250 Recharge Adapter to a regulated source of nitrogen. NOTE: Nitrogen used for pressurizing must be dry with a dew point of -70°F (-57°C) or lower. Pressurize Agent Cylinder with a regulated nitrogen source to 350 psi (2413 kPa) @ 70°F. When charging a V250 from the top port, the pressure should be 15-20psi (103-138 kPa) higher than target pressure. This is necessary to overcome the spring force of the Schrader valve. For example, if the target gauge pressure on the cylinder is 350psi @ 70°F, the regulator will need to be set between 365-370 psi (2517-2551 kPa) @ 70°F (21°C). *For charging in conditions where the temperature is NOT 70°F, reference Appendix G for equivalent charge pressure as a function of temperature.* Confirm proper pressurization by using a calibrated pressure gauge on the low pressure side of the pressure regulator. Verify that the valve Pressure Gauge is reading in the green pie. After correct pressure is reached, relieve pressure in the nitrogen source and disconnect the nitrogen source from V250 Recharge Adapter.

8. Remove the V250 Recharge Adapter from the top of Agent Cylinder Valve and replace with Protective Cap (P/N 17990-P001). Tighten securely. **WARNING: Do not depress Valve Core Stem located under Protective Cap, as a system discharge will occur (See Figure 4.6.4.a)! Ensure Protective Cap is in place and tightened securely before proceeding.**

9. SLOWLY AND CAREFULLY remove the 1-1/4 NPT plug from the Agent Cylinder Valve discharge port, ensuring that the Agent Cylinder Valve is closed with no leakage from the discharge port. Reinstall Anti-Recoil Plug (P/N 17559-P001) in its place and tighten securely.

10. Use leak detect fluid to check for any leaks.

Protective Cap and Anti-Recoil Plug (P/N 17559-P001) must be in place until Agent Cylinder can be placed back into service.

6.2.7 Actuator Removal & Cleaning

For systems using a Pneumatic Actuation Network with a Manual Actuator (P/N 10210), Electric Nitrogen Actuator (P/N 20775), or Manual/Electric Actuator (P/N 23600), the actuator must be removed, disassembled, cleaned, and reassembled after each use.

Actuator Removal (See Section 4.7.4):

1. If using and Outdoor Nitrogen Bracket (P/N 10354) remove Bracket Cover by removing the (4) Bracket Screws using a 3/16 in hex head wrench.

2. Slowly remove Nitrogen Cylinder (P/N 09956) from actuator, allowing any residual pressure to escape. See Section 6.2.9 for Nitrogen Cylinder recharge instructions.

3. Disconnect the Pneumatic Actuation Network from the nitrogen outlet port.

4. Remove the actuator from the Bracket Back by removing the (2) Mounting Screws (P/N 10573-P012) using a 3/16 in hex head wrench.

Reference the appropriate subsection for actuator disassembly, cleaning, and reassembly instructions:

6.2.7.1 For Systems Using Manual Actuator (P/N 10210)

Actuator Disassembly (See Figure 6.2.7.1):

5. Using a deep walled 1/2 in socket to hold bottom of Puncture Stem Assembly (P/N 10259), unscrew the Palm Button (P/N 10205-P001).

6. Remove the Dust Boot (P/N 09988-P006) and Puncture Stem Assembly with O-ring and back-up O-ring from the Manual Actuator Body. Remove Gasket (P/N 07247-P006).

Actuator Cleaning (See Figure 6.2.7.1):

7. Inspect and clean the inner bore of Manual Actuator Body. If any scarring or damage has occurred in the inner bore, replace the Manual Actuator Body.

8. Inspect and clean the Puncture Stem Assembly (P/N 10259). Replace the O-ring and back-up O-ring with new rings. These are included in the Actuator Rebuild Kit (P/N 10939). Lubricate both O-rings with Visilox Bluestar V711 or equivalent silicone style lubricant .

9. Inspect and clean the Dust Boot (P/N 09988-P006) and Gasket (P/N 07247-P006). Replace any damaged components.

Actuator Reassembly (See Figure 6.2.7.1):

10. Insert Puncture Stem Assembly (P/N 10259) into Manual Actuator Body. Apply one drop of medium grade thread locking compound (for example Loctite 242) to the Stem threads and install Dust Boot (P/N 09988-P006) and Palm Button (P/N 10205-P001). Firmly torque the Palm Button to hand tight. Function test the assembly to verify it works properly.

11. Install the Gasket (P/N 07247-P006) and Pull Pin (P/N 10993).

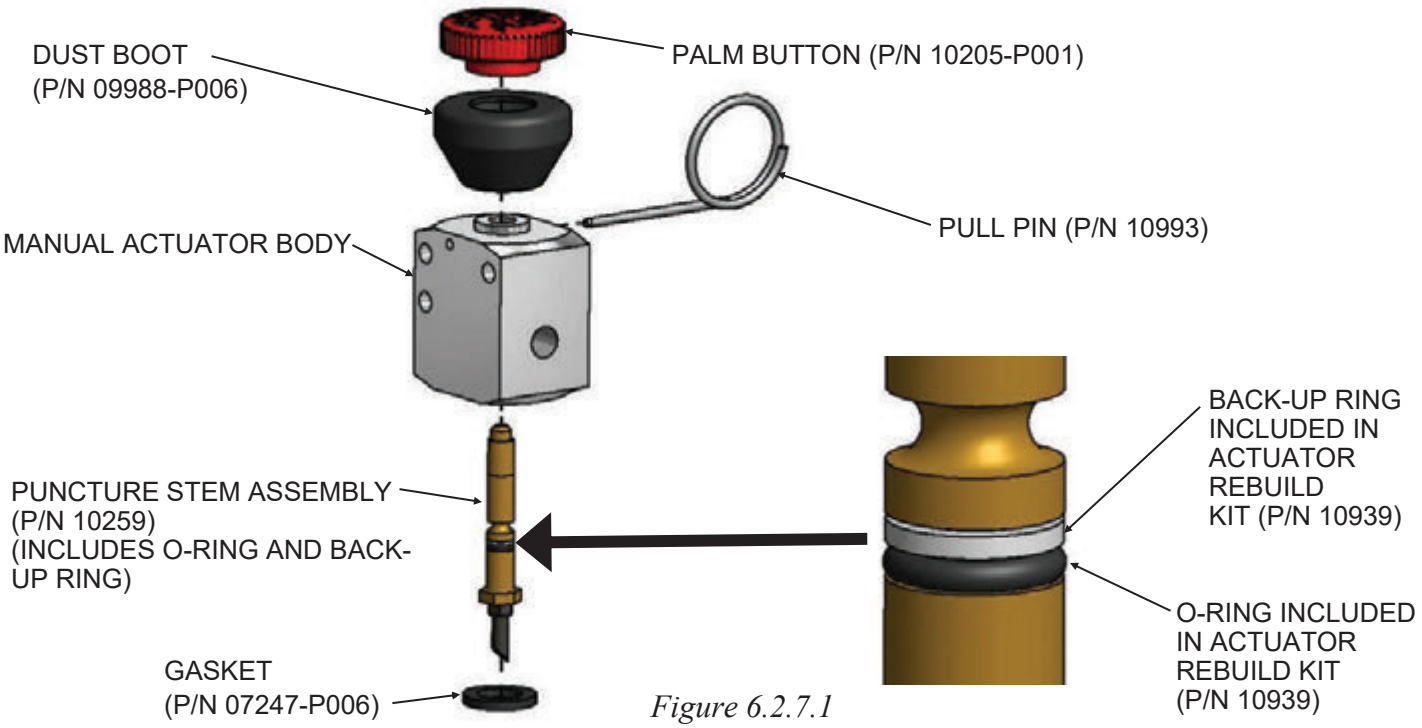


Figure 6.2.7.1

6.2.7.2 For Systems Using Electric Nitrogen Actuator (P/N 20775)

A rebuild kit is available (P/N 10939) which includes O-rings used in the actuator. Additionally, a second rebuild kit is available (P/N 22873) which includes a replacement Puncture Stem Assembly used in the actuator.

Actuator Disassembly (See Figure 6.2.7.2):

5. Remove spent Linear Actuator (P/N 22579). Locate and discard the small stainless steel disc which was displaced from the end of the Linear Actuator upon actuation. It is normally found on top of the Puncture Stem Assembly.

6. Using an 1-1/8 in wrench, remove the Adapter with O-ring from the top of the Actuator Body (P/N 20774).

7. Remove the Puncture Stem Assembly with O-ring and (2) back-up Rings from the Actuator Body. Remove Spring (P/N 10097-P006) and Gasket (P/N 07247-P006).

Actuator Cleaning (See Figure 6.2.7.2):

8. Inspect and clean the inner bore of Actuator Body. If any scarring or damage has occurred to inner bore, replace the Actuator Body.

9. Inspect and clean the Puncture Stem Assembly. Replace the O-ring and (2) back-up Rings with new rings. These are included in the Actuator Rebuild Kit (P/N 10939). Lubricate O-rings with Visilox Bluestar V711 or equivalent silicone style lubricant .

10. Inspect and clean the Adapter. Replace O-ring with a new one. This is also included in the Actuator Rebuild Kit (P/N 10939). Inspect and clean the Gasket (P/N 07247-P006). Replace any damaged components.

Actuator Reassembly (See Figure 6.2.7.2):

11. Insert Spring (P/N 10097-P006) then Puncture Stem Assembly into Actuator Body (P/N 20774). Install the Adapter with O-ring and torque to 50 ft-lbs (68 Nm). Function test the assembly using a Phillips head screw driver inserted through the Linear Actuator port in the Adapter to verify it works properly.

12. Install the Gasket (P/N 07247-P006).

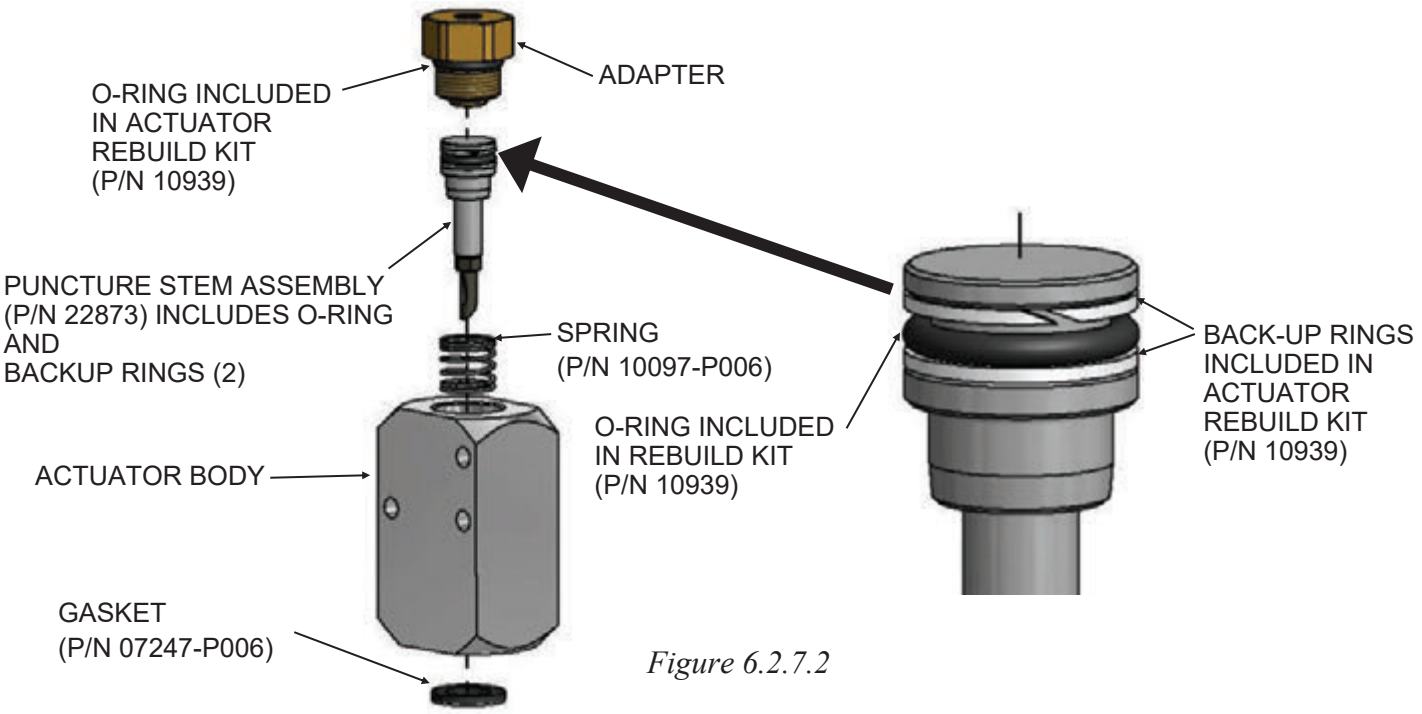


Figure 6.2.7.2

6.2.7.3 For Systems Using Manual/Electric Actuator (P/N 23600)

A rebuild kit is available (P/N 23761) which includes a replacement Puncture Stem Assembly and replacement O-rings used in the actuator. **Replacement of the Puncture Stem Assembly is required after each use.**

Actuator Disassembly (See Figure 4.7.4.c & 6.2.7.3):

5. Loosen Set Screw on Upper Piston and unscrew Upper Piston from Lower Piston. Unscrew Linear Actuator from Lower Piston. If the Linear Actuator (P/N 22579) was used for actuation, it must be replaced. Locate and discard the small stainless steel disc which was displaced from the end of the Linear Actuator upon actuation. It is normally found on top of the Puncture Stem Assembly.

6. Using an 1-1/2 in wrench, remove the Adapter with O-ring from the top of the Actuator Body.

7. Remove and discard the Puncture Stem Assembly (P/N 23761) from the Actuator Body. Remove Spring (P/N 10097-P006) and remove Gasket (P/N 07247-P006) from the opposite side of the Actuator Body.

Actuator Cleaning (See Figure 6.2.7.3):

8. Inspect and clean the inner bore of Actuator Body. If any scarring or damage has occurred to inner bore, replace the Actuator Body.

9. Inspect and clean the Adapter and replace O-ring with a new one from kit (P/N 23761). Lubricate O-ring with Visilox Bluestar V711 or equivalent silicone style lubricant .

10. Inspect and clean the Upper and Lower Piston. Replace O-ring on Lower Piston with a new one from kit (P/N 23761). Lubricate O-ring with Visilox Bluestar V711 or equivalent silicone style lubricant .

11. Replace the Gasket (P/N 07247-P006). Replace any damaged components.

Actuator Reassembly (See Figure 6.2.7.3):

12. Locate new Puncture Stem Assembly with O-ring and (2) back-up Rings from kit (P/N 23761). Lubricate O-rings with Visilox Bluestar V711 or equivalent silicone style lubricant. Lubricate inner bore of Actuator Body and Adapter.

12. Insert Spring (P/N 10097-P006) then Puncture Stem Assembly (P/N 23761) into Actuator Body being careful not to pinch back-up O-rings on Puncture Stem Assembly. Install the Lower Piston into Adapter. Install Adapter into Actuator Body and torque to 50 ft-lbs (68 Nm). Function test the assembly by pressing the Lower Piston into the Actuator Body to verify it works properly and returns to original position.

13. Install Linear Actuator and Upper Piston (See Section 4.7.4).

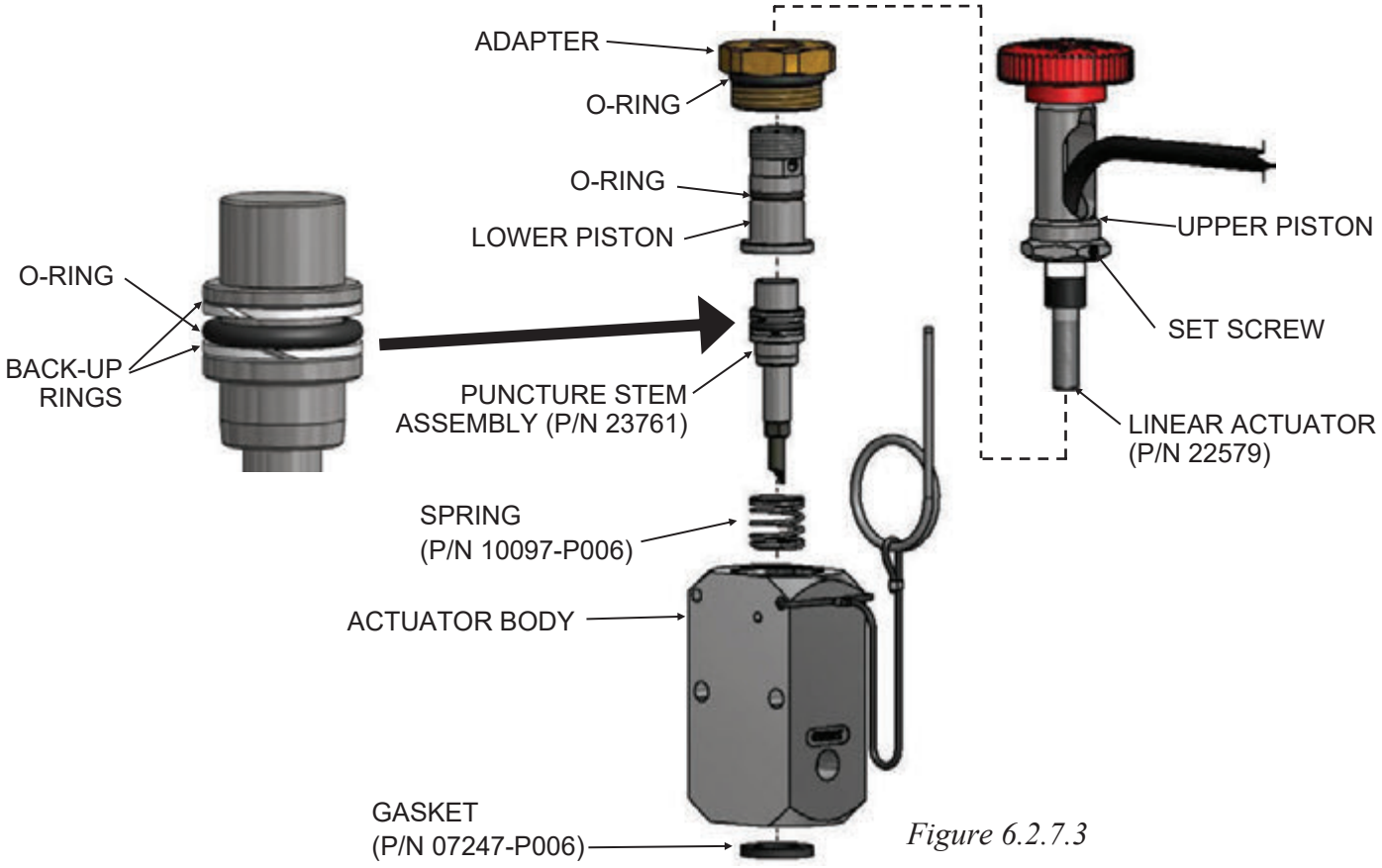


Figure 6.2.7.3

6.2.8 Pneumatic Actuation Network Testing

For systems using a Pneumatic Actuation Network, perform the following steps. After connecting all control heads and actuators to the Pneumatic Actuation Network, the network must be tested for functionality and leaks. If multiple actuators are used along with Check Valves, each actuator and independent leg of the Pneumatic Actuation Network must be tested separately.

1. Before proceeding, all control heads must be removed from Agent Cylinders, and all Nitrogen Cylinders must be removed from actuators. Disconnect the electrical connector for any 50 psi Pressure Switches.

2. Install the Actuation Network Test Adapter (P/N 10895) into the actuator body in place of the Nitrogen Cylinder (See Figure 6.1.7).

3. Pressurize the Pneumatic Actuation Network through the Actuation Network Test Adapter using dry air or nitrogen at 80-90 psi (551-620 kPa).

4. Verify that each piston in each control head actuates. Pistons equipped with a Locking Plunger should lock in the open or actuated position.

5. Verify that each component and connection in the Pneumatic Actuation Network has no leaks.

6. To relieve pressure in the Pneumatic Actuation Network, unseat the Vent Check(s) (P/N 10173) on the control head(s). After all pressure is relieved, reinstall Vent Check.

7. Reset all control head pistons to their fully recessed positions. If equipped, depress the Spring Plungers per Section 6.2.1.

8. If multiple actuators are used in a Pneumatic Actuation Network, repeat steps 2 through 7 for each actuator.

9. After verifying that all components are functioning properly and no leaks are present, reinstall control heads on Agent Cylinders per Sections 4.6.3 thru 4.6.6 and Nitrogen Cylinders in actuators per Section 4.7.4. Reconnect the electrical connector for any 50 psi Pressure Switches per Section 4.7.2.

6.2.9 Nitrogen Cylinder Recharge

WARNING: NITROGEN CYLINDERS OPERATE AT EXTREMELY HIGH PRESSURE (1800 psi). HANDLE WITH EXTREME CAUTION. PERFORM ALL RECHARGING WITH NITROGEN CYLINDER CONTAINED INSIDE A SUITABLE SAFETY CAGE

1. Slowly remove Nitrogen Cylinder(s) (P/N 09956) from actuator as described in Section 6.2.7.1, 6.2.7.2 or 6.2.7.3, allowing any residual pressure to escape. Install shipping cap(s) on Nitrogen Cylinder(s).

2. Clean Nitrogen Cylinder(s) to remove dirt, grease, and foreign material (use mild soap and water for cleaning process, no harsh solvents). Verify that the nameplate for each Nitrogen Cylinder is in place and fully legible. Inspect the Nitrogen Cylinders for corrosion, abrasion, or dents. Relieve any pressure and discard if integrity of the Nitrogen Cylinder has been compromised.

3. Remove old Rupture Disc (P/N 09958-P001/006) and discard by fully screwing the Nitrogen Cylinder into a Nitrogen Cylinder Recharge Adapter (P/N 10270) (See Figure 6.2.9.a). Hold Nitrogen Cylinder in place using a 1-1/8 inch wrench on the Nitrogen Cylinder hex fitting. Loosen Rupture Disc by turning the recharge adapter wrench 1/4 turn counterclockwise. On Nitrogen Cylinders that have not been actuated and still have Rupture Disc intact, a technician must carefully allow residual pressure to vent. Unscrew cylinder from the Recharge Adapter. Unscrew old rupture disc assembly and discard (See Figure 6.2.9.b).

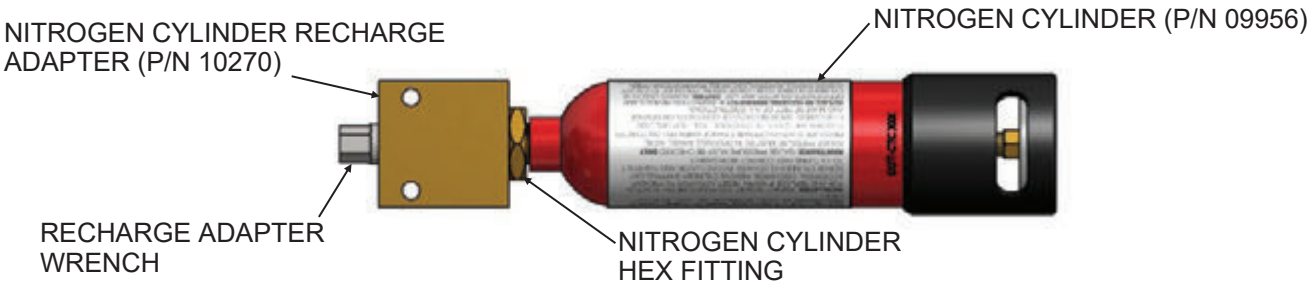


Figure 6.2.9.a

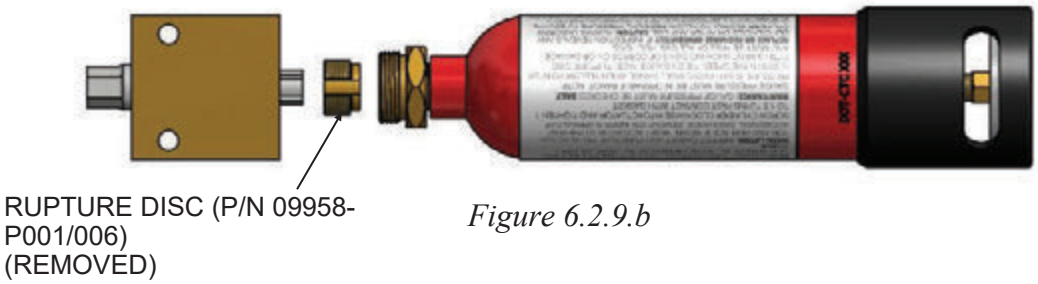


Figure 6.2.9.b

4. Inspect sealing seat on Nitrogen Cylinder hex fitting. Discard Nitrogen Cylinder if seat is damaged (See Figure 6.2.9.c)

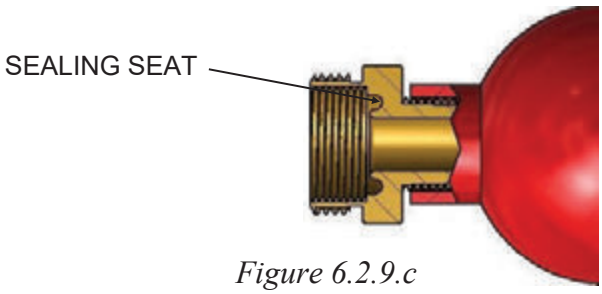


Figure 6.2.9.c

5. Install a new Rupture Disc. The Rupture Disc on Nitrogen Cylinders may be replaced only with P/N 09958-P001/006. Substitute parts will void manufacturer's warranty. Wipe sealing seat on Nitrogen Cylinder and copper gasket on new Rupture Disc with a clean damp cloth. Apply a small amount of Visilox V-728 or synthetic motor oil to copper gasket on new Rupture Disc and spread across entire gasket. Screw Rupture Disc into Nitrogen Cylinder hand tight.

6.To pressurize the Nitrogen Cylinder, reinstall Nitrogen Cylinder in Nitrogen Cylinder Recharge Adapter (P/N 10270). Tighten Nitrogen Cylinder by hand 1 to 1-1/2 turns past contact with sealing gasket in Recharge Adapter. Hold Nitrogen Cylinder in place using a 1-1/8 inch wrench on the Nitrogen Cylinder hex fitting. Loosen Rupture Disc by turning the Recharge Adapter wrench 1/8 turn counterclockwise. Connect a regulated nitrogen supply to the Nitrogen Cylinder Recharge Adapter (See Figure 6.2.9.d for a typical pressurization network).

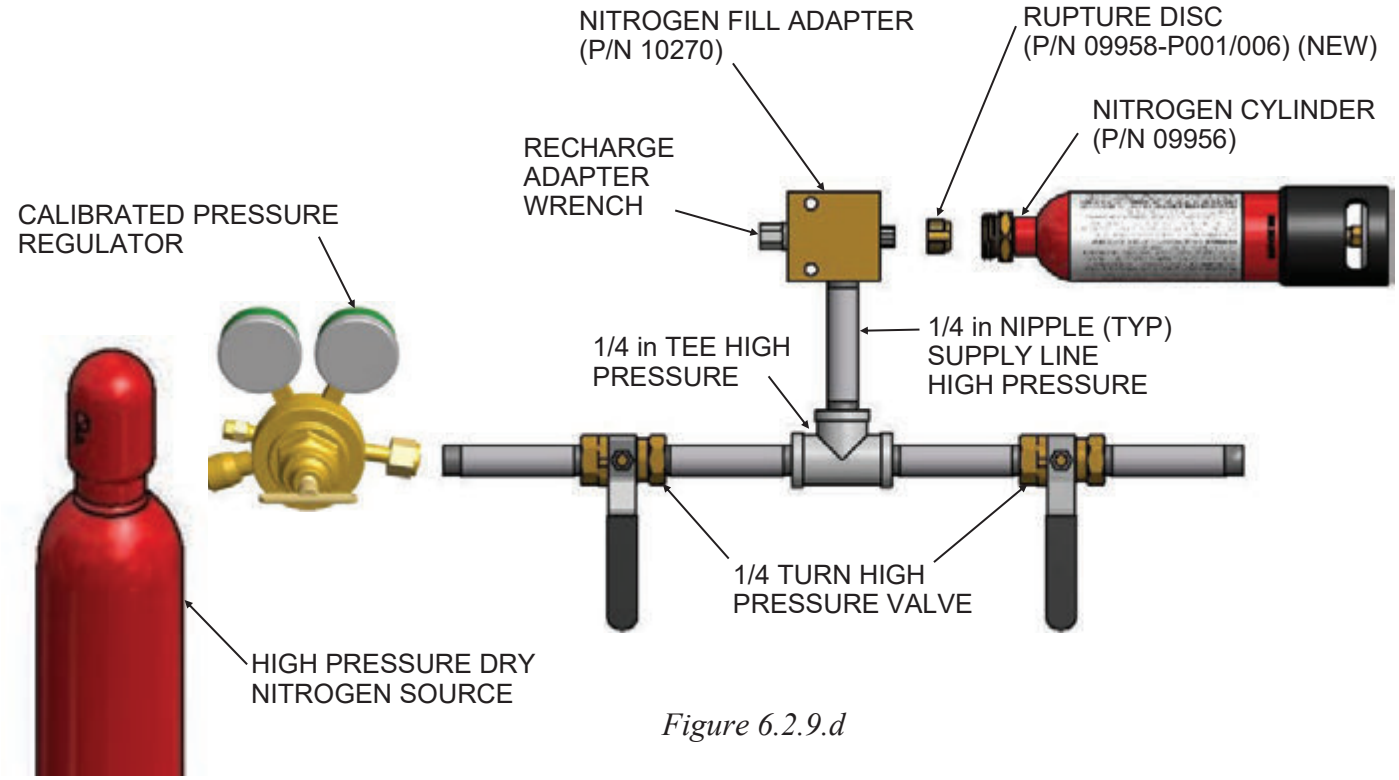


Figure 6.2.9.d

7. Pressurize the Nitrogen Cylinder to 1800 psi at 70°F (12410 kPa at 21.1 °C). NOTE: The nitrogen, as it compresses into the 15 cu. in. Nitrogen Cylinder, may experience a significant temperature rise. This temperature rise must be compensated for by pressurizing to the value corresponding to 1800 psi (12410 kPa) at the higher temperature. The best method to accomplish proper pressurization is to attach a commercially available magnetic base thermometer to the side of the Nitrogen Cylinder. Pressurize and hold the Nitrogen Cylinder at 1800 psi (12410 kPa) (Make sure there are no leaks in the nitrogen supply plumbing). Let the apparatus sit for 2 minutes minimum undisturbed to allow the temperature to stabilize. Read the temperature on the thermometer. Locate the temperature on the "CYLINDER TEMPERATURE" (horizontal) axis of the graph (See Appendix H). Draw a line vertically upward from that temperature until it crosses the "NOMINAL PRESSURE" line. Draw a second line horizontally from the point of intersection to the "CYLINDER CHARGE PRESSURE" (vertical) axis of the graph. Increase the pressure from the regulated nitrogen supply to match the value read from the "CYLINDER CHARGE PRESSURE" axis. NOTE: Nitrogen used for pressurizing must be dry with a dew point of -70°F (-57°C) or lower.

8. When the determined pressure is reached, tighten the Rupture Disc (P/N 09958-P001/006) by applying a torque wrench to the Recharge Adapter wrench and tightening clockwise to 40 ft-lbs (54 Nm). Shut off nitrogen supply. Relieve the pressure in the supply line. Remove Nitrogen Cylinder (P/N 09956) from the Recharge Adapter (P/N 10270).

9. Check for leaks by applying leak detect fluid or soapy water to the Rupture Disc (P/N 09958-P001/006), the Nitrogen Cylinder hex fitting threads, and the Nitrogen Cylinder pressure gauge threads. A leak is present if new bubbles continue to form where leak detect fluid was applied. Inspect the applied leak detect fluid for bubbles. If bubbles are observed over a 10 minute period within the applied leak detect fluid, wipe up remaining fluid, relieve pressure, and repeat steps 2-9. Dry any leak detect fluid from all surfaces and inside of rupture disc following leak detect. Reinstall Shipping Cap on Nitrogen Cylinder.

Chapter 7: Warranty

For information on the Amerex warranty go to http://www.amerex-fire.com/terms-and-conditions.

Appendix A: HDME-1 Enclosed Engine Compartment

- Engine compartments with 25% or less unclose-able openings.
- Total Flooding Coverage
- Scalable for engines of any size or shape
- Scaling factors include: SVR, DVR, DDM
- Static Volume Requirement (SVR) is defined as the maximum amount of agent applied to the fire hazards during engine compartment testing divided by the free volume of the engine compartment, which results in the minimum amount of agent per unit volume to be used to design systems.
- Dynamic Volume Requirement (DVR) is defined as the maximum agent discharge rate used among all engine compartment fire extinguishment tests divided by the air flow through the engine compartment to obtain the minimum agent discharge rate per air volume flow rate to be used in the design of systems.
- Design Duration Minimum (DDM) is defined as 1.5x times the maximum extinguishing time, determined during testing. The DDM pertains to the minimum time required to discharge the entire agent cylinder.

Coverage Type	Agent Type	SVR lb/ft^3 (kg/m^3)	DVR lb/ft^3 (kg/m^3)	DDM (s)
Total Flooding (Volumetric)	ABC	0.222 (3.556098)	0.005153 (0.082543)	7.5
Total Flooding (Volumetric)	Purple K	0.252 (4.036652)	0.006102 (0.097744)	7.5

Table 8.1

Sample Calculation

Scaling Example 1 (English Units):

Consider the following:

Customer A has a bus with a rear engine compartment (EC) that needs an ABC Agent fire suppression system. Use values from Table 8.1 for SVR, DVR, & DDM. The free volume of the new engine compartment is measured as 102 ft^3. The airflow rate is measured as 2,000 ft^3/min. Calculate the static design quantity (SDQ), dynamic design rate (DDR), & the agent quantity (AQ). The larger value of the two (SDQ) vs (AQ) is the limiting factor for design.

Known: *SVR = 0.222 lb/ft^3 (ABC)*

DVR = 0.004862 lb/ft^3

DDM = 7.5 s = 0.125 min

SDQ = Free Volume x SVR = (102 ft^3) x (0.222 lb/ft^3) = 22.64 lb

DDR = Airflow Rate x DVR = (2,000 ft^3/min) x (0.004862 lb/ft^3) = 9.724 lb/min

AQ = DDM x DDR = (0.125 min) x (9.724 lb/min) = 1.21 lb

Now, compare values for SDQ vs AQ; the higher value will be the design minimum.

Therefore, the agent weight required would be a minimum of 22.64 lb.

For this example, the appropriate Agent Cylinder size would be a V25 or larger.

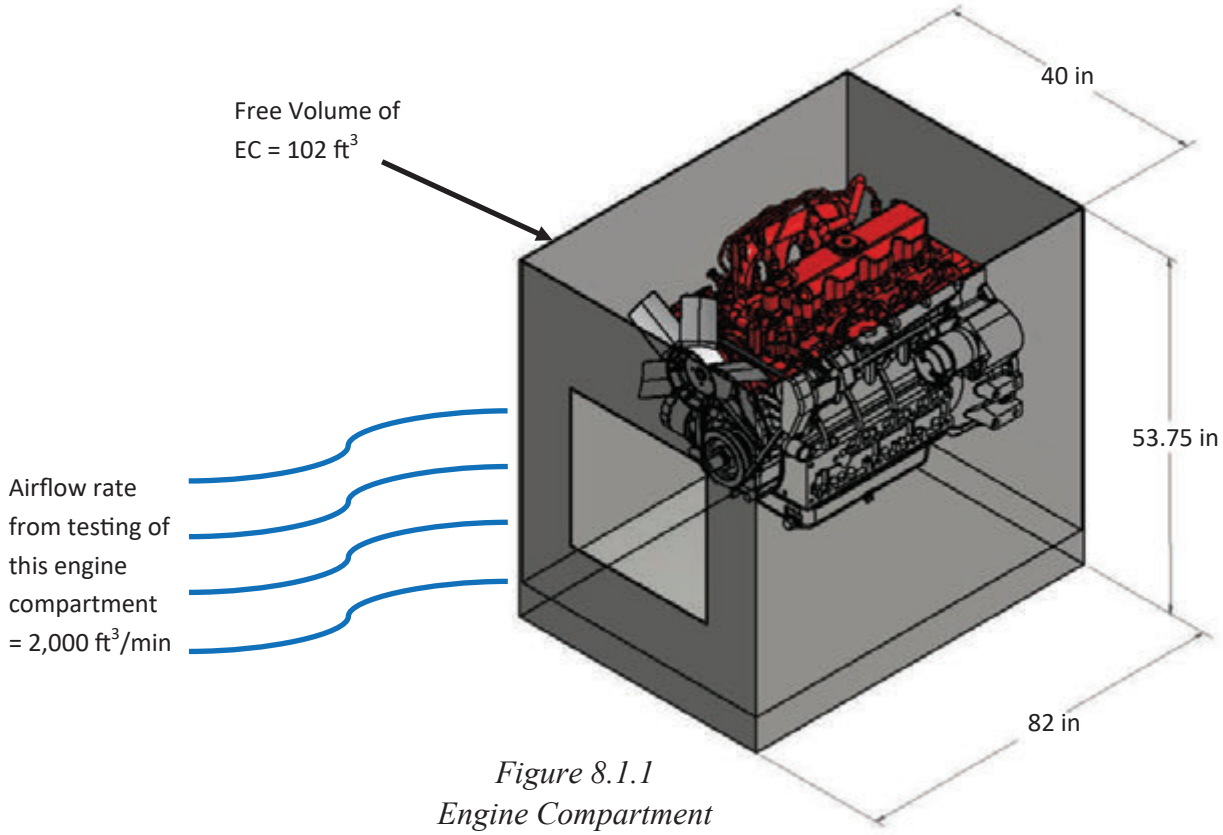


Figure 8.1.1
Engine Compartment

Sample Calculation

Scaling Example 1 (Metric Units):

Consider the following:

Customer A has a bus with a rear engine compartment (EC) that needs an ABC Agent fire suppression system. Use values from Table 8.1 for SVR, DVR, & DDM. The free volume of the new engine compartment is measured as 2.88 m^3. The airflow rate is measured as 56.63 m^3/min. Calculate the static design quantity (SDQ), dynamic design rate (DDR), & the agent quantity (AQ). The larger value of the two (SDQ) vs (AQ) is the limiting factor for design.

Known: *SVR = 3.556098 kg/m^3 (ABC)*

DVR = 0.07788 kg/m^3

DDM = 7.5 s = 0.125 min

SDQ = Free Volume x SVR = (2.88 m^3) x (3.556098 kg/m^3) = 10.24 kg

DDR = Airflow Rate x DVR = (56.63 m^3/min) x (0.07788 kg/m^3) = 4.410 kg/min

AQ = DDM x DDR = (0.125 min) x (4.410 kg/min) = 0.551 kg

Now, compare values for SDQ vs AQ; the higher value will be the design minimum.

Therefore, the agent weight required would be a minimum of 10.24 kg.

For this example, the appropriate Agent Cylinder size would be a V25 or larger.

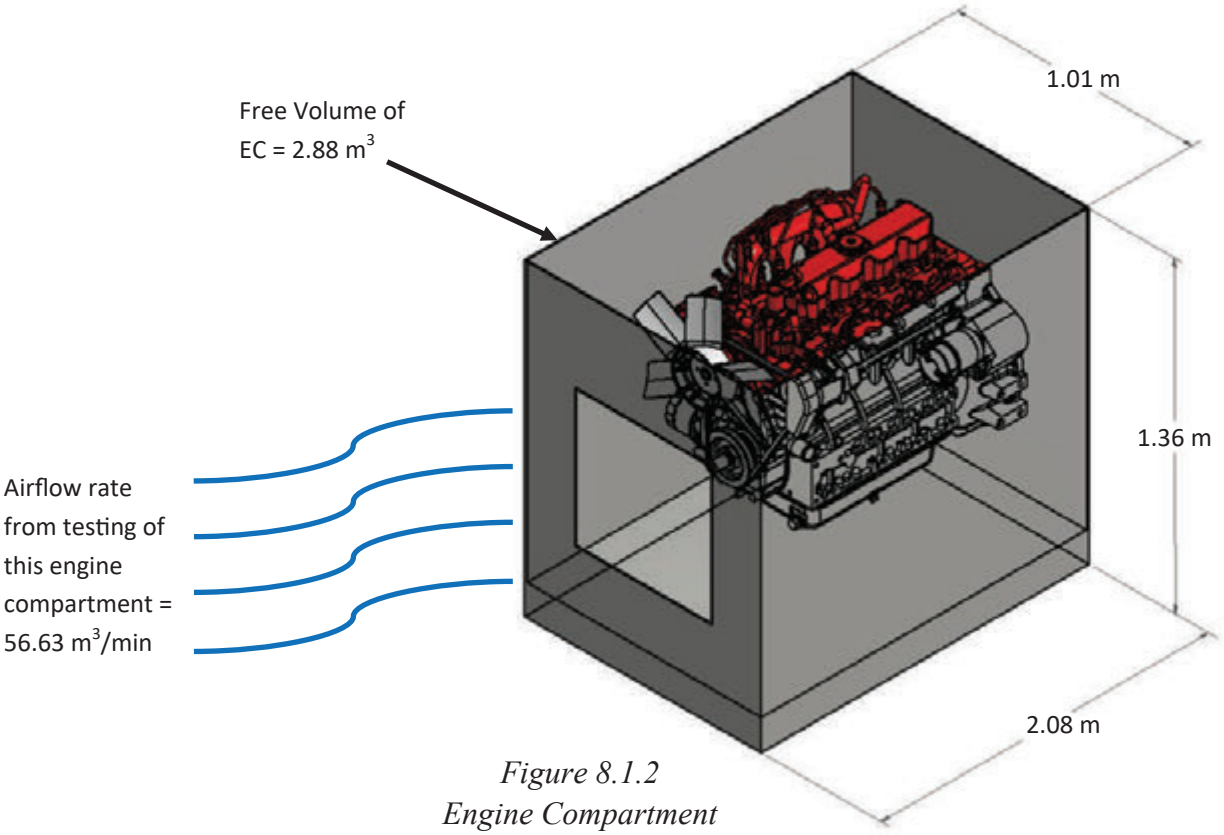


Figure 8.1.2
Engine Compartment

Appendix B: HDME-2 Open Engine Compartment

- Open engine compartments contain more than 25% unclose-able openings.
- Local Application Coverage
- Area of coverage: up to 27.5 in x 27.5 in (69.8 cm x 69.8 cm) MAX giving a total area of 756 in^2 (4,877 cm^2). Area of Coverage is defined as the maximum area (length times width) that one nozzle can cover when located at the maximum range.
- Range: up to 48 in (122 cm) MAX. Range is defined as the maximum distance away from the hazard that one nozzle can be located to cover the maximum area.
- *See Appendix F for Range vs Spray Diameter*

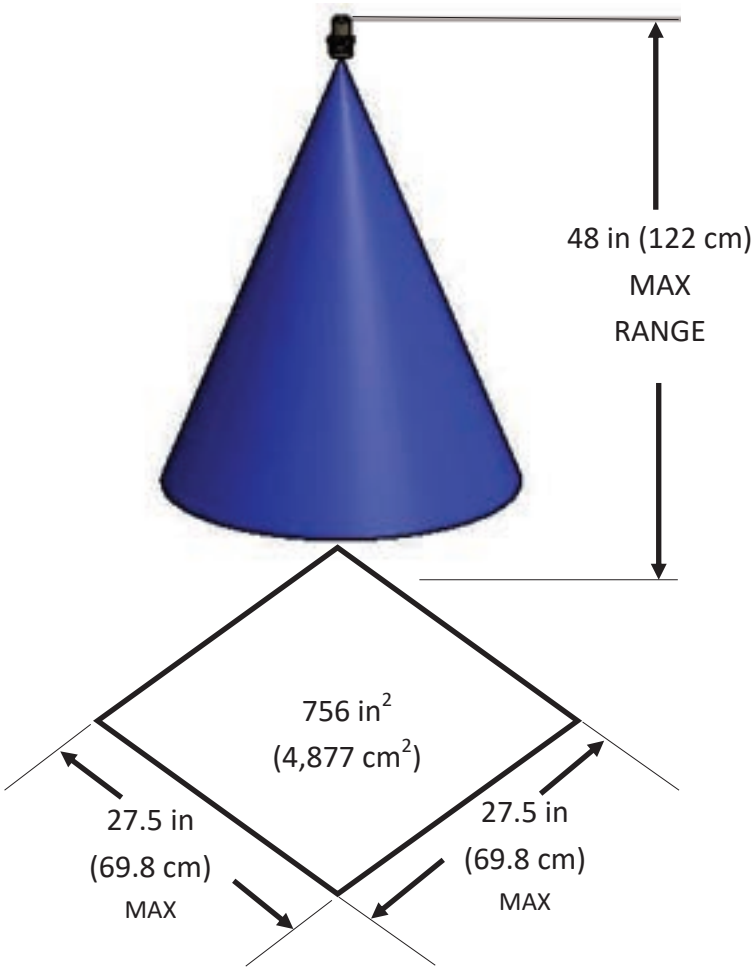


Figure 8.2

Coverage Type	Area of Coverage	Nozzle Range & aim
Local Application (Area)	27.5 in x 27.5 in area (69.8 cm x 69.8 cm)	48 in (122 cm) MAX aimed at center of hazard

Table 8.2

Appendix C: HDME-4 Machinery Spaces

- Machinery Spaces with 5% or less uncloseable openings
- Total Flooding Coverage
- Examples include: electrical cabinets, switchgear rooms, flammable and combustible liquid storage, ring gear, slip rings, and etc.
- Single nozzle covers a volume up to 244 ft^3 (6.9 m^3) via total flooding
- Nozzle height can be increased up to 62.5 in (158.7 cm) MAX
- *Testing was conducted with three room air changes per minute and without.*

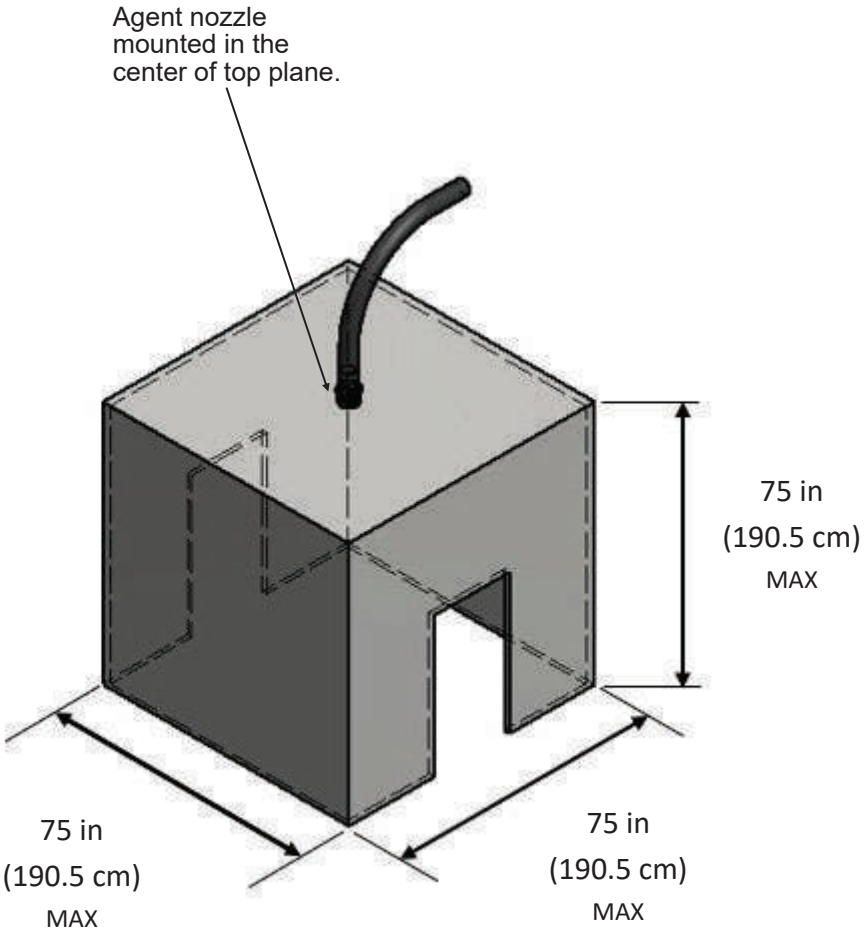


Figure 8.3
Volumetric Coverage

Coverage Type	Rated Protection (max)	Nozzle Placement	Nozzle Height (max)
Total Flooding (Volumetric)	244 ft^3 (6.9 m^3)	Center of top plane.	62.5 in (158.7 cm)

Table 8.3

Appendix D: HDME-7 Hydraulic/Propulsion /Brake Systems

- Examples include: drive motors, differentials, transmissions, brake systems, hydraulic pumps, and control valves
- Local Application Coverage
- Area of coverage: up to 27.5 in x 27.5 in (69.8 cm x 69.8 cm) MAX giving a total area of 756 in^2 (4,877 cm^2). Area of Coverage is defined as the maximum area (length times width) that one nozzle can cover when located at the maximum range.
- Range: up to 48 in (122 cm) MAX. Range is defined as the maximum distance away from the hazard that one nozzle can be located to cover the maximum area.
- *See Appendix F for Range vs Spray Diameter*

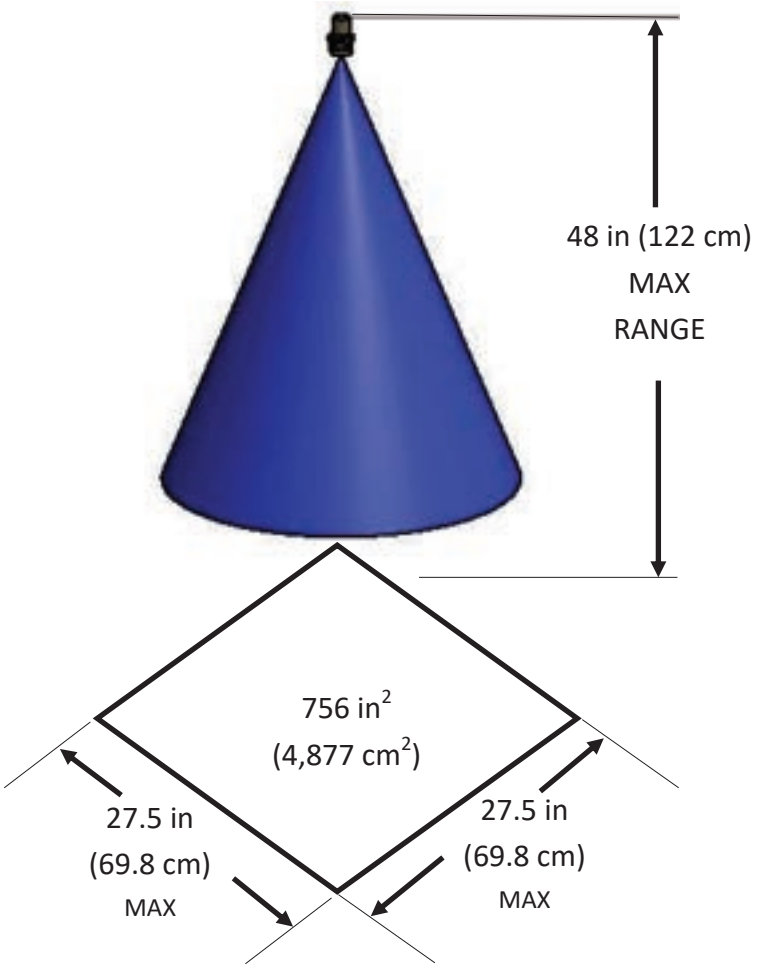


Figure 8.4

Coverage Type	Area of Coverage	Nozzle Range & aim
Local Application (Area)	27.5 in x 27.5 in area (69.8 cm x 69.8 cm)	48 in (122 cm) MAX aimed at center of hazard

Table 8.4

Appendix E: HDME-8 Class A Materials

- ABC Dry Chem only used on Class A hazards such as cloth, paper, wood, plastic, rubber, etc.
- Local Application Coverage
- Area of coverage: up to 19 in x 19 in (48.2 cm x 48.2 cm) MAX giving a total area of 361 in^2 (2,329 cm^2). Area of Coverage is defined as the maximum area (length times width) that one nozzle can cover when located at the maximum range.
- Range: up to 48 in (122 cm) MAX. Range is defined as the maximum distance away from the hazard that one nozzle can be located to cover the maximum area.
- *See Appendix F for Range vs Spray Diameter*

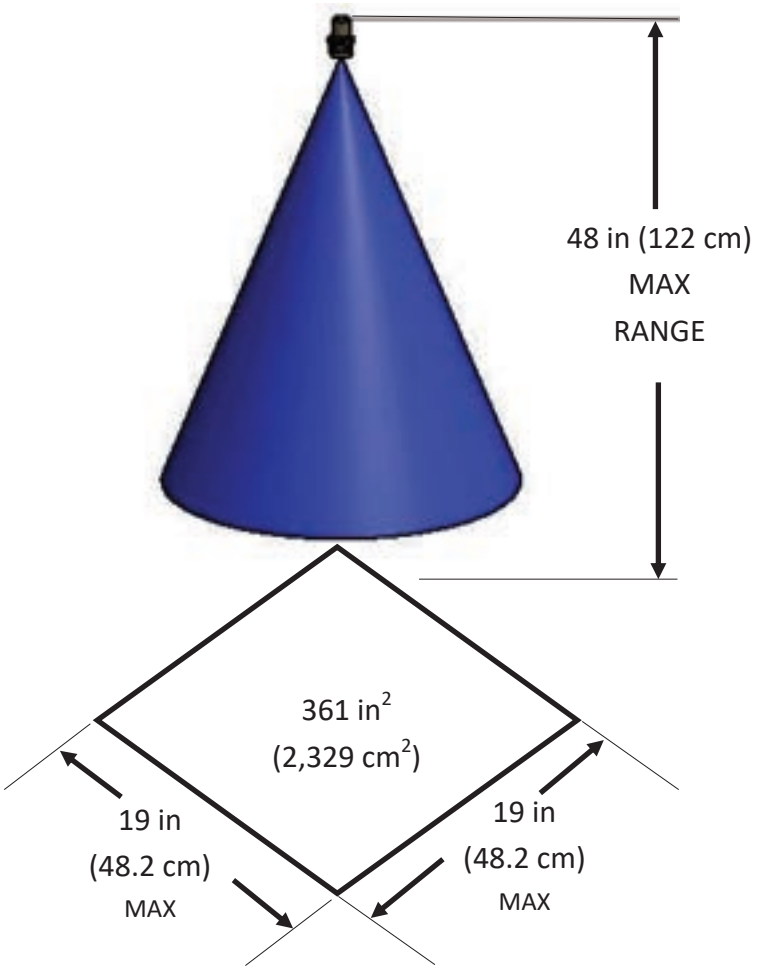


Figure 8.5

Coverage Type	Area of Coverage	Nozzle Range & aim
Local Application (Area)	19 in x 19 in area (48.2 cm x 48.2 cm)	48 in (122 cm) MAX aimed at center of hazard

Table 8.5

Appendix F: Nozzle Distance vs Spray Diameter (ABC/PK)

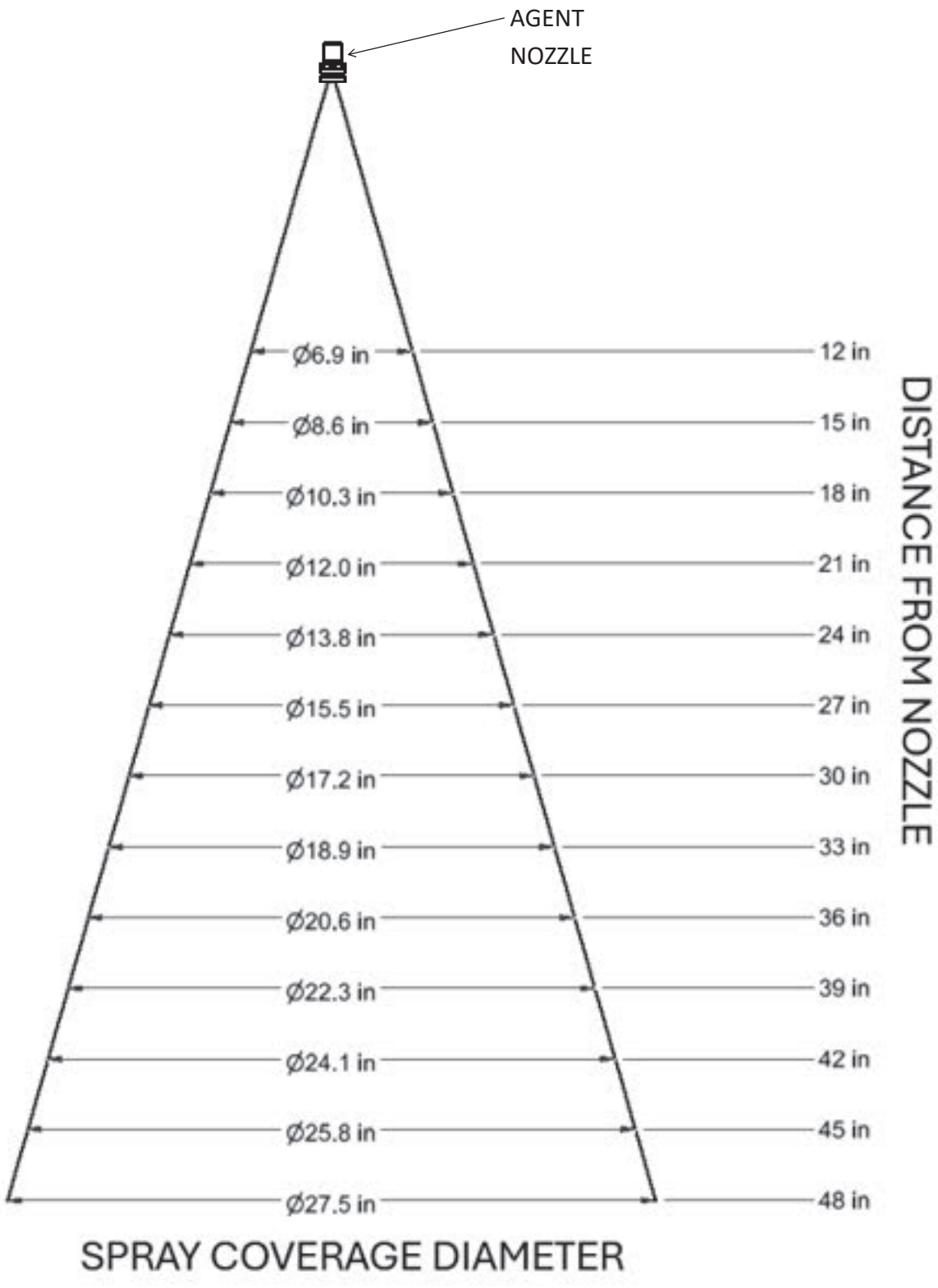


Figure 8.6
Single Nozzle Range vs Area Of Coverage

Appendix G: Agent Cylinder Charge Pressure vs Temperature (English Units)

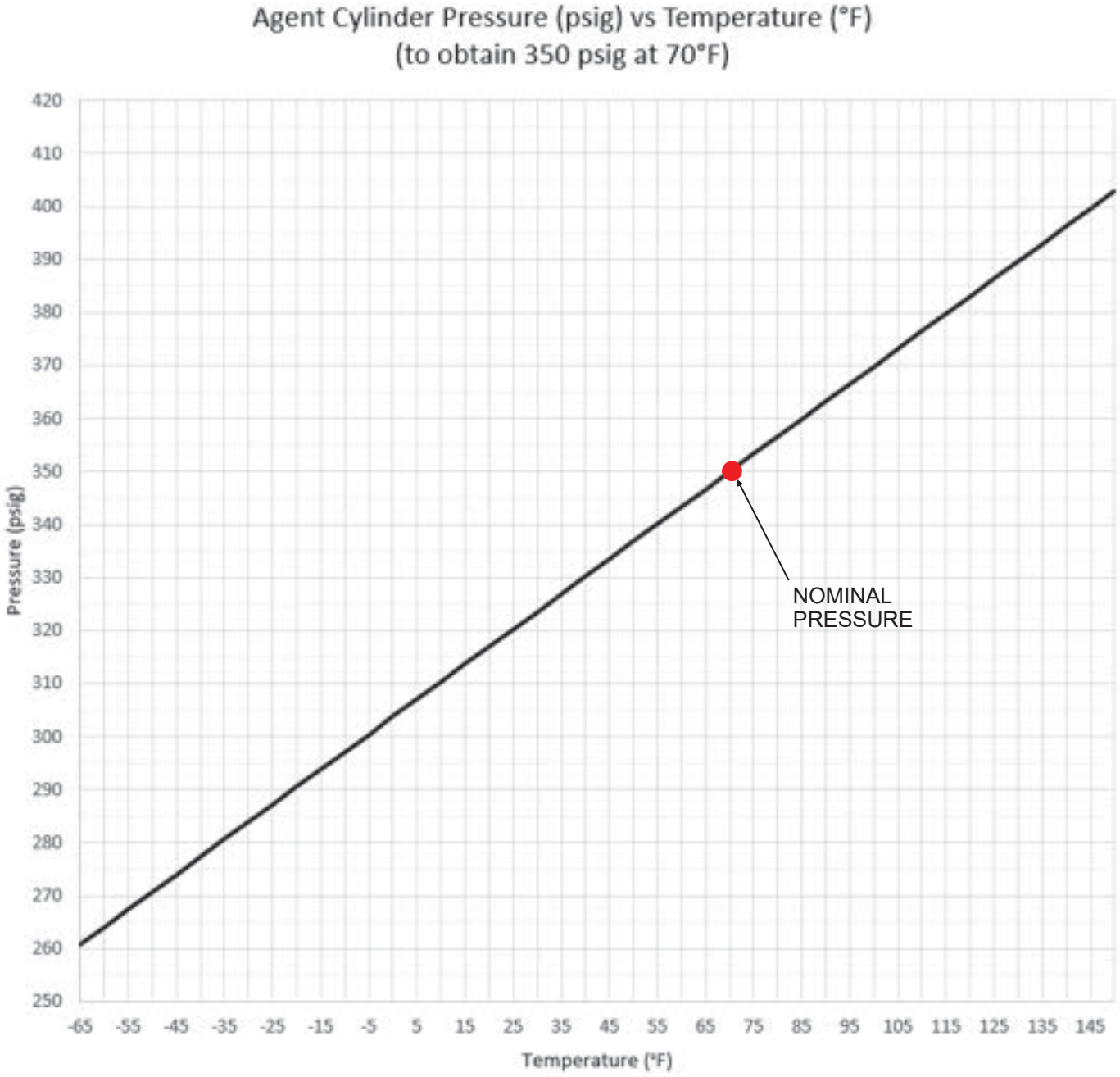


Figure 8.7.1
Pressure (psig) vs Temperature (°F)
for Agent Cylinder
English Units

Appendix G cont'd. (Metric Units)

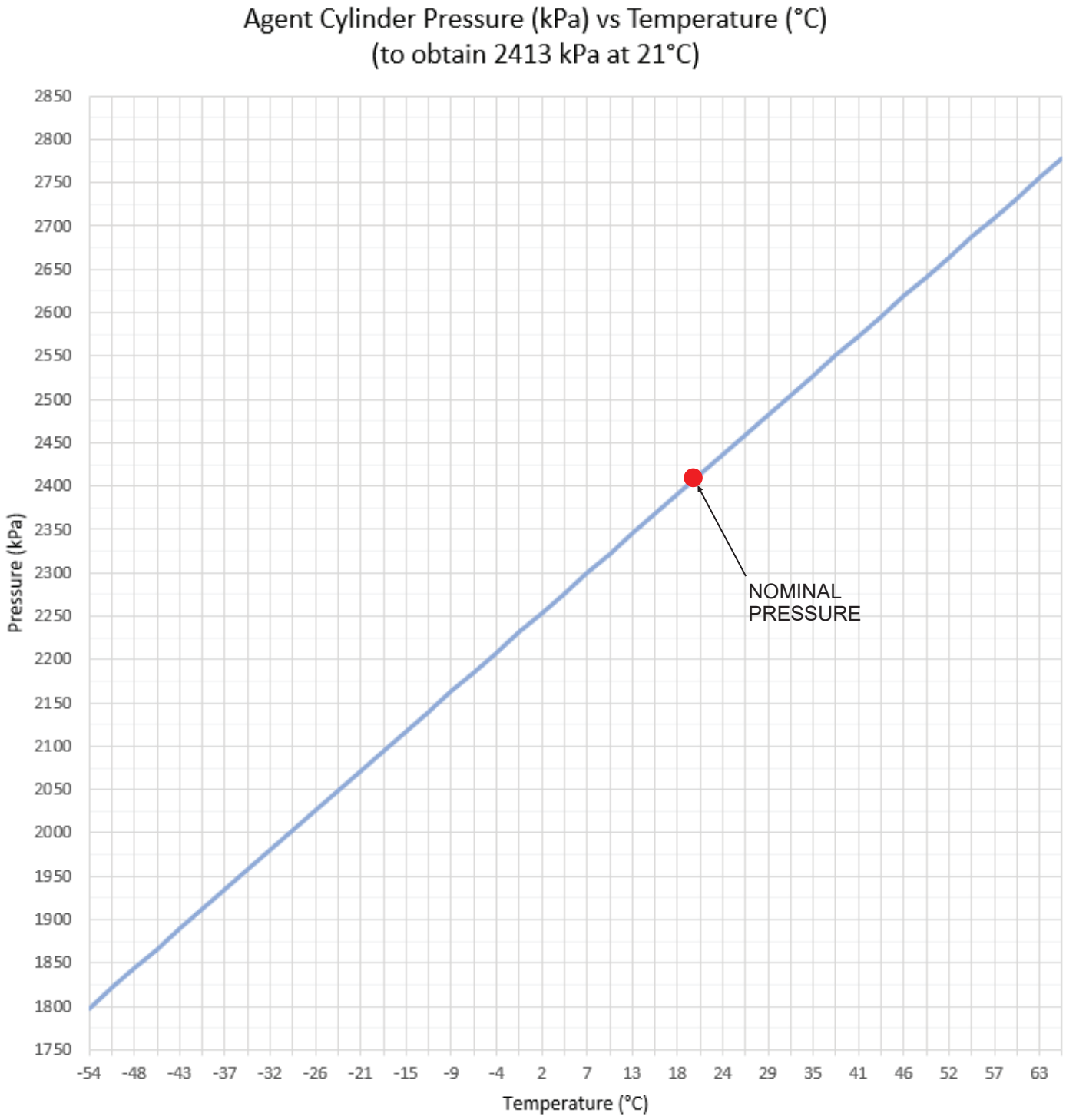


Figure 8.7.2
Pressure (kPa) vs Temperature (°C)
for Agent Cylinder
Metric Units

Appendix G cont'd.

Table 8.7.1 →
English Units

Dry Chem (ABC, PK) Standard Pressure of 350 psi	
Temperature (°F)	**Pressure (psig)**
-65	260.8
-60	264.1
-55	267.4
-50	270.7
-45	274.0
-40	277.3
-35	280.6
-30	283.9
-25	287.2
-20	290.5
-15	293.8
-10	297.1
-5	300.4
0	303.7
5	307.0
10	310.4
15	313.7
20	317.0
25	320.3
30	323.6
35	326.9
40	330.2
45	333.5
50	336.8
55	340.1
60	343.4
65	346.7
70	350.0
75	353.3
80	356.6
85	359.9
90	363.2
95	366.5
100	369.8
105	373.1
110	376.4
115	379.7
120	383.0
125	386.3
130	389.6
135	393.0
140	396.3
145	399.6
150	402.9

Table 8.7.2 →
Metric Units

Dry Chem (ABC, PK) Standard Pressure of 2413 kPa	
Temperature (°C)	***Pressure (kPa)***
-53.9	*1798.1*
-51.1	*1820.9*
-48.3	*1843.7*
-45.6	*1866.4*
-42.8	*1889.2*
-40.0	*1912.0*
-37.2	*1934.8*
-34.4	*1957.6*
-31.7	*1980.3*
-28.9	*2003.1*
-26.1	*2025.9*
-23.3	*2048.7*
-20.6	*2071.5*
-17.8	*2094.2*
-15.0	*2117.0*
-12.2	*2139.8*
-9.4	*2162.6*
-6.7	*2185.4*
-3.9	*2208.1*
-1.1	*2230.9*
1.7	*2253.7*
4.4	*2276.5*
7.2	*2299.3*
10.0	*2322.0*
12.8	*2344.8*
15.6	*2367.6*
18.3	*2390.4*
21.1	*2413.2*
23.9	*2435.9*
26.7	*2458.7*
29.4	*2481.5*
32.2	*2504.3*
35.0	*2527.1*
37.8	*2549.8*
40.6	*2572.6*
43.3	*2595.4*
46.1	*2618.2*
48.9	*2641.0*
51.7	*2663.7*
54.4	*2686.5*
57.2	*2709.3*
60.0	*2732.1*
62.8	*2754.9*
65.6	*2777.6*

Appendix H: Nitrogen Cartridge Charge Pressure vs Temperature (English Units)

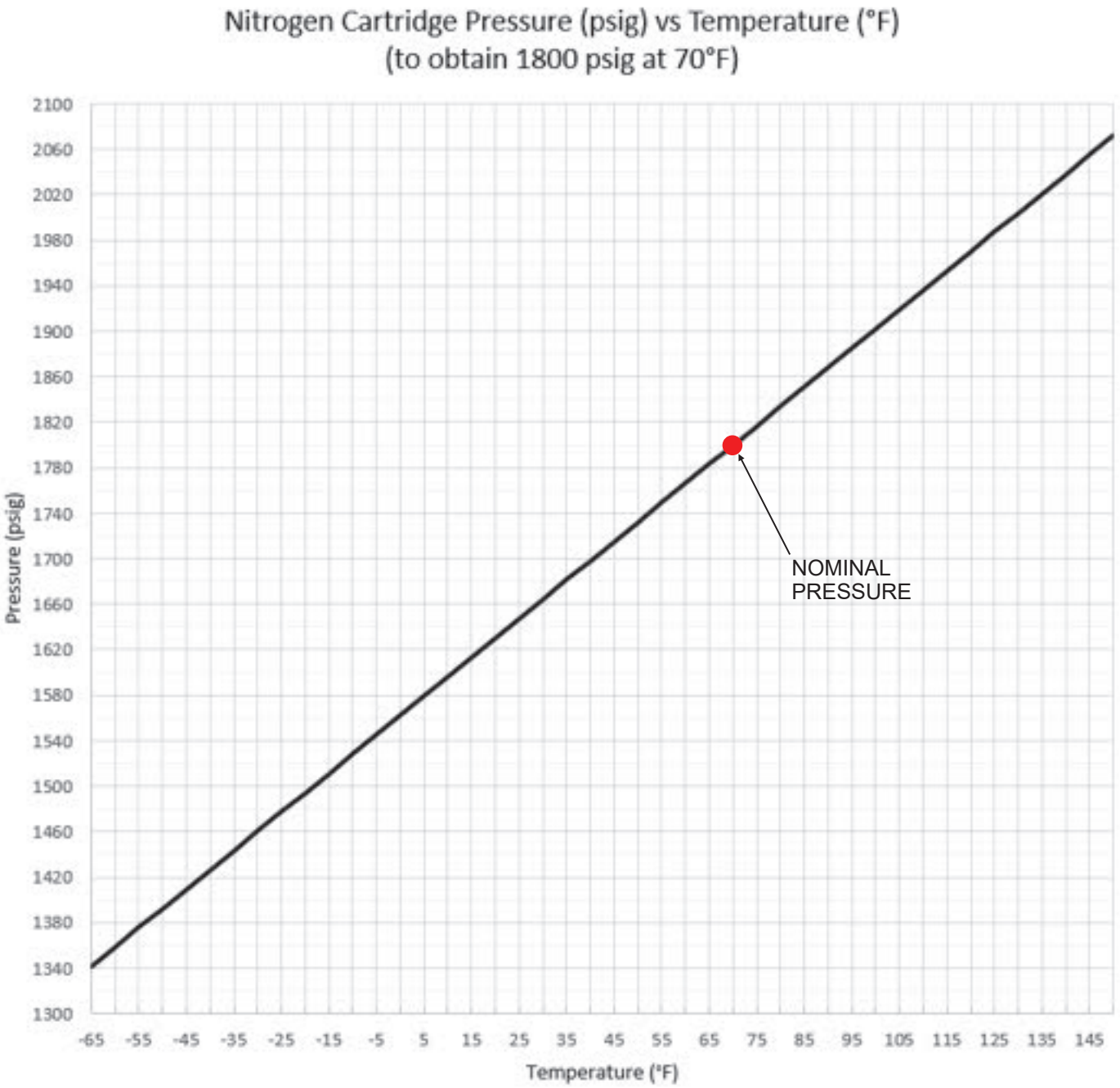


Figure 8.8.1
Pressure (psig) vs Temperature (°F)
for Nitrogen Cartridge
English Units

Appendix H cont'd. (Metric Units)

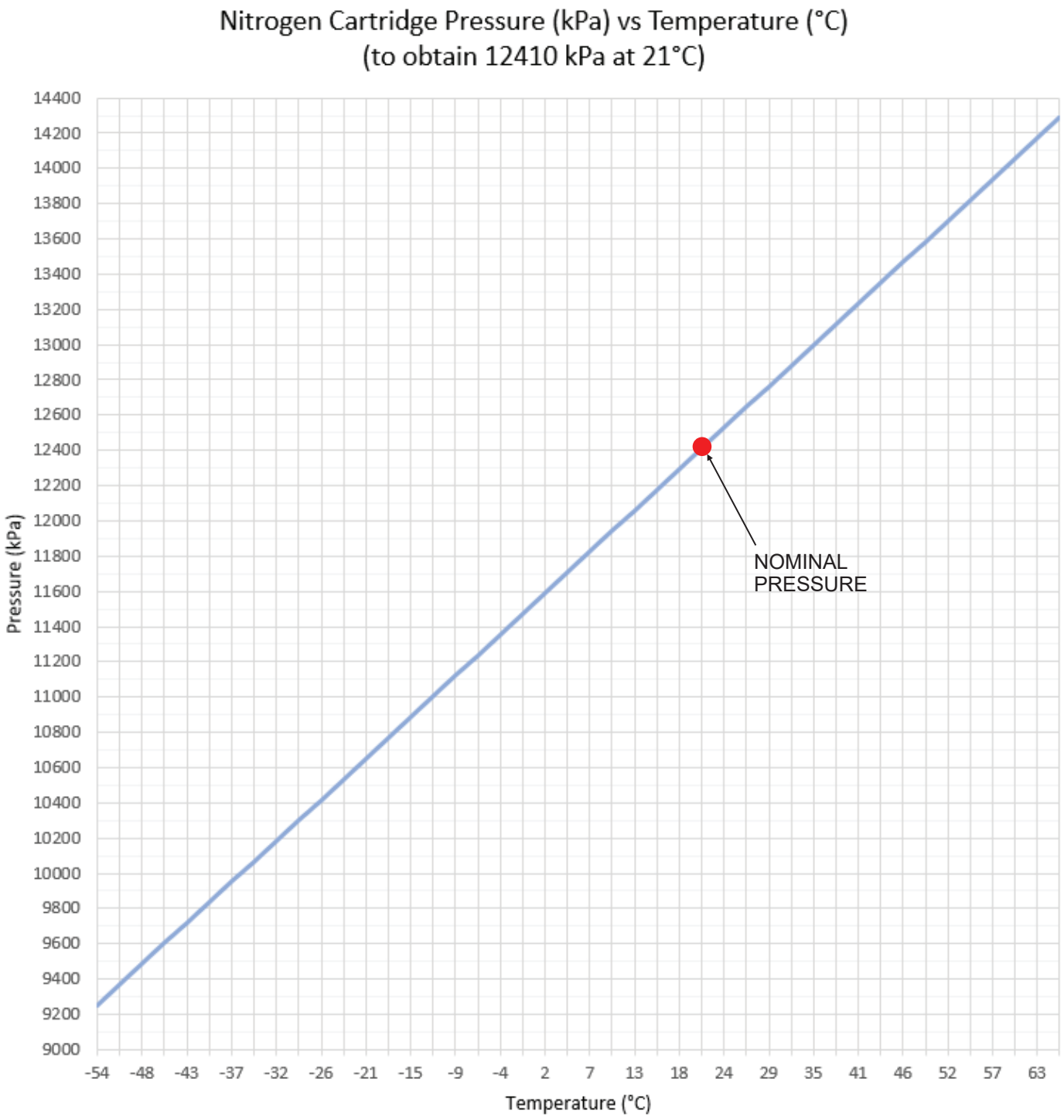


Figure 8.8.2
Pressure (kPa) vs Temperature (°C)
for Nitrogen Cartridge
Metric Units

Appendix H cont'd.

Table 8.8.1 →
English Units

Nitrogen Cartridge Standard Pressure of 1800 psi	
Temperature (°F)	**Pressure (psig)**
-65	1341.2
-60	1358.2
-55	1375.2
-50	1392.2
-45	1409.2
-40	1426.2
-35	1443.2
-30	1460.2
-25	1477.2
-20	1494.1
-15	1511.1
-10	1528.1
-5	1545.1
0	1562.1
5	1579.1
10	1596.1
15	1613.1
20	1630.1
25	1647.1
30	1664.1
35	1681.1
40	1698.0
45	1715.0
50	1732.0
55	1749.0
60	1766.0
65	1783.0
70	1800.0
75	1817.0
80	1834.0
85	1851.0
90	1868.0
95	1885.0
100	1902.0
105	1918.9
110	1935.9
115	1952.9
120	1969.9
125	1986.9
130	2003.9
135	2020.9
140	2037.9
145	2054.9
150	2071.9

Table 8.8.2 →
Metric Units

Nitrogen Cartridge Standard Pressure of 12410 kPa	
Temperature (°C)	***Pressure (kPa)***
-53.9	*9247.4*
-51.1	*9364.6*
-48.3	*9481.7*
-45.6	*9598.9*
-42.8	*9716.0*
-40.0	*9833.2*
-37.2	*9950.3*
-34.4	*10067.5*
-31.7	*10184.6*
-28.9	*10301.8*
-26.1	*10418.9*
-23.3	*10536.1*
-20.6	*10653.3*
-17.8	*10770.4*
-15.0	*10887.6*
-12.2	*11004.7*
-9.4	*11121.9*
-6.7	*11239.0*
-3.9	*11356.2*
-1.1	*11473.3*
1.7	*11590.5*
4.4	*11707.6*
7.2	*11824.8*
10.0	*11941.9*
12.8	*12059.1*
15.6	*12176.3*
18.3	*12293.4*
21.1	*12410.6*
23.9	*12527.7*
26.7	*12644.9*
29.4	*12762.0*
32.2	*12879.2*
35.0	*12996.3*
37.8	*13113.5*
40.6	*13230.6*
43.3	*13347.8*
46.1	*13464.9*
48.9	*13582.1*
51.7	*13699.3*
54.4	*13816.4*
57.2	*13933.6*
60.0	*14050.7*
62.8	*14167.9*
65.6	*14285.0*

Appendix I: Safety Data Sheets (ABC)

Quality is Behind the Diamond

SAFETY DATA SHEET

Section 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name:	ABC Dry Chemical Fire Extinguishant
Other Identifiers:	Multi-purpose Dry Chemical
Product Code(s):	CH555, F13, F11
Model Code(s) of Extinguishers:	402, IS 18ABC, IS35ABC, IS 45ABC, 13ABC, V25ABC, VH25ABC, V30ABC, VH30ABC, V50ABC, VS50ABC, VS75ABC, V250ABC
Recommended Use:	Fire suppression, not for human or animal drug use.
Manufacturer:	AMEREX CORPORATION
Internet Address:	www.amerex-fire.com
Address:	7595 Gadsden Highway, P.O. Box 81 Trussville, AL 35173-0081
Company Telephone:	(205) 655-3271
E-mail Address:	customer.service@amerex-fire.com
Emergency Contacts:	Chemtrec 1(800) 424-9300 or (703) 527–3887
Revised:	June 16, 2021; Revision A

Section 2. HAZARDS IDENTIFICATION

GHS – Classification

Health	Environmental	Physical
Acute Toxicity: Category 5	None	None
Skin Corrosion/Irritation: Category 3	None	None
Skin Sensitization: NO	None	None
Eye: Category 2A	None	Warning
STOT – Category 3	None	Warning
Carcinogen: Category None	None	None

GHS – Label Symbol(s):





If Pressurized: Gas Under Pressure

GHS – Words(s): **Warning**

Other Hazards Not Resulting in Classification: Mica may contain small quantities of quartz (crystalline silica). Prolonged exposure to respirable crystalline silica dust at concentrations exceeding the occupational exposure limits may increase the risk of developing a disabling

Appendix I: Safety Data Sheet (ABC) Con't.

lung disease known as silicosis. IARC found limited evidence for pulmonary carcinogenicity of crystalline silica in humans. In the case of normal use of this product, exposure to silica should be nil.

The attapulgite clay used in this product has a fiber length of less than 5um; therefore, the clay is not considered to be carcinogenic in animals or humans.

GHS – Hazard Phrases

GHS Hazard	GHS Codes(s)	Code Phrase(s)
Physical	H229	*- Contents under pressure; may explode if heated.
Health	H303	May be harmful if swallowed
	315	Causes skin irritation
	319	Causes serious eye irritation
	335	May cause respiratory irritation
Environmental	None	
Precautionary:		
General	P101	If medical advice is needed, have product container or label at hand
Prevention	P251	Do not pierce or burn, even after use.
	261	Avoid breathing dust/fumes/gas/mist/vapours/spray.
	264	Wash exposed skin thoroughly after handling.
	280	Wear protective gloves/protective clothing/eye protection/face protection.
Response	P312	Call a doctor if you feel unwell.
	321	Specific treatment (see Section 4. First Aid Measures)
	362	Take off contaminated clothing.
	302+352	IF ON SKIN: Wash with plenty of water.
	304+340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
	305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.
	332+313	If skin irritation occurs: Get medical advice/attention.
	342+311	If experiencing respiratory symptoms: Call a doctor.
	337+313	If eye irritation persists get medical advice/attention.
Storage	P410 +403	*- Protect from sunlight. Store in well-ventilated place.
Disposal	P501	Dispose of contents through a licensed disposal company. Contaminated container should be disposed of as unused product.

*- If under pressure

Section 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	EC No.	REACH Reg. No.	CAS-No.	Weight %	Classification
Mono-ammonium phosphate	231-764-5	01-2119488166-29	7722-76-1	80-98	NA
Attapulgite clay	601-805-5	Not Available	12174-11-7	3-16	NA
Mica-potassium aluminum silicate	310-1276	Not Available	12001-26-2	1-2	NA
Silicone oil methyl hydrogen polysiloxane	613-152-3	Not Available	63148-57-2	<1	NA
Calcium carbonate	207-439-9	Not Available	1317-65-3	<1	NA
Amorphous silica precipitated synthetic zeolite	231-545-4	01-2119379499-16-0036	7631-86-9	<1	NA
Yellow 14 pigment – di-azo dye	226-789-3	Not Available	5468-75-7	<1	NA

Emergency overview: Light yellow, fine solid powder, odorless.
Adverse health effects and symptoms: Mild irritant to the respiratory system. Irritant to eyes, and skin. Symptoms may include coughing,

Appendix I: Safety Data Sheet (ABC) Con't.

shortness of breath, and irritation of the lungs, eyes, and skin. Ingestion, although unlikely, may cause cramps, nausea and diarrhea.

Section 4. FIRST AID MEASURES

Eye Exposure:	May cause irritation. Irrigate eyes with water and repeat until pain free. Seek medical attention if irritation develops, or if vision changes occur.
Skin Exposure:	May cause skin irritation. In case of contact, wash with plenty of soap and water. Seek medical attention if irritation persists.
Inhalation:	May cause irritation, along with coughing. If respiratory irritation or distress occurs remove victim to fresh air. Seek medical attention if irritation persists.
Ingestion:	Overdose symptoms may include numbness or tingling in hands or feet, uneven heart rate, paralysis, feeling faint, chest pain or heavy feeling, pain spreading to the arm or shoulder, nausea, diarrhea, sweating, general ill feeling, or seizure (convulsions). If victim is conscious and alert, give 2-3 glasses of water to drink. If conscious, do not induce vomiting. Seek immediate medical attention. Do not leave victim unattended. To prevent aspiration of swallowed product, lay victim on side with head lower than waist.
Medical conditions possibly aggravated by exposure:	Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema, or bronchitis. Skin contact may aggravate existing skin disease. Chronic overexposure may cause pneumoconiosis ("dusty lung" disease).

Section 5. FIRE-FIGHTING MEASURES

Flammable Properties:	Not flammable
Flash Point:	Not determined
Suitable Extinguishing Media:	Non-combustible. Use extinguishing media suitable for surrounding conditions.
Hazardous Combustion Products:	Carbon oxides

Appendix I: Safety Data Sheet (ABC) Con't.

Explosion Data:	
Sensitivity to Mechanical Impact:	Not sensitive
Sensitivity to Static Discharge:	Not sensitive
Unusual fire/explosion hazards:	In a fire this material may decompose, releasing oxides of carbon, potassium and nitrogen (see Section 10).
Protective Equipment and Precautions for Firefighters:	As in any fire, wear self-contained breathing apparatus pressure-demand. NIOSH (approved or equivalent) and full protective gear.

Section 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:	Avoid contact with skin, eyes, and clothing.
Personal Protective Equipment:	Minimum - safety glasses, gloves, and a dust respirator.
Emergency Procedures:	NA
Methods for Containment:	Prevent further leakage or spillage if safe to do so.
Methods for Clean Up:	Avoid dust formation; clean up released material using vacuum or wet sweep and shovel to minimize generation of dust. Bag and transfer to properly labeled containers. Ventilate area and wash spill site after material pickup is complete.
Other:	If product is contaminated, use PPE and containment appropriate to the nature of the most toxic chemical/material in the mixture.

Section 7. HANDLING AND STORAGE

Personal Precautions:	Use appropriate PPE when handling or maintaining equipment, and wash thoroughly after handling (see Section 8).
Conditions for Safe Storage:	Keep product in original container or extinguisher. Contents may be under pressure – inspect for extinguisher rust periodically to ensure container integrity.
Incompatible Products:	Do not mix with other extinguishing agents, particularly potassium bicarbonate and sodium bicarbonate. Incompatible with strong oxidizing agents and strong acids. Do not store in high humidity. Do not combine with chlorine compounds.

Appendix I: Safety Data Sheet (ABC) Con't.

Section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical Name	OSHA PEL	ACGIH TLV	DFG MAK *	EU BLV
Mono-ammonium phosphate	PNOC** Total dust, 15 mg/m³ Respirable fraction, 5 mg/m³	PNOC Total dust, 10 mg/m³ Respirable fraction, 3 mg/m³	PNOC Total dust, 4 mg/m³ Respirable fraction, 1.5 mg/m³	NA
Mica	6 mg/m³	3 mg/m3	------	NA
Attapulgite clay	PNOC** Total dust, 15 mg/m³ Respirable fraction, 5 mg/m³	PNOC Total dust, 10 mg/m³ Respirable fraction, 3 mg/m³	PNOC Total dust, 4 mg/m³ Respirable fraction, 1.5 mg/m³	
Silicone oil	NR**	NR		
Calcium carbonate	PNOC Total dust, 15 mg/m³ Respirable fraction, 5 mg/m³	PNOC Total dust, 10 mg/m³ Respirable fraction, 3 mg/m³	------	NA
Amorphous silica	20mppcf 80 mg/m³ or % SiO_2	10 mg/m³	4 mg/m³	NA
Yellow 14 pigment	NR	NR	NR	NA

*German regulatory limits **PNOC = Particulates not otherwise classified (ACGIH) also known as Particulates not otherwise regulated (OSHA) *** NR = Not Regulated. All values are 8 hour time weighted average concentrations.

Engineering Controls:

Showers
Eyewash stations
Ventilation systems

Personal Protective Equipment – PPE Code E:

The need for respiratory protection is not probable during short-term exposure. During production, the manufacturer should use judgement concerning the need for PPE.






Eye/Face Protection: Tightly fitting safety goggles
Skin and Body Protection: Wear protective gloves/coveralls
Respiratory Protection: If exposure limits are exceeded or irritation is experienced, NIOSH approved respiratory protection should be worn. Use P100 respirators for limited exposure. Use air-purifying respirator (APR) with high efficiency particulate air (HEPA) filters for prolonged

Appendix I: Safety Data Sheet (ABC) Con't.

	exposure. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations. The need for respiratory protection is not likely for short-term use in well ventilated areas.
Hygiene Measures:	Good personal hygiene practices essential, such as avoiding food, tobacco products, or other hand-to-mouth contact when handling. Wash thoroughly after handling.

Section 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Light yellow powder, finely divided odorless solid
Molecular Weight:	$NH_4H_2PO_4$: 115.03
Odor:	Odorless
Odor Threshold:	No information available
Decomposition Temperature °C:	100 - 120
Freezing Point °C:	No information available
Initial Boiling Point °C:	No information available
Physical State:	Crystalline Powder
pH:	Approximately 4.4 to 4.9
Flash Point °C:	None
Autoignition Temperature °C:	None
Boiling Point/Range °C:	No information available
Melting Point/Range °C:	$NH_4H_2PO_4$: 190
Flammability/Explosion Limits in Air °C:	Upper – None; Lower-None
Explosive Properties:	None
Oxidizing Properties:	None
Volatile Component (%vol)	Not applicable
Evaporation Rate:	No information available
Vapor Density:	No information available
Vapor Pressure:	$NH_4H_2PO_4$: 1.41 mm/Hg
Specific gravity at 25 °C:	$NH_4H_2PO_4$: 1.80
Solubility:	40.4 g/100 ml
Partition Coefficient:	$NH_4H_2PO_4$ Est: -4.11
Viscosity:	No information available

NOTE: $NH_4H_2PO_4$ – Monoammonium Phosphate

Appendix I: Safety Data Sheet (ABC) Con't.

Section 10. STABILITY AND REACTIVITY

Stability:	Stable under recommended storage and handling conditions.
Incompatibles:	Strong oxidizing agents; Strong acids; sodium hypochlorite and chlorine compounds. Protect from moisture
Conditions to Avoid:	Storage or handling near incompatibles.
Hazardous Decomposition Products:	Carbon, nitrogen, and potassium oxides. Heat of fire may release carbon monoxide.
Possibility of Hazardous Reactions:	None
Hazardous Polymerization	Does not occur

Section 11. TOXICOLOGICAL INFORMATION

Likely Routes of Exposure:	Inhalation, skin and eye contact.
Symptoms:	
Inhalation:	Irritation, coughing.
Eyes:	Irritation.
Skin:	Irritation.
Acute Toxicity:	Relatively non-toxic.
Chronic Toxicity:	
Short-term Exposure:	None known.
Long-term Exposure:	As with all dusts, pneumoconiosis, or "dusty lung" disease, may result from chronic exposure.

Acute Toxicity Values - Health

Chemical Name	LD50		LC50 (Inhalation)
	Oral	Dermal	
Mono-ammonium phosphate	5750 mg/kg (rat)	>7940 mg/kg (rabbit)	Not available
Mica	None	None	None
Attapulgite clay	None	None	None
Silicone oil	None	None	None
Calcium carbonate	6450 mg/kg (rat)	500 mg/24 hr (rabbit)	Not available
Amorphous silica	>5000 mg/kg (rat)	>2000 mg/kg (rabbit)	>2.2 mg/L (rat)
Yellow 14 pigment	>17000 mg/kg (rat)	>3000 mg/kg (rat)	>4448 mg/m3 (rat)

Reproductive Toxicity:	This product's ingredients are not known to have reproductive or teratogenic effects.
Target Organs and Effects (TOST):	Respiratory system (mild irritant). This product is a mild irritant to epithelial tissue, (eyes, mucous membranes, skin) and may aggravate dermatitis. No information was found indicating the product causes sensitization.

Appendix I: Safety Data Sheet (ABC) Con't.

Other Toxicity Categories

Chemical Name	Germ Cell Mutagenicity	Carcino-genicity	Repro-ductive	TOST Single Exp	TOST Repeated Exp	Aspiration
Mono-ammonium phosphate	None	None	None	Cat 3	None	None
Attapulgite clay	None	None	None	None	None	None
Mica	None	None	None	None	None	None
Silicone oil	None	None	None	None	None	None
Calcium carbonate	None	None	None	None	None	None
Amorphous silica	None	None	None	None	None	None
Yellow 14 pigment	None	None	None	None	None	None

Section 12. ECOLOGICAL INFORMATION

Ecotoxicity:	Negative effects unknown. Provides nutrient nitrogen and phosphorus to plant life.
Persistence/Degradability:	Degrades rapidly in humid/wet environment.
Probability of rapid biodegradation:	$NH_4H_2PO_4$ Est: 0.693 (Rapid); $(NH_4)_2SO_4$: Est: 0.684 (Rapid)
Anaerobic biodegradation probability:	$NH_4H_2PO_4$ Est: 0.398 (Slow); $(NH_4)_2SO_4$: Est: 0.398 (Slow)
Bioaccummulation potential:	Low.
Bioconcentration factor:	$NH_4H_2PO_4$: 3.16 L/kg (wet weight) (Low BCF)
Bioaccummulation factor:	$NH_4H_2PO_4$: 63.04 L/kg (wet weight)
Mobility in soil:	Slow evaporation rate; water soluble, may leach to groundwater
Log Koc:	$NH_4H_2PO_4$ Est: -1.25
Log Koa:	$NH_4H_2PO_4$ Est: 16.72
Log Kaw:	$NH_4H_2PO_4$ Est: -20.86

NOTE: $NH_4H_2PO_4$ – Mono-ammonium Phosphate

Other Adverse Ecological Effects: No other known effects at this time

Aquatic Toxicity Values – Environment – Research

Chemical Name	Acute (LC50)	Chronic (LC50)
Mono-ammonium phosphate	N/A	N/A
Mica	N/A	N/A
Attapulgite clay	N/A	N/A
Silicone oil	N/A	N/A
Calcium carbonate	N/A	N/A
Amorphous silica	N/A	N/A
Yellow 14 pigment	N/A	N/A

Appendix I: Safety Data Sheet (ABC) Con't.

Aquatic Toxicity Values – Environment – Estimates

Chemical Name	Acute (LC50)	EC50
Mono-ammonium phosphate	2.91e+07 mg/L Fish 96 hr; 9.4e+06 mg/l Daphnid 48 hr;	6.70e+05 mg/L Gr. Algae 96 hr
Mica	N/A	N/A
Attapulgite clay	N/A	N/A
Silicone oil	N/A	N/A
Calcium carbonate	N/A	N/A
Amorphous silica	N/A	N/A
Yellow 14 pigment	N/A	N/A

Section 13. DISPOSAL CONSIDERATIONS

Safe Handling	Use appropriate PPE when handling, and wash thoroughly after handling (see Section 8).
Waste Disposal Considerations	Dispose in accordance with federal, state, and local regulations.
Contaminated Packaging	Dispose in accordance with federal, state, and local regulations.

NOTES:
This product is not a RCRA characteristically hazardous or listed hazardous waste. Dispose of according to state or local laws, which may be more restrictive than federal laws or regulations. Used product may be altered or contaminated, creating different disposal considerations.

Section 14. TRANSPORT INFORMATION

UN Number:	NA
UN Proper Shipping Name:	NA
Transport Hazard Class:	NA
Packing Group:	NA
Marine Pollutant?:	NO

See current applicable transport regulation (Dot - Ground, IATA - Air, IMDG - Maritime) prior to shipping.

NOTES:
This product is not defined as a hazardous material under U.S. Department of Transportation (DOT) 49 CFR 172, or by Transport Canada "Transportation of Dangerous Goods" regulations.

Special Precautions for Shipping:
The transportation information above covers the ABC 555 dry chemical extinguisher agent as shipped in bulk containers and not when contained in fire extinguishers or fire extinguisher systems. If shipped in a stored pressure-type fire extinguisher, and pressurized with a non-flammable, non-toxic

Appendix I: Safety Data Sheet (ABC) Con't.

inert expellant gas, the fire extinguisher is considered a hazardous material by the US Department of Transportation and Transport Canada. The proper shipping name shall be FIRE EXTINGUISHER and the UN designation is UN 1044. The DOT hazard class/division is LIMITED QUANTITY when pressurized to less than 241 psig and when shipped via highway or rail. UN Class 2.2. Non-Flammable Gas, when shipping via air. Packing Group – N/A

Section 15. REGULATORY INFORMATION

International Inventory Status: All ingredients are on the following inventories

Country(ies)	Agency	Status
United States of America	TSCA	Yes
Canada	DSL	Yes
Europe	EINECS/ELINCS	Yes
Australia	AICS	Yes
Japan	MITI	Yes
South Korea	KECL	Yes

REACH Title XVII Restrictions: No information available

Chemical Name	Dangerous Substances	Organic Solvents	Harmful Substances Whose Names Are to be Indicated on Label	Pollution Release and Transfer Registry (Class II)	Pollution Release and Transfer Registry (Class I)	Poison and Deleterious Substances Control Law
Monoammonium Phosphate	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Component	ISHA – Harmful Substances Prohibited for Manufacturing, Importing, Transferring, or Supplying	ISHA – Harmful Substances Requiring Permission	Toxic Chemical Classification Listing (TCCL) – Toxic Chemicals	Toxic Release Inventory (TRI) – Group I	Toxic Release Inventory (TRI) – Group II
Monoammonium Phosphate 7722-76-1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Attapulgite clay 12174-11-7 (>3)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Mica-potassium aluminum silicate 120001-26-2 (>2)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Calcium carbonate 471-34-1	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Amorphous silica 69012-64-2	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Yellow 14 pigment 5468-75-7	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Appendix I: Safety Data Sheet (ABC) Con't.

European Risk and Safety phrases:

EU Classification:	Xn - Irritant	
R Phrases:	20	Harmful by inhalation.
	36/37/38	Irritating to eyes, respiratory system and skin.
S Phrases:	22	Do not breath dust.
	24/25	Avoid contact with skin and eyes
	26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	36	Wear suitable protective clothing.

U.S. Federal Regulatory Information:

SARA 313:
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) - This product does not contain and chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.
None of the chemicals in this product are under SARA reporting requirements or have SARA threshold planning quantities (TPQs) or CERCLA reportable quantities (RQs), or are regulated under TSCA 8(d).

SARA 311/312 Hazard Categories:

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
*-Sudden Release of Pressure Hazard	Yes
Reactive Hazard	No

* - Only applicable if material is in a pressurized extinguisher.

Clean Water/Clean Air Acts:
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42) or Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61) and Section 112 of the Clean Air Act Amendments of 1990.

U.S. State Regulatory Information:

Chemicals in this product are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: None
California – Permissible Exposure Limits for Chemical Contaminants: None
Florida – Substance List: Mica Dust
Illinois – Toxic Substance List: None
Kansas – Section 302/303 List: None
Massachusetts – Substance List: Mica Dust

Appendix I: Safety Data Sheet (ABC) Con't.

Minnesota – List of Hazardous Substances: None
Missouri – Employer Information/Toxic Substance List: None
New Jersey – Right to Know Hazardous Substance List: None
North Dakota – List of Hazardous Chemicals, Reportable Quantities: None
Pennsylvania – Hazardous Substance List: None
Rhode Island – Hazardous Substance List: Mica Dust
Texas – Hazardous Substance List: No
West Virginia – Hazardous Substance List: None
Wisconsin – Toxic and Hazardous Substances: None

California Proposition 65: No component is listed on the California Proposition 65 list.

Other:

Mexico – Grade	No component listed
Canada – WHMIS Hazard Class	No component listed

Section 16. OTHER INFORMATION

This SDS conforms to requirements under U.S., U.K., Canadian, Australian, and EU regulations or standards, and conforms to the proposed 2003 ANSI Z400.1 format.

Issuing Date	17-June-2012
Revision Date	16-June-2021; Revision A
Revision Notes	None

The information herein is given in good faith but no warranty, expressed or implied, is made. Updated by Cason Tyree.

Appendix J: Safety Data Sheets (Purple K)

Quality is Behind the Diamond

SAFETY DATA SHEET

Section 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name:	Purple K Dry Chemical Fire Extinguisher
Other Identifiers:	Potassium Bicarbonate, KDC, PK
Product Code(s):	CH 515, 517, 542, 553
Model Code(s) for Extinguishers:	410, 413, 415, 416, 452,460, 466, 469, 472, 478, 479, 483, 486, 490, 493, 497, 566, 569, 575, 580, 584,591, 595, 599, 652, 688, 689, 690, 691, 693, 716, 717, 718, 722, 759, 762, 764, 783, 793, 794, 795, 796, A413, V10PK, V13PK, V25PK, VH25PK,V50PK, VS50PK
Recommended Use:	Fire suppression, agriculture, medical Not for human or animal drug use.
Manufacturer:	AMEREX CORPORATION
Internet Address:	www.amerex-fire.com
Address:	7595 Gadsden Highway, P.O. Box 81 Trussville, AL 35173-0081
Company Telephone:	(205) 655-3271
E-mail Address:	customer.service@amerex-fire.com
Emergency Contacts:	Chemtrec 1(800) 424-9300 or (703) 527–3887
Revised:	February 14, 2023; Revision N

Section 2. HAZARDS IDENTIFICATION

GHS – Classification

Health	Environmental	Physical
Acute Toxicity: Category 5	None	None
Skin Corrosion/Irritation: Category 2	None	Warning
Skin Sensitization: NO	None	None
Eye Irritation: Category 2A	None	Warning
STOT – Category 3	None	Warning
Carcinogen: Category None	None	None

GHS – Label Symbol(s):



If Pressurized: Gas Under Pressure



GHS – Signal Word(s): **Danger**

Appendix J: Safety Data Sheet (Purple K) Con't.

Other Hazards Not Resulting in Classification: Mica may contain small quantities of quartz (crystalline silica). Prolonged exposure to respirable crystalline silica dust at concentrations exceeding the occupational exposure limits may increase the risk of developing a disabling lung disease known as silicosis. IARC found limited evidence for pulmonary carcinogenicity of crystalline silica in humans. In the case of normal use of this product, exposure to silica should be nil.

The attapulgite clay used in this product is not considered to be carcinogenic to animals or humans.

GHS – Hazard Phrases

GHS Hazard	GHS Codes	Code Phrases
Physical	H229	*- Contents under pressure; may explode if heated.
Health	H303	May be harmful if swallowed.
	313	May be harmful in contact with skin.
	315	Causes skin irritation.
	319	Causes serious eye irritation.
	333	May be harmful if inhaled.
	335	May cause respiratory irritation.
Environmental	None	
Precautionary:		
General	P101	If medical advice is needed, have product container or label at hand.
Prevention	P251	Do not pierce or burn, even after use.
	261	Avoid breathing dust/fumes/gas/mist/vapours/spray.
	264	Wash exposed skin thoroughly after handling.
	270	Do not eat, drink or smoke when using this product.
	271	Use Only outdoors or in a well-ventilated area.
	280	Wear protective gloves/protective clothing/eye protection/face protection.
Response	P312	Call a doctor if you feel unwell.
	321	Specific treatment (see Section 4. First Aid Measures).
	302+352	IF ON SKIN: Wash with plenty of water.
	304+340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
	305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing.
	332+313	If skin irritation occurs: Get medical advice/attention.
	342+311	If experiencing respiratory symptoms: Call a doctor.
	337+313	If eye irritation persists get medical advice/attention.
	362	If exposed or concerned, get medical advice/attention.
Storage	P403+233	Store in a well-ventilated place. Keep container tightly closed.
	405	Store locked up.
	410+403	*- Protect from sunlight. Store in well-ventilated place.
Disposal	P501	Dispose of contents through a licensed disposal company. Contaminated container should be disposed of as unused product.

*- If under pressure

Section 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	EC No.	REACH Reg. No.	CAS-No.	Weight %
Potassium Bicarbonate (potassium hydrogen carbonate)-may contain minor calcium carbonate	206-059-0	01-2119532640-48-0002	298-14-6	>35
Calcium Carbonate	215-279-6	Not Available	1317-65-3	>40
Attapulgite clay	601-805-5	Not Available	12174-11-7	>4
Mica-potassium aluminum silicate	NA	Not Available	12001-26-2	>2
Silicone oil methyl hydrogen polysiloxane	NA	Not Available	63148-57-2	<0.5
Violet 23 pigment oxazine dye	228-767-9	Not Available	6358-30-1	<0.2

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Adverse health effects and symptoms:	A mild irritant to the respiratory system, eyes, and skin. Symptoms may include coughing, shortness of breath, and irritation of the lungs, eyes, and skin. Ingestion, although unlikely, may cause gastric distress.

Section 4. FIRST AID MEASURES

Eye Exposure:	Causes irritation. Can cause damage. Irrigate eyes with water and repeat until pain free. Seek medical attention if irritation continues, or if vision changes occur.
Skin Exposure:	May cause skin irritation. In case of contact, wash with plenty of soap and water. Seek medical attention if irritation persists.
Inhalation:	May cause irritation, along with coughing. If respiratory irritation or distress occurs remove victim to fresh air. Seek medical attention if irritation persists.
Ingestion:	Overdose symptoms may include numbness or tingling in hands or feet, uneven heart rate, paralysis, feeling faint, chest pain or heavy feeling, pain spreading to the arm or shoulder, nausea, sweating, general ill feeling, or seizure (convulsions). If victim is conscious and alert, give 2-3 glasses of water to drink. If conscious, do not induce vomiting. Seek immediate medical attention. Do not leave victim unattended. To prevent aspiration of swallowed product, lay victim on side with head lower than waist.
Medical conditions possibly aggravated by exposure:	Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema, or bronchitis. Skin contact may aggravate existing skin disease. Chronic overexposure may cause pneumoconiosis ("dusty lung" disease).

Section 5. FIRE-FIGHTING MEASURES

Flammable Properties:	Not flammable
Flash Point:	Not determined

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Suitable Extinguishing Media:	Non-combustible. Use extinguishing media suitable for surrounding conditions.
Hazardous Combustion Products:	Calcium and Carbon oxides
Explosion Data:	
Sensitivity to Mechanical Impact:	Not sensitive
Sensitivity to Static Discharge:	Not sensitive
Unusual fire/explosion hazards:	In a fire this material may decompose, releasing oxides of carbon and calcium, potassium and nitrogen, and CO2. Ignites when in contact with fluorine. (see Section 10).
Protective Equipment and Precautions for Firefighters:	As in any fire, wear self-contained breathing apparatus (pressure-demand, NIOSH approved or equivalent), and full protective gear.

Section 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:	Avoid contact with skin, eyes, and clothing.
Personal Protective Equipment:	Minimum - safety glasses, gloves, and a dust respirator.
Emergency Procedures:	NA
Methods for Containment:	Prevent further leakage or spillage if safe to do so.
Methods for Clean Up:	Avoid dust formation; clean up released material using vacuum or wet sweep and shovel to minimize generation of dust. Bag and transfer to properly labeled containers. Ventilate area and wash spill site after material pickup is complete.
Other:	If product is contaminated, use PPE and containment appropriate to the nature of the most toxic chemical or material in the mixture.

Section 7. HANDLING AND STORAGE

Personal Precautions:	Use appropriate PPE when handling or maintaining equipment, and wash thoroughly after handling (see Section 8).
Conditions for Safe Storage/Handling:	Keep product in original container or extinguisher. Prevent falling. Do not allow near heat sources. Contents may be under pressure – inspect extinguisher consistent with product labeling to ensure container integrity.

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Incompatible Products:	Do not mix with other extinguishing agents, particularly ammonium phosphate. Incompatible with strong oxidizing agents, acids, aluminum, ammonium salts, fluorine and magnesium. Do not store in high humidity.
Hazardous Decomposition Products:	Gaseous CO2 and calcium oxide.
Hazardous Polymerization:	Will not occur

Section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical Name	OSHA PEL	ACGIH TLV	DFG MAK *	EU BLV
Potassium Bicarbonate (potassium hydrogen carbonate)-may contain minor calcium carbonate	PNOC** Total dust, 15 mg/m³ Respirable fraction, 5 mg/m³	PNOC** Total dust, 10 mg/m³ Respirable fraction, 3 mg/m³	PNOC** Total dust, 4 mg/m³ Respirable fraction,1.5 mg/m³	NA
Attapulgite clay	PNOC** Total dust, 15 mg/m³ 50 ug/m³ Silica	PNOC** Total dust, 15 mg/m³ 25 ug/m³ Silica	PNOC** Total dust, 4 mg/m³ Respirable fraction,1.5 mg/m³	NA
Calcium Carbonate	PNOC** Total dust, 15 mg/m³ Respirable fraction, 5 mg/m³	PNOC** Total dust, 10 mg/m³	NR***	NA
Mica- potassium aluminum silicate	PNOC** Total dust, 15 mg/m³ Respirable fraction, 50 ug/m³ Silica	PNOC** Total dust, 10 mg/m³ Respirable fraction, 25 ug/m³ Silica	PNOC** Total dust, 4 mg/m³ Respirable fraction, 1.5 mg/m³	NA
Silicone oil methyl hydrogen polysiloxane	NR***	NR***	NR***	NA
Violet 23 pigment oxazine dye	NR***	NR***	NR***	NA

*German regulatory limits **PNOC = Particulates not otherwise classified (ACGIH) also known as Particulates not otherwise regulated (OSHA) *** NR = Not Regulated. All values are 8 hour time weighted average concentrations.

Engineering Controls:

Showers
Eyewash stations
Ventilation systems

Personal Protective Equipment – PPE Code E:

The need for respiratory protection is not probable during short-term exposure. PPE use during production process must be independently evaluated.






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Eye/Face Protection:	Tightly fitting safety goggles
Skin and Body Protection:	Wear protective gloves/coveralls
Respiratory Protection:	If exposure limits are exceeded or irritation is experienced, NIOSH approved respiratory protection should be worn. Use P100 respirators for limited exposure, use air-purifying respirator (APR) with high efficiency particulate air (HEPA) filters for prolonged exposure. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current safety and health requirements. The need for respiratory protection is not likely for short-term use in well ventilated areas.
Hygiene Measures:	Good personal hygiene practice is essential, such as avoiding food, tobacco products, or other hand-to-mouth contact when handling. Wash thoroughly after handling.

Section 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Light purple powder, odorless
Molecular Weight:	KHCO3: 100.11 g/mol; CaCO3: 100.09 g/mol
Odor:	KHCO3: No information available; CaCO3: None
Odor Threshold:	No information available
Decomposition Temperature °C:	KHCO3: 100 – 110; CaCO3: 825
Freezing Point °C:	No information available
Initial Boiling Point °C:	KHCO3: No information available; CaCO3: 2850
Physical State:	Crystalline Powder
pH:	KHCO3: Approximately 8.2; CaCO3: 8-9
Flash Point °C:	None
Autoignition Temperature °C:	None
Boiling Point/Range °C:	KHCO3: Not Applicable; CaCO3: 2850
Melting Point/Range °C:	KHCO3: 100 – 110; CaCO3: 825
Flammability:	Not Flammable
Flammability Limits in Air °C:	Upper – Not Flammable; Lower-Not Flammable
Explosive Properties:	KHCO3: None; CaCO3: If heated with a mixture of magnesium and hydrogen, a violent explosion can occur.
Oxidizing Properties:	KHCO3: None; CaCO3: No data available
Volatile Component (%vol)	Not Applicable
Evaporation Rate:	Not Applicable
MMHG @ 37.8 C:	Not Applicable
Vapor Density:	Not Applicable
Vapor Pressure 20 °C:	KHCO3: < 1 mm Hg; CaCO3: appr. 0 mm Hg

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Specific gravity:	KHCO3: Approximately 2.17; 0.88 in aerated condition CaCO3: 2.7
Solubility:	KHCO3: Product is coated, not immediately soluble in water; CaCO3: 0.013 g/L at 25° C
Partition Coefficient:	No Information Available
Viscosity:	Not Applicable.

Section 10. STABILITY AND REACTIVITY

Stability:	Stable under recommended storage and handling conditions.
Reactivity:	None
Incompatibles:	Strong oxidizing agents; Acids and acid salts; Ammonium phosphate, ammonium salts, lithium, aluminum, fluorine, magnesium. Protect from moisture
Conditions to Avoid:	Storage or handling near incompatibles.
Hazardous Decomposition Products:	Carbon, nitrogen, and potassium oxides, CO2. Heat of fire may release carbon monoxide.
Possibility of Hazardous Reactions:	KHCO3: None; CaCO3: ignites in contact with fluorine
Hazardous Polymerization:	Does not occur

Section 11. TOXICOLOGICAL INFORMATION

Likely Routes of Exposure:	Inhalation, skin and eye contact.
Symptoms:	
Immediate:	
Inhalation:	Irritation, coughing.
Eyes:	Irritation, perhaps severe.
Skin:	Irritation.
Delayed:	Symptoms appear to be relatively immediate
Acute Toxicity:	Relatively non-toxic.
Chronic Toxicity:	
Short-term Exposure:	None known.
Long-term Exposure:	As with all dusts, pneumoconiosis, or "dusty lung" disease, may result from chronic exposure.

Acute Toxicity Values – Health

Chemical Name	LD50		LC50 (Inhalation)
	Oral	Dermal	
Potassium bicarbonate	2825 mg/kg (rat)	>2000 mg/kg (rabbit)	4.96 mg/l (rat)
Mica	None	None	None
Calcium Carbonate	6450 mg/kg (rat)	500 mg/kg 24 hr (rabbit)	None
Attapulgite clay	None	None	None
Silicone oil	None	None	None
Violet 23 pigment	None	None	None

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Reproductive Toxicity:	This product's ingredients are not known to have reproductive or teratogenic effects.
Target Organs and Effects (TOST):	Respiratory system (mild irritant). This product is a mild irritant to epithelial tissue, (eyes, mucous membranes, skin) and may aggravate dermatitis. No information was found indicating the product causes sensitization.

Other Toxicity Categories

Chemical Name	Germ Cell Mutagenicity	Carcino-genicity	Repro-ductive	TOST Single Exp	TOST Repeated Exp	Aspiration
Potassium Bicarbonate12	None	None	None	Cat 3	None	None
Attapulgite clay	None	None	None	None	Kidney	None
Mica	None	None	None	None	None	None
Silicone oil	None	None	None	None	None	None
Violet 23 pigment oxazine dye	None	None	None	None	None	None

Section 12. ECOLOGICAL INFORMATION

Ecotoxicity:	Low risk.
Persistence/Degradability:	Degrades rapidly in humid/wet environment.
Probability of rapid biodegradation:	KHCO3 Est: 0.718 (Rapid); CaCO3: (Rapid)
Anaerobic biodegradation probability:	KHCO3 Est: 0.836 (Rapid); CaCO3: (Rapid)
Bioconcentration factor:	KHCO3: 3.16 L/kg; CaCO3: 3.162 L/kg
Bioaccummulation potential:	KHCO3: Low. Est biotransformation half-like 0.012 days CaCO3: Low. Est biotransformation half-like 0.004 days
Mobility in soil:	KHCO3: Log Koc: Est -2.062; CaCO3: Log Koc: Est -0.478
Log Koa:	Not applicable
Log Kaw:	Not applicable
Fraction sorbed to airborne particulates:	KHCO3: 0.886; CaCO3: 0.052
Atmospheric oxidation half-life:	KHCO3: 20.6 days; CaCO3: Not Applicable
Level III Fugacity Model:	KHCO3: 62% soil, 37% water, <0.1% sediment, air CaCO3: 93% soil, 37.69% water, <0.1% sediment air

NOTE: KHCO3 - Potassium bicarbonate; CaCO3 – Calcium carbonate

Other Adverse Ecological Effects:	No other known effects at this time.

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Aquatic Toxicity Values - Research

Chemical Name	Acute (LC50)	Chronic (LC50)
Potassium bicarbonate	Cat IV; 1300 mg/l (rainbow trout), 96 hr. 630 mg/l (water flea) 48 hr., mortality min. at 94 mg/l 260 mg/l (flathead minnow), mortality min. dose	N/A
Mica	N/A	N/A
Calcium carbonate	N/A	N/A
Attapulgite clay	N/A	N/A
Silicone oil	N/A	N/A
Violet 23 pigment	N/A	N/A

Aquatic Toxicity Values – Calculated Estimates

Chemical Name	Acute (LC50)	Chronic (LC50)
Potassium bicarbonate	8259 mg/l Fish 96 hr; 3737 mg/l Daphnid 48 hr;	1088 mg/l Gr. Algae 96 hr
Mica	N/A	N/A
Calcium carbonate	N/A	N/A
Attapulgite clay	N/A	N/A
Silicone oil	N/A	N/A
Violet 23 pigment	N/A	N/A

Section 13. DISPOSAL CONSIDERATIONS

Safe Handling	Use appropriate PPE when handling, and wash thoroughly after handling (see Section 8).
Waste Disposal Considerations	Dispose in accordance with federal, state, and local regulations.
Contaminated Packaging	Dispose in accordance with federal, state, and local regulations.

NOTES:
This product is not a RCRA characteristically hazardous or listed hazardous waste. Dispose of according to state or local laws, which may be more restrictive than federal laws or regulations. Used product may be altered or contaminated, creating different disposal considerations.

Section 14. TRANSPORT INFORMATION

UN Number:	NA
UN Proper Shipping Name:	NA
Transport Hazard Class:	NA
Packing Group:	NA
Marine Pollutant?:	NO

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See current applicable transport regulations (DOT - Ground, IATA – Air, IMDG – Maritime) prior to shipping.

NOTES:
This product is not defined as a hazardous material under U.S. Department of Transportation (DOT) 49 CFR 172, or by Transport Canada "Transportation of Dangerous Goods" regulations.

Special Precautions for Shipping:
The transportation information above covers the Purple K dry chemical extinguisher agent as shipped in bulk containers and not when contained in fire extinguishers or fire extinguisher systems. If shipped in a stored pressure-type fire extinguisher, and pressurized with a non-flammable, non-toxic inert expellant gas, the fire extinguisher is considered a hazardous material by the US Department of Transportation and Transport Canada. The proper shipping name shall be FIRE EXTINGUISHER and the UN designation is UN 1044. The DOT hazard class/division is LIMITED QUANTITY when pressurized to less than 241 psig and when shipped via highway or rail. UN Class 2.2. Non-Flammable Gas when shipping via air. Packing Group – N/A

Section 15. REGULATORY INFORMATION

International Inventory Status: All ingredients are on the following inventories

Country(ies)	Agency	Status
United States of America	TSCA	Yes
Canada	DSL	Yes
Europe	EINECS/ELINCS	Yes
Australia	AICS	Yes
Japan	MITI	Yes
South Korea	KECL	Yes

REACH Title VII Restrictions: No information available

Chemical Name	Dangerous Substances	Organic Solvents	Harmful Substances Whose Names Are to be Indicated on Label	Pollution Release and Transfer Registry (Class II)	Pollution Release and Transfer Registry (Class I)	Poison and Deleterious Substances Control Law
Potassium Bicarbonate	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Calcium Carbonate	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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Component	ISHA – Harmful Substances Prohibited for Manufacturing, Importing, Transferring, or Supplying	ISHA – Harmful Substances Requiring Permission	Toxic Chemical Classification Listing (TCCL) – Toxic Chemicals	Toxic Release Inventory (TRI) – Group I	Toxic Release Inventory (TRI) – Group II
Potassium Bicarbonate 298-14-6 (>35)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Attapulgite clay 298-14-6 (>4)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Mica-potassium aluminum silicate 120001-26-2 (>2)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Calcium Carbonate 1317-65-3 (>40)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Silicone oil methyl hydrogen polysiloxane 63148-57-2 (<0.5)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Violet 23 pigment oxazine dye 6358-30-1 (<0.2)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

European Risk and Safety phrases:

EU Classification:	Xi	Irritant
R Phrases:	20	Harmful by inhalation.
	36/37	Irritating to eyes, respiratory system.
	38	Irritating to skin.
	39	Danger of very serious irreversible effects.
	40	Limited evidence of carcinogenic effect.
	41	Risk of serious damage to eyes.
S Phrases:	22	Do not breath dust.
	24/25	Avoid contact with skin and eyes.
	26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	36/37/39	Wear suitable protective clothing, gloves and eye/face protection.

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U.S. Federal Regulatory Information:

SARA 313:
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) - This product does not contain and chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372. None of the chemicals in this product are under SARA reporting requirements or have SARA threshold planning quantities (TPQs) or CERCLA reportable quantities (RQs) or are regulated underTSCA 8(d).

SARA 311/312 Hazard Categories:

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard-*	Yes
Reactive Hazard	No

* - Only applicable if material is in a pressurized extinguisher.

Clean Water/Clean Air Acts:
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42) or Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61) and Section 112 of the Clean Air Act Amendments of 1990.

U.S. State Regulatory Information:

Chemicals in this product are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: None
California – Permissible Exposure Limits for Chemical Contaminants: None
Florida – Substance List: Mica Dust
Illinois – Toxic Substance List: None
Kansas – Section 302/303 List: None
Massachusetts – Substance List: Mica Dust
Minnesota – List of Hazardous Substances: None
Missouri – Employer Information/Toxic Substance List: None
New Jersey – Right to Know Hazardous Substance List: None
North Dakota – List of Hazardous Chemicals, Reportable Quantities: None
Pennsylvania – Hazardous Substance List: None

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Rhode Island – Hazardous Substance List: Mica Dust
Texas – Hazardous Substance List: None
West Virginia – Hazardous Substance List: None
Wisconsin – Toxic and Hazardous Substances: None

California Proposition 65: No component is listed on the California Proposition 65 list.

Other:

Mexico – Grade	No component listed
Canada – WHMIS Hazard Class	No component listed

Section 16. OTHER INFORMATION

This Information Sheet complies with the requirements of US, UK, Canadian, Australian and European regulations or standards, and conforms to the proposed format, ANSI Z400.1, 2003. No modification of this safety data sheet is permitted by AMEREX Corporation. Questions or comments should be directed to AMEREX Corporation (see section 1).

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