

004654

# LT-A-101-50/125/250 SYSTEMS

Installation, Recharge, Inspection, and Maintenance Manual





This manual is intended for use with the ANSUL® LT-A-101-50/125/250 Fire Suppression Systems.

Those who install, operate, recharge, inspect, or maintain these fire suppression systems should read this entire manual. Specific sections will be of particular interest depending upon one's responsibilities.

Fire suppression systems are mechanical devices. They need periodic care to provide maximum assurance that they will operate effectively and safely. Inspection frequency shall be performed monthly, or sooner, depending on operating and/or environmental conditions. Maintenance shall be performed semi-annually or sooner, depending on operating and/or environmental conditions.

This ANSUL systems manual is limited to uses herein described. For other applications, contact your local ANSUL distributor, Domestic District Manager, International Area Manager, or Ansul Incorporated – Technical Services Department, Marinette, Wisconsin 54143-2542.

**REVISION RECORD**

6-1-08

REV. 3

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## INTRODUCTION

- ▶ The ANSUL LT-A-101-50/125/250 fire suppression system is a pre-engineered, fixed nozzle system for protection of off-highway vehicles and equipment. The LT-A-101-50/125/250 agent storage tank sizes can be assembled in any combination, and/or in combination with any of the smaller tank sizes (i.e., 10 lb, 20 lb, 30 lb) to meet the fire suppression needs of the equipment to be protected. Each system application will need to be designed specifically for the equipment intended for protection. Typical applications include surface mining equipment, underground mining machines, forest harvesting equipment, land fill equipment, and construction equipment.

Three larger agent tank sizes are available: a 50 lb (22.7 kg) tank, a 125 lb (56.7 kg) tank and a 250 lb (113.4 kg) tank. The 50 lb (22.7 kg) tank can be used with 4, 6, or 8 nozzles. The 125 lb (56.7 kg) tank can be used with 8, 12, or 16 nozzles. The 250 lb (113.4 kg) tank can be used with 8, 12, 16, or 24 nozzles. All tanks can be used where an extended discharge is required.

- ▶ The LT-A-101-50/125/250 system consists of three major components: a container to store the dry chemical extinguisher agent; an actuation system operated manually or automatically, and an agent distribution system which delivers the agent from the tank through hydraulic hose and fixed nozzles to the hazard areas.

The system described is a fire suppression system and is not designed or intended to extinguish all fires, particularly when unusual amounts of combustible materials and an ample oxygen supply are present. It is extremely important that supplement fire fighting equipment be available in case the system does not totally extinguish a fire.

If an automatic fire detection and actuation system has not been supplied or has been disconnected, system actuation and discharge will not occur unless the fire suppression system is manually actuated. (Use of manual system only must be approved by authority having jurisdiction.) Reliance on a manual release system usually results in a slower reaction to fire. Means to automatically shut down the vehicle must be added to a manual or disconnected automatic system.

- ▶ The basic agent storage assembly is a tank that holds either 45 lb (20.4 kg) (LT-A-101-50), 112 lb (50.8 kg) (LT-A-101-125) or 225 lb (102.1 kg) (LT-A-101-250) of ANSUL FORAY (monoammonium phosphate base) dry chemical which is effective on Class A, B, and C fires. A nitrogen gas expellant cartridge provides pressurization of the dry chemical upon actuation.

- ▶ Automatic detection and actuation is recommended. The LT-A-101-50/125/250 system is actuated manually or automatically by a small cartridge operated actuator located near the operator or on the exterior of the vehicle.

The dry chemical extinguishing agent is delivered from the tank through hydraulic hose and pipe, to specifically designed nozzle locations. Nozzles discharge into the fire hazard areas or onto the fire prone surfaces.

Along with the fire suppression system, the total system design must include a hand portable fire extinguisher(s) located on board the vehicle that can be used to manually suppress a fire that may be burning in an unprotected area. Refer to NFPA 10, "Standard For Portable Fire Extinguisher," for additional information.

## TWIN AGENT SYSTEM

- ▶ The fire suppression system may consist of both dry chemical and liquid agent. The dry chemical portion of the system is the ANSUL A-101/LT-A-101, 50, 125, or 250 system and the liquid agent portion of the system consists of an agent storage tank containing a premixed solution of LVS wet chemical.

- ▶ The LVS Fire Suppression System is designed to operate within a temperature range of –40 °F to +120 °F (–40 °C to 49 °C) (not FM Approved).

The dry chemical system used in conjunction with the LVS system is the ANSUL A-101/LT-A-101, 50, 125, or 250. The dry chemical system is connected to the ANSUL CHECKFIRE Detection and Control System. The dry chemical system can be designed as a standard discharge or as an extended discharge system per the requirements of the A-101/LT-A-101 vehicle Fire suppression Installation, Recharge, Inspection, and Maintenance Manual.

- ▶ **Both systems are designed to discharge simultaneously when actuated either manually or automatically.**

- ▶ For detailed instructions, refer to manual Part No. 24327 regarding the A-101/LT-A-101 system. For detailed instructions, refer to manual Part No. 427109 regarding the LVS system.

## FM APPROVAL

- ▶ The ANSUL LT-A-101-50/125/250 fire suppression system has been tested and approved by FM Approvals. These tests require extinguishment of fire initiated in open vessels and within enclosures fueled with flammable liquid. In each case, these fires are allowed to progress to maximum intensity before the system is actuated. The time of actuation in these tests is well beyond the time that a detector would take to detect the fire and actuate the system. Other tests required by FM Approvals are as follows:

1. Fuel in depth splash tests under a minimum hose length, maximum temperature, and minimum clearance condition to ensure that the nozzle does not cause splashing of fuel.
2. Operational flow rate tests at the minimum, average, and the maximum temperatures, with maximum and minimum hose lengths.
3. Cycle tests on all mechanical and electrical devices to determine their structural integrity.

- ▶ The LT-A-101-50/125/250 systems utilize nitrogen as the expellant gas and are approved for temperature ranges of –65 °F to +130 °F (–54 °C to 54 °C).

## SECTION I – GENERAL INFORMATION

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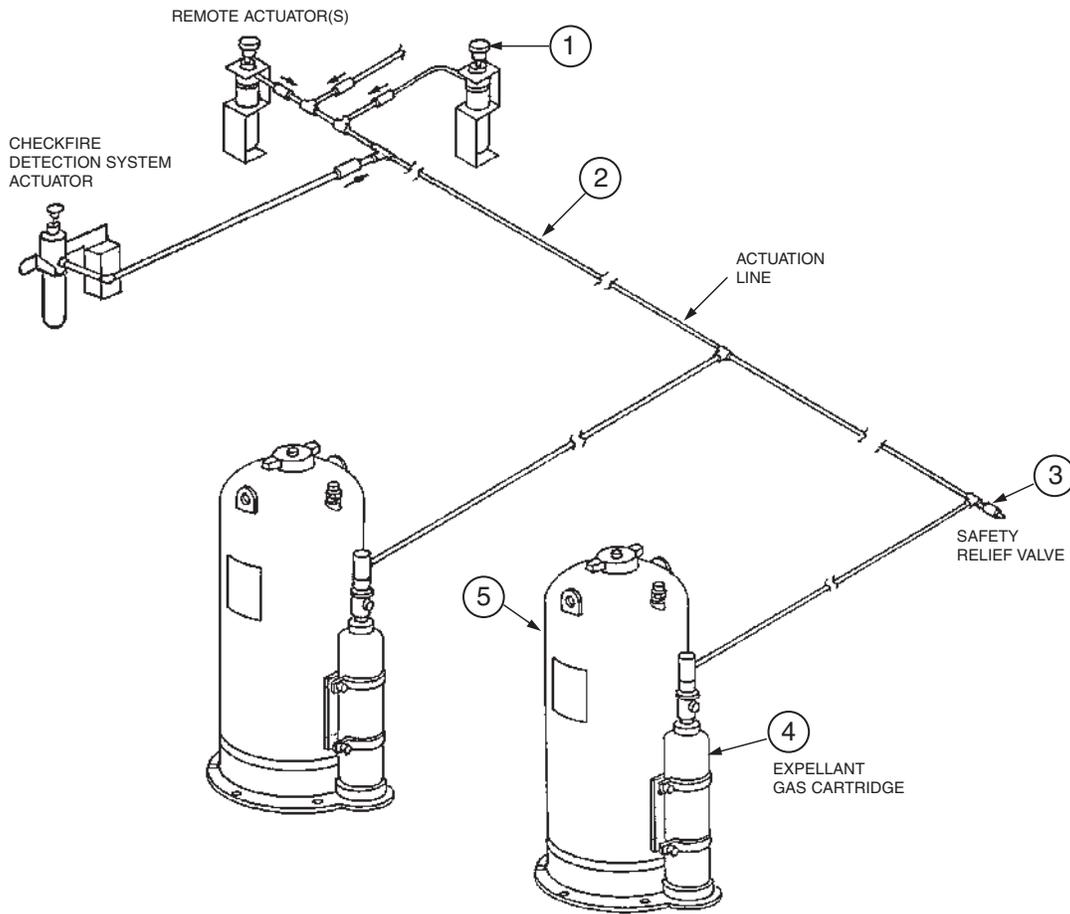


FIGURE 1

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### HOW THE SYSTEM OPERATES

Discharge of the LT-A-101 system manually is initiated from an automatic or manual actuator (1). Automatic operation or manually depressing the actuator plunger punctures the seal on the cartridge. The released pressure is transmitted through the actuation line (2). A safety relief valve (3) in the actuation line prevents too high an actuation pressure build-up. The pressure drives a puncture pin through the seal in the expellant gas cartridge (4). This releases the expellant gas which is then transmitted to the dry chemical tank (5) where it fluidizes the dry chemical before carrying it to the fire hazard. A seal burst disc assembly prevents the flow of dry chemical until sufficient pressure is built up within the dry chemical tank. When the proper pressure is reached, the disc breaks allowing the gas/dry chemical mixture to flow to the nozzle(s) and discharge onto the hazard.

Refer to appropriate CHECKFIRE® design, installation and maintenance manual for information on the operation of the automatic detection system.

**Note:** Mechanical or electrical means should be provided to shut down vehicle upon system actuation.

### IN CASE OF FIRE

When a fire starts, the way the operator reacts is very important. As soon as the operator is aware of a fire, he should do the following four things:

- ▶ 1. Once the machine is safely stopped, turn the machine off and set the brake.
- ▶ 2. Quickly actuate the LT-A-101-50/125/250 system by pulling the safety ring pin on the manual actuator and strike the red button.
- 3. Evacuate the vehicle.
- ▶ 4. Stand by at a safe distance with a fire extinguisher.

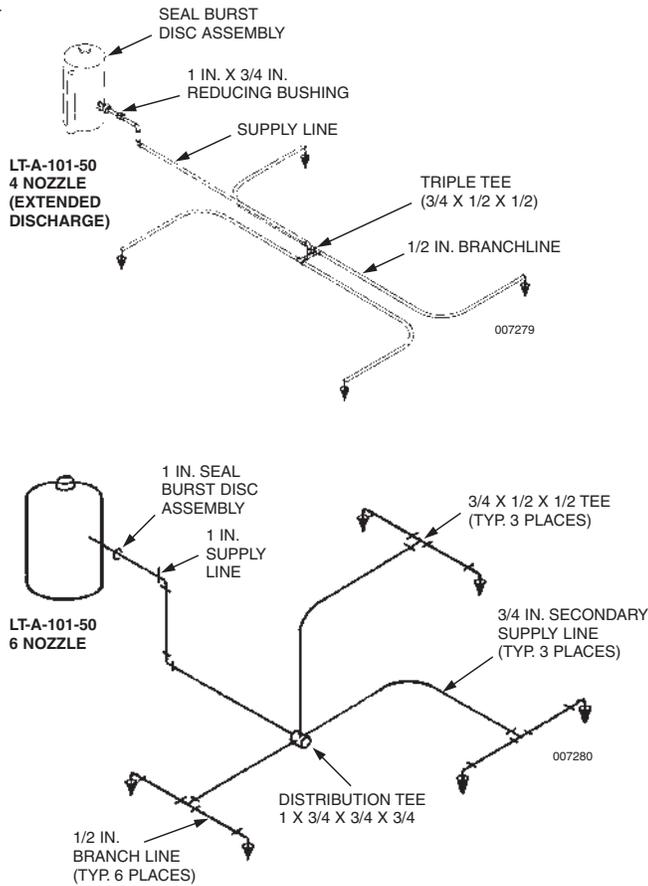


### CAUTION

The system described in this manual is a fire suppression system and is not designed or intended to extinguish all fires, particularly when unusual amounts of combustible materials and an ample oxygen supply are present. It is extremely important that supplement firefighting equipment be available in case the system does not totally extinguish a fire.



**SECTION II – SYSTEM DESCRIPTION**



**FIGURE 1 – Continued**

**System Size/Nozzle Quantity Chart**

	4	6	8	12	16	24
LT-A-101-50	X	X	X			
LT-A-101-125			X	X	X	
LT-A-101-250			X	X	X	X

**DETECTION**

Several types of electric automatic detection systems with various detector options are available for the LT-A-101-50/125/250 systems.

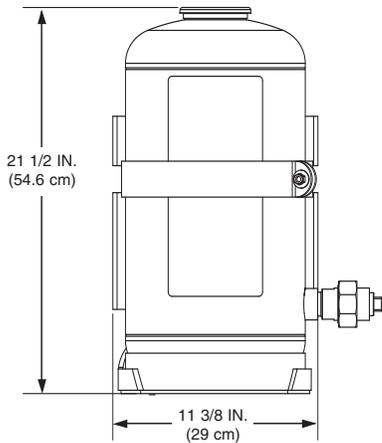
**Electric**

Electric detection systems (CHECKFIRE SC-N, Series I, and MP-N) are available to provide rugged, automatic detection for vehicle protection. These systems are either powered by the vehicle battery or by the internal module battery or both.

The electric detection systems can use either linear heat detection, spot detectors, pneumatic linear detectors, or can be combined with optional flame detection in certain applications.

**LT-A-101-50 TANK AND BRACKET SHIPPING ASSEMBLY**

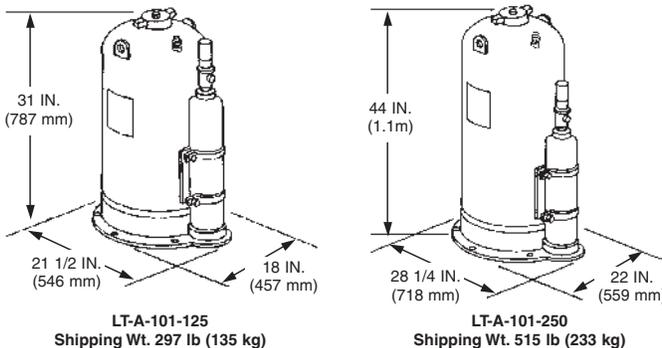
The LT-A-101-50 Tank and Bracket Shipping Assembly (Part No. 433788) (CE marked) is factory filled with 45 lb (20.4 kg) of FORAY dry chemical. The tank is finished with a red, corrosion-resistant paint. A nameplate is affixed to the exterior and contains information on recharge and maintenance. See Figure 1 If only tank (unfilled) is required, order Part No. 433487. **Note:** Expellant gas cartridge, pneumatic actuator, and cartridge bracket must be ordered separately, or as shipping assembly, Part No. 24883.



**FIGURE 1**  
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**LT-A-101-125/250 TANK ASSEMBLY**

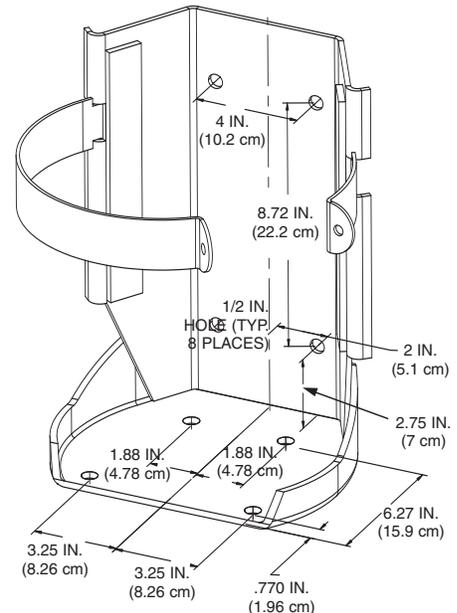
The tank assemblies, LT-A-101-125 (Part No. 427745) (CE Version 434378) and LT-A-101-250 (Part No. 427746) (CE Version 434379) are factory filled with 112 lb (50.8 kg) and 225 lb (102.1 kg) respectively with FORAY dry chemical. Each tank is finished with a red, corrosion resistant paint. A nameplate is affixed to the exterior and contains information on recharge and maintenance. Each tank assembly contains the proper size nitrogen cartridge for expelling the dry chemical. Each tank is manufactured with a seismic mounting ring on the bottom, which can be bolted to the mounting surface or to the optional mounting ring. See Figure 1a.



**FIGURE 1a**  
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**LT-A-101-50 TANK BRACKET**

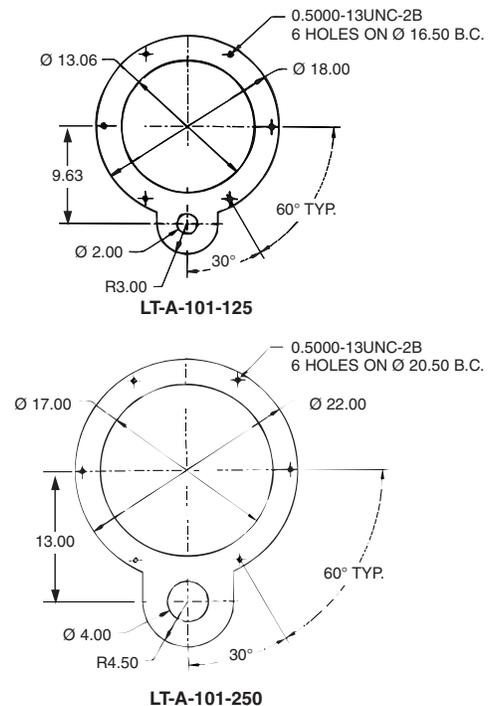
The LT-A-101-50 Tank Bracket, Part No. 433685, consists of heavy gauge steel back/bottom plate, and clamp arms. The bracket is constructed to properly retain the agent tank from movement or damage in the rugged environment that these systems are normally used. The bracket contains rubber pads to minimize the shock and vibration effect on the tank. The bracket is finished in red, corrosion-resistant paint. See Figure 2.



**FIGURE 2**  
007278

**MOUNTING RING**

The Mounting Ring, Part No. 428404 (for the LT-A-101-125) or Part No. 428405 (for the LT-A-101-250) is available for additional tank mounting ease. The ring contains threaded holes which match up to the holes located in the base of the tank. The ring is constructed of 1/2 in. (13 mm) steel. The mounting ring can be pre-welded to the mounting surface and the tank can be then bolted to the ring during installation. When bolting the tank to the ring, use (6) six 1/2 in. x 1 in. (25 mm) long bolts with a flat washer and a lock washer on each. Bolts and washers supplied by others. See Figure 2a.



**FIGURE 2a**  
004698

**SECTION III – SYSTEM COMPONENTS**

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**DRY CHEMICAL**

FORAY dry chemical is a monoammonium phosphate based dry chemical, which is effective on Class A, B, and C Class fires. FORAY agent is color coded yellow for easy identification. FORAY dry chemical is shipped in 45 lb. pails, Part No. 53080. See Figure 3. The LT-A-101-50 must be refilled with 45 lb (20.4 kg) and the LT-A-101-125 and LT-A-101-250 must be refilled with 112 lb (50.8 kg) and 225 lb (102.1 kg) respectively.

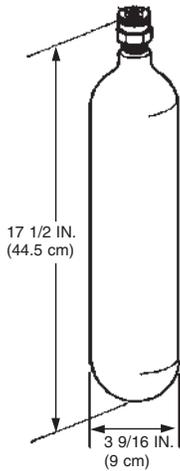
For ease of filling, a large funnel, Part No. 1196, is available.



**FIGURE 3**  
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**EXPELLANT GAS CARTRIDGE**

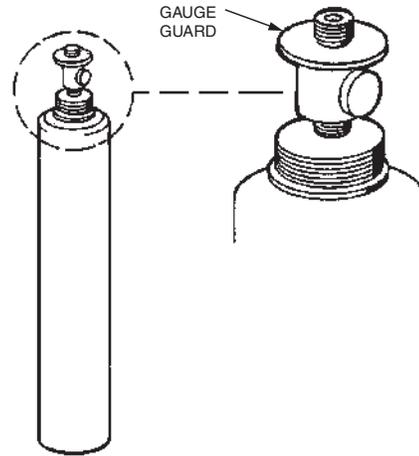
The Expellant Gas Cartridge, used on the LT-A-101-50 tank is the LT-A-101-30 cartridge, Part No. 423491, containing nitrogen as the expellant gas. The cartridge is a sealed pressure vessel containing gas under pressure. When the cartridge seal is punctured by the pneumatic actuator pin, the gas flows into the dry chemical tank, fluidizes the dry chemical, and carries it through the distribution piping network and out the nozzles. See Figure 4. **Note:** Mounting bracket must be ordered separately.



**FIGURE 4**  
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**EXPELLANT GAS NITROGEN CARTRIDGE – LT-A-101-125/250**

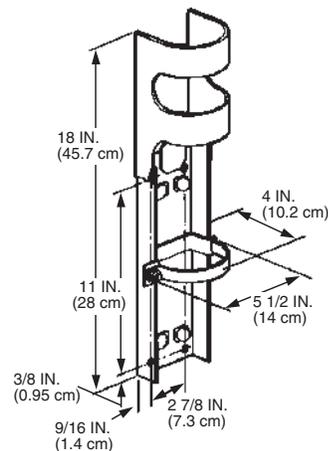
The Expellant Gas Nitrogen Cartridge, Part No. 428060 (23 cu ft for LT-A-101-125 tank) and Part No. 428061 (55 cu ft for LT-A-101-250 tank) is included with the tank shipping assembly. A brass pneumatic actuator mounts on top of the cartridge. The nitrogen cartridge is securely bracketed to the agent tank. The cartridge assembly also includes a gauge guard, which helps protect the gauge. Cartridges have been approved by Transport Canada (TC) and also carry the Department of Transportation (DOT) approval. See Figure 4a.



**FIGURE 4a**  
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**CARTRIDGE BRACKET**

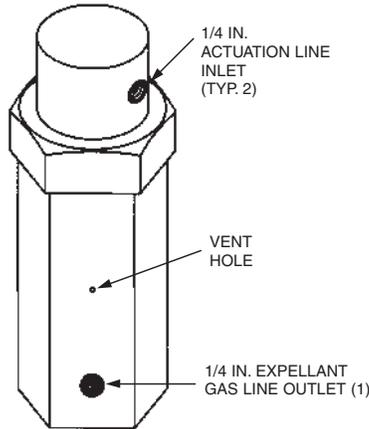
The Cartridge Bracket, Part No. 29193, is required for the LT-A-101-30 cartridge used for the LT-A-101-50 tank. The bracket is constructed of heavy gauge steel and formed to protect and secure the cartridge. The cartridge bracket is painted with red corrosion-resistant paint. See Figure 4b.



**FIGURE 4b**  
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**PNEUMATIC ACTUATOR**

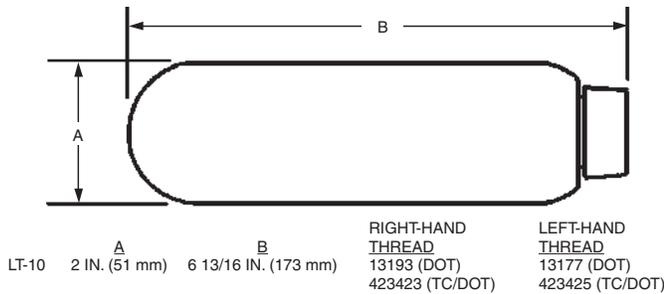
The Pneumatic Actuator, Part No. 430221, is constructed of brass and mounts on the top of the LT-A-101-30, the 23 cu. ft. and 55 cu. ft. nitrogen cartridge. When actuated, the actuator punctures a seal in the cartridge head, allowing the expellant gas to flow into the agent tank. See Figure 5.



**FIGURE 5**  
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**ACTUATION GAS CARTRIDGE**

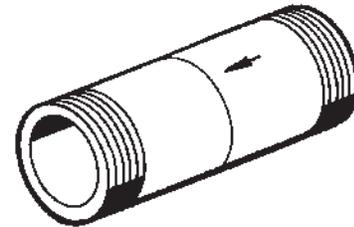
The Actuation Gas Cartridge, either an LT-10-R or LT-10-L, is used in the LT-A-101-50/125/250 remote actuators, either manual or automatic. The cartridge is a sealed pressure vessel containing nitrogen gas under pressure. When the pin in the remote manual or pneumatic actuator punctures the cartridge seal, the gas flows to the actuator on the expellant gas cartridge, causing that actuator to puncture the seal in the expellant gas cartridge. The actuation gas cartridge meets the requirements of DOT 3E-1800. Additional cartridge shipping assemblies are available to meet Transport Canada (TC) approval. They are listed below. See Figure 6.



**FIGURE 6**  
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**BURSTING DISC NIPPLE (FOR LT-A-101-125/250 TANKS)**

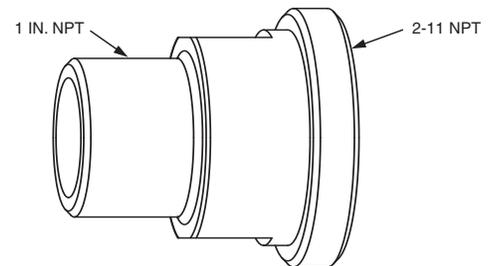
The agent tank Bursting Disc Nipple, Part No. 428324, consists of a machined stainless steel housing containing the bursting disc. The housing is machined with 1 1/2 in. NPT male threads on both ends. The body contains an arrow indicating the direction of flow. The burst disc holds the tank pressure until the proper pressure is reached, and then ruptures, allowing the dry chemical to discharge into the piping network. The complete nipple must be replaced after it is used. See Figure 7.



**FIGURE 7**  
004578

**SEAL BURST DISC ASSEMBLY (FOR LT-A-101-50 TANK)**

The Agent Tank Seal Burst Disc Assembly, Part No. 433706, consists of a machined brass housing containing the bursting disc. The housing is machined with a male 1 in. NPT (tank end) and a male 2-11 NPT thread at the other end. This thread mates to a standard 1 in. union ring (supplied by others). The burst disc holds the tank pressure until the proper pressure is reached, and then ruptures, allowing the dry chemical to discharge into the piping network. The complete assembly must be replaced after it is used. See Figure 7a.



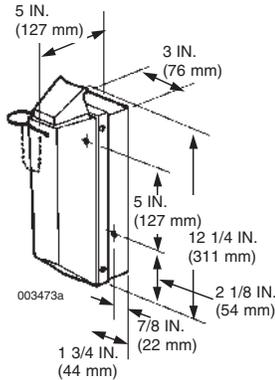
**FIGURE 7a**  
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**SECTION III – SYSTEM COMPONENTS**

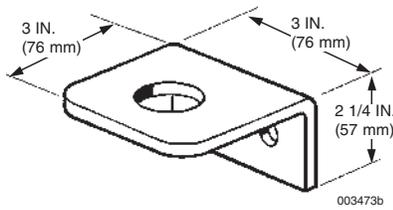
**MANUAL ACTUATORS**

The manual actuator is available for use with either right or left hand cartridges. Manual actuators should be mounted near the vehicle operator and at a point on the vehicle that can be reached from ground level. Two styles of manual actuators are available: the standard actuator with either the “S” type bracket or the “L” type bracket, and the cartridge guard type actuator. See Figure 8.

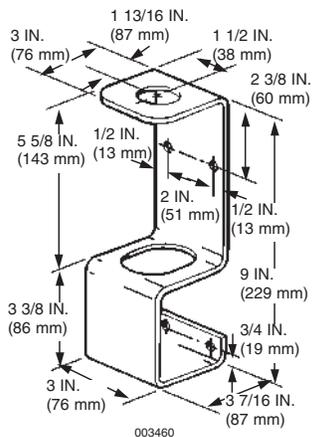
**CARTRIDGE GUARD ACTUATOR FOR RIGHT HAND CARTRIDGES PART NO. 19330**  
**CARTRIDGE GUARD ACTUATOR FOR LEFT HAND CARTRIDGES PART NO. 16186**



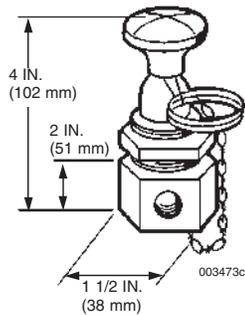
“L” BRACKET PART NO. 70580



“S” BRACKET PART NO. 57661



**REMOTE ACTUATOR FOR RIGHT HAND CARTRIDGES PART NO. 57452**  
**REMOTE ACTUATOR FOR LEFT HAND CARTRIDGES PART NO. 70581**

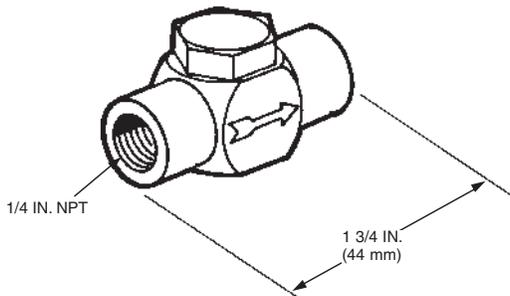


**FIGURE 8**

**1/4 IN. CHECK VALVE**

The 1/4 in. actuation line check valve, Part No. 25627, is used at the branch lines to each actuation device (whether manual or automatic). The check valve blocks the flow of actuation gas from the actuator that was actuated to the actuator(s) that was not actuated. This prevents actuation gas from escaping from an open actuator which may have had the cartridge removed. The check valve also keeps the gas from pressurizing all branch actuation lines thus allowing the main line to be of maximum length. See Figure 9.

**CHECK VALVE PART NO. 25627**

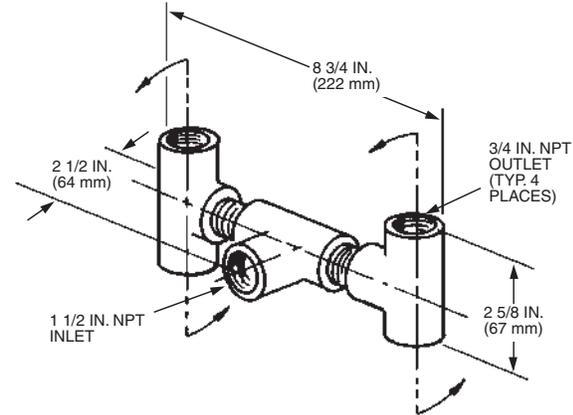


**FIGURE 9**

**PRIMARY SUPPLY LINE TRIPLE TEE (16 AND 24 NOZZLE SYSTEMS)**

The primary supply line triple tee, Part No. 428065, is used to properly distribute the dry chemical from the primary supply line to the four groups of four nozzles. See Figure 10.

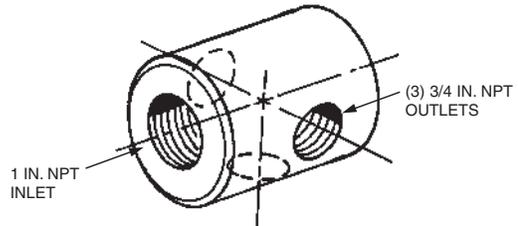
**THE TEE INLET IS 1 1/2 IN. NPT AND THE FOUR OUTLETS ARE 3/4 IN. NPT**



**FIGURE 10**

**PRIMARY SUPPLY LINE DISTRIBUTION TEE (12 NOZZLE SYSTEMS)**

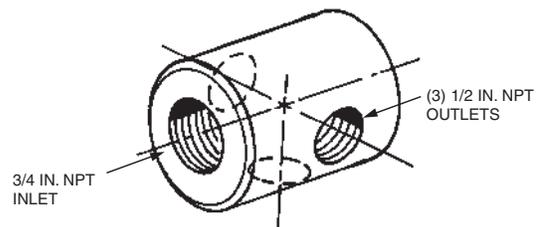
▶ The Primary Supply Line Distribution Tee, Part No. 551608, is required for proper distribution of dry chemical in 12 nozzle systems (LT-A-101-125/250) and 6 nozzle systems (LT-A-101-50). The distribution tee is designed with a 1 in. NPT inlet and three (3) 3/4 in. NPT outlets. See Figure 11. **Note:** Use of this fitting, with the LT-A-101-125/250 system, also requires a 1 1/2 x 1 in. reducing coupling installed prior to fitting.



**FIGURE 11**

**SECONDARY SUPPLY LINE DISTRIBUTION TEE (24 NOZZLE SYSTEMS)**

The Secondary Supply Line Distribution Tee, Part No. 25031, is required for proper distribution of dry chemical in 24 nozzle systems. The distribution tee is designed with a 3/4 in. NPT inlet and three (3) 1/2 in. NPT outlets. See Figure 11a.



**FIGURE 11a**

**SECONDARY SUPPLY LINE TRIPLE TEE (4, 8, OR 16 NOZZLE SYSTEMS)**

The secondary supply line triple tee, Part No. 16424, can be used to properly distribute the dry chemical from the secondary supply line to four branch lines. This tee is also available in a two pack, Part No. 53038. See Figure 12.

TRIPLE TEE, 1/2 IN. X 1/2 IN. X 1/2 IN. X 3/4 IN. – PART NO. 16424

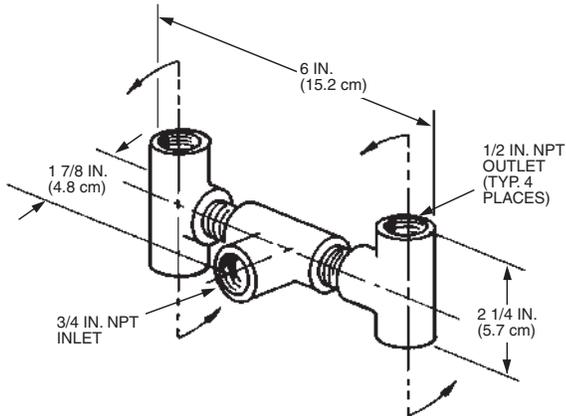


FIGURE 12  
003462

**PRIMARY SUPPLY LINE TRIPLE TEE (8 NOZZLE LT-A-101-50 SYSTEM)**

The primary supply line triple tee, Part No. 433759, is used to properly distribute the dry chemical from the primary supply line to the four groups of two nozzles. See Figure 12a.

► THE TEE INLET IS 1 IN. NPT AND THE FOUR OUTLETS ARE 3/4 IN. NPT

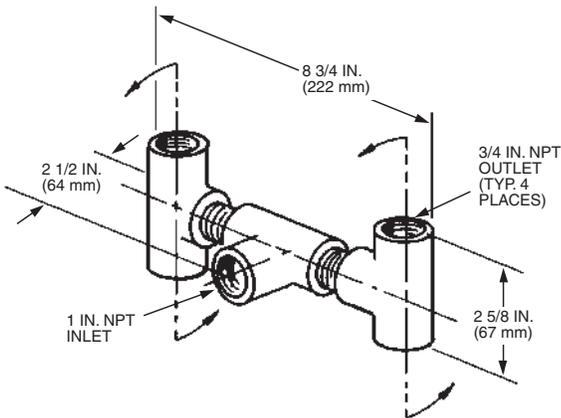


FIGURE 12a  
003462

**REDUCING TEE (12 AND 16 NOZZLE SYSTEMS)**

A 1/2 x 1/2 x 3/4 in. reducing tee, Part No. 4655, is used to properly distribute the dry chemical from the 3/4 in. secondary supply line to two primary branch lines. Also available is a two pack, Part No. 53040. See Figure 13.

REDUCING TEE, 1/2 IN. X 1/2 IN. X 3/4 IN. – PART NO. 4655

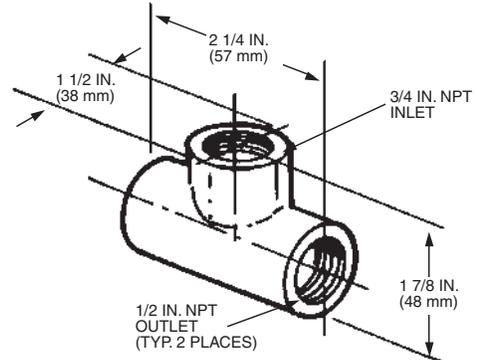


FIGURE 13  
003456

**SAFETY RELIEF VALVE**

A spring-loaded pressure relief valve, Part No. 15677, is used to prevent excessive pressure from building up in the actuation line. The valve is set to relieve at 265 psi (18.3 bar). After system discharge, all pressure in the actuation line can be relieved by pulling the ring on the safety relief valve. See Figure 13a.

SAFETY RELIEF VALVE PART NO. 15677

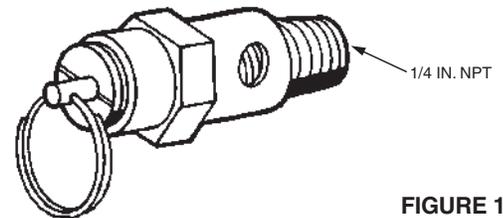


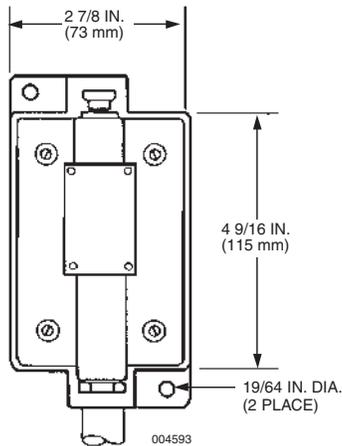
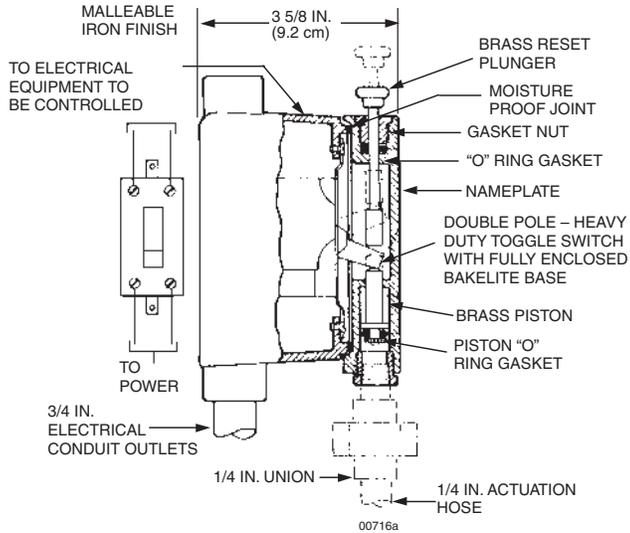
FIGURE 13a  
000437

**SECTION III – SYSTEM COMPONENTS**

**PRESSURE SWITCH – WEATHERPROOF**

The pressure switch, Part No. 46250, is a DPST (Double-Pole, Single Throw) pneumatically operated, resettable switch used to open or close electrical circuits to either shut down equipment or turn on lights or alarms. The pressure switch is constructed of malleable iron. A 1/4 in. NPT pressure inlet is used to connect the 1/4 in. hose from the actuation line. The switch rating is 2 HP-240 VAC/480 VAC, 2 HP-250 VDC, 30A-250 VAC/DC, 5A-480 VAC/DC. See Figure 14.

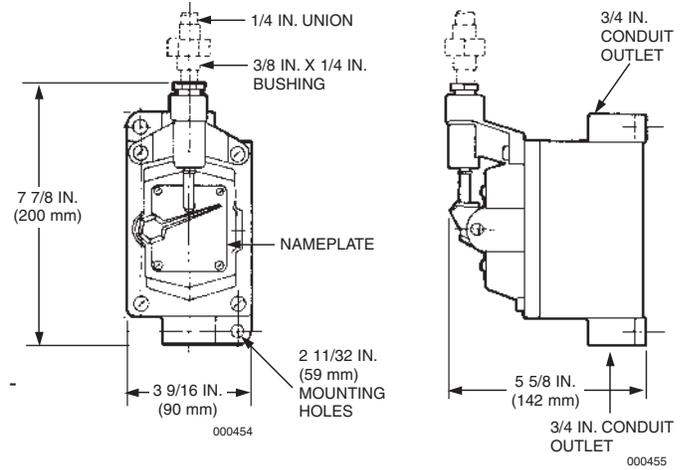
**PRESSURE SWITCH PART NO. 46250**



**FIGURE 14**

**EXPLOSION-PROOF PRESSURE SWITCH – DPDT**

The Explosion-Proof Pressure Switch, Part No. 43241, is a DPDT (Double-Pole, Double-Throw) pneumatically operated, resettable switch to be used for turning off pump motors, exhaust fans, conveyors, and similar devices; or turning on alarms or electric door closures. The switch contacts are rated at 10 amp at 125 VAC or 5 amp at 250 VAC. The pressure switch is constructed with an explosion-proof housing suitable for hazardous environments. The switch operates off the nitrogen actuation pressure. See Figure 15.



**FIGURE 15**

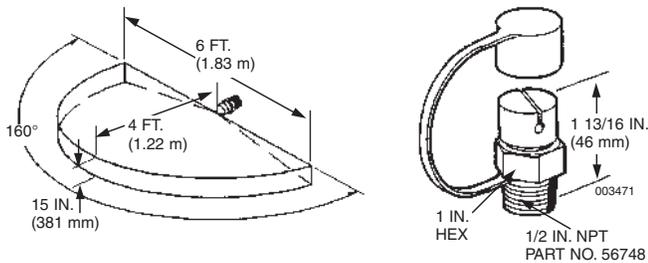
**NOZZLES**

Three types of nozzles are approved for use with the LT-A-101-50/125/250 system. The first type of nozzle is the V-1/2. This nozzle produces a 160° fan shape pattern and is generally used for screening engine compartments, torque converters and all other hazard areas. The second type of nozzle is the C-1/2. This nozzle gives a cone pattern and is used for direct application to a vehicle component or burning surface. The third type is the F-1/2 nozzle. This nozzle gives a 180° fan shape pattern and can be used for either total flooding or local application. All nozzles are constructed of brass and require protective blow-off caps. Pack the opening of the F-1/2 nozzle with a good grade of extreme temperature silicone grease, such as Dow Corning No. 4 before installing the blow-off cap. See Figure 16.

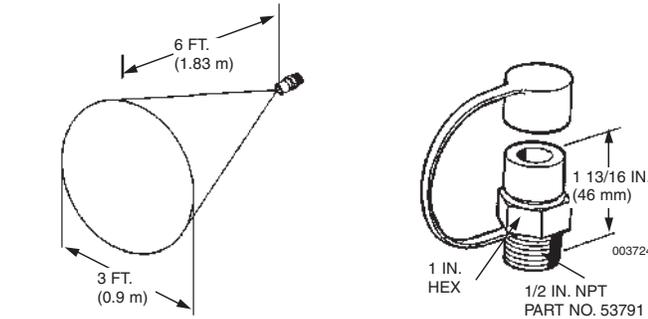
Nozzles are available in the following shipping assemblies:

Part No.	Description
57044	V-1/2 Nozzle with Blow-off Cap, "L" shaped bracket, Lockwashers – 4 pack
57046	C-1/2 Nozzle with Blow-off Cap, "L" shaped bracket, Lockwashers – 4 pack
57042	F-1/2 Nozzle with Blow-off Cap, "L" shaped bracket, Lockwashers – 4 pack
56748	V-1/2 Nozzle with Blow-off Cap
53791	C-1/2 Nozzle with Blow-off Cap
16449	F-1/2 Nozzle

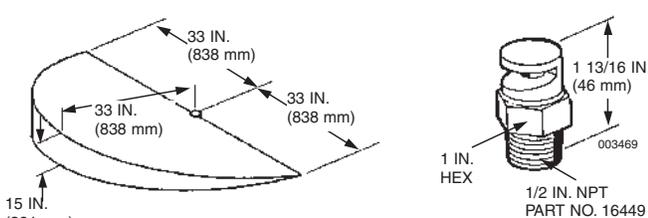
**V-1/2 NOZZLE EFFECTIVE DISCHARGE PATTERN PART NO. 56748**



**C-1/2 NOZZLE EFFECTIVE DISCHARGE PATTERN PART NO. 53791**



**F-1/2 NOZZLE EFFECTIVE DISCHARGE PATTERN PART NO. 16449**



**FIGURE 16**

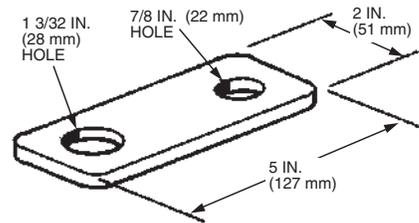
**NOZZLE BRACKETS**

Two styles of nozzle brackets are available for the A-101 system. Each style of bracket is constructed of unpainted 1/4 in. (6.4 mm) steel. They contain pre-punched mounting holes for the nozzle.

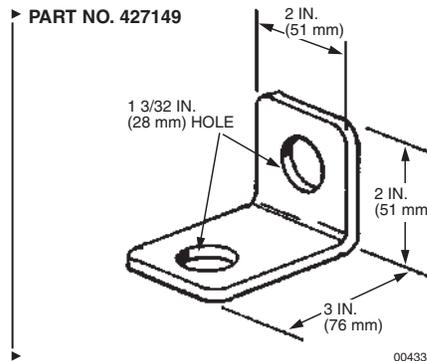
An individual "L"-shaped bracket-shipping assembly, Part No. 427149, is available. This bracket is 2 in. x 3 in. (51 mm x 76 mm). The "L"-shaped bracket is also available in packs of 12 (Part No. 73871).

A straight bracket (in packs of 4), Part No. 427228, is available. This bracket is 5 in. x 2 in. (127 mm x 51 mm). See Figure 17.

**PART NO. 427228**



**PART NO. 427149**

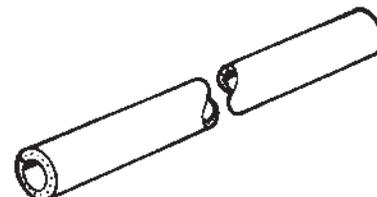


**FIGURE 17**

**HOSE (SUPPLIED BY OTHERS)**

To assure proper performance of an A-101 system, the hose used must meet SAE 100 R5 or 100 R1 (minimum) hose specification. The hose must have an operating temperature of -40 °F to +200 °F (-40 °C to +93 °C). For underground mining applications, the hose must also be accepted by MSHA as flame resistant and marked as follows "Flame-Resistant, USMSHA No. \_\_\_\_\_" at intervals not exceeding 3 ft. (.9 m). Letters and numbers must be at least 1/4 in. (0.6 cm) high. The hose must also comply with all other SAE requirements. (\*This number is assigned to the manufacturer after samples have passed the required tests. The number will be different for each manufacturer.) See Figure 18.

Special colored jacketed hose is available from some hose suppliers. This is an easy way to identify the fire suppression system hose from the vehicle hydraulic hose.



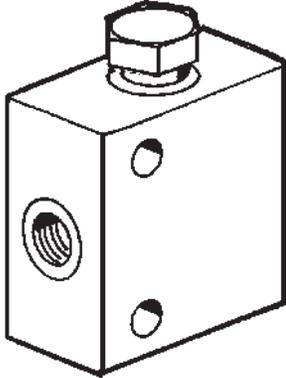
**FIGURE 18**  
003475

### SECTION III – SYSTEM COMPONENTS

► 6-30-05 Page 3-8

#### ► ENGINE SHUTDOWN DEVICE (OPTIONAL)

The ANSUL Engine Shutdown Device, Part No. 427425, can be used in some applications to pneumatically shutdown the vehicle fuel rack by venting the hydraulic pressure through the “safety system.” This can be accomplished by installing the shutdown device in the actuation line. When the fire suppression system is actuated, the actuation pressure opens the check valve located in the shutdown device, allowing the safety system pressure to bleed into the holding tank. The drop in pressure causes the valves in the fuel rack to close, thus shutting down the engine. See Figure 19.



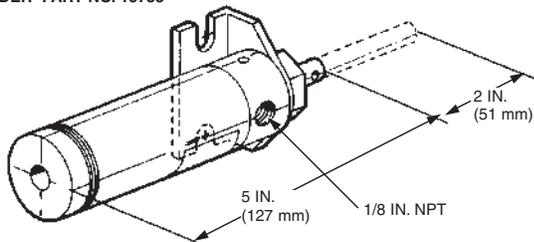
**FIGURE 19**

004474

#### AIR CYLINDER (OPTIONAL)

The air cylinder, Part No. 15733, is a system accessory whose function is to shut off the fuel supply to the engine when the fire suppression system is actuated. It is a piston operated by gas pressure from the actuation line. See Figure 20.

AIR CYLINDER PART NO. 15733



**FIGURE 20**

003459

#### CHECKFIRE ELECTRIC DETECTION AND ACTUATION SYSTEM

Two styles of electric detection and actuation systems are available: CHECKFIRE Electric SC-N, and CHECKFIRE Electric MP-N. Each electric/pneumatic system consists of detection wiring, control module, actuator with nitrogen cartridge, mounting bracket, and squib (SC-N) or gas motor (MP-N). The CHECKFIRE SC-N and MP-N contains its own internal Lithium batteries as the power source. All styles of CHECKFIRE electric are FM Approvals approved when consisting of all basic components.

The temperature ratings of the system are as follows:

CHECKFIRE Series SC-N: Manual Part No. 423522	−40 °F to +140 °F (−40 °C to +60 °C)
CHECKFIRE Series MP-N: Manual Part No. 427310	+32 °F to +120 °F (0 °C to +49 °C)

## HAZARD ANALYSIS

This section deals with analyzing your fire protection needs and deciding where to place system components to provide the protection you need. Knowledge of the LT-A-101-50/125/250 capabilities is required and is dealt with in this manual. Knowledge of the fire hazards that exist in the equipment to be protected is also required. This will be obtained through the investigation described below. Finally, a good understanding of federal and local fire protection codes and standards is necessary. No one should begin designing without previously becoming familiar with the applicable codes.

Having read about the LT-A-101 system and the basic terminology and operation of the system, you should now begin to identify the fire hazards in the equipment to be protected. Every foreseeable hazard must be identified now while you have design flexibility; once the system is installed, adding protection for another hazard becomes more difficult. Note that the LT-A-101 system is designed only for the protection of specified equipment for the foreseeable hazards that exist due to that equipment and its operation. The areas of protection are fixed at installation and are limited in number. **An LT-A-101 system does not remove the need for a hand portable fire extinguisher on the equipment.** Fuel spills, welding (repair) heat or other unforeseeable causes may result in fires in areas not having LT-A-101 protection. The LT-A-101 system protects the areas with high likelihood of fire and potential for high damage; seldom would an LT-A-101 system be designed to protect every square inch of the equipment to be protected.

An effective system design is based on a thorough hazard analysis. Fire is made up of heat, fuel, and oxygen. A fire hazard is any place that these three elements could be brought together or where fire can propagate to, due to the design of the vehicle and the nature of the burning liquids. Because oxygen is always present, identifying fuel and heat sources is most critical.

Large excavators must be considered special type hazards. Some may require twin-agent protection. See the Appendix Section for design information or contact ANSUL Application Engineering Department.

Operator safety is also a concern when designing a fire suppression system. The operator must have enough time to safely exit off the vehicle. In some situations, an extended discharge dry chemical system may offer the operator the additional time he needs to get away from the burning vehicle. Consider egress time when designing the final system.

Some common fuel sources in vehicles include flammable liquids and greases, rubber, plastics, upholstery, and environmental debris such as wood chips or coal dust.

Common vehicle heat sources are engine blocks, exhaust systems, pumps, and turbochargers, as well as bearings, gears, brakes, and electrical equipment. A potential hazard exists when a fuel comes in contact with any heat source.

Where there is dripping or leaking fuel, the hazard can become even more dangerous than initially considered. Consulting with experienced operators or owners of similar equipment can help to identify locations of previous fires and special hazards not normally considered as common hazards.

► **Note:** In hazard areas where vehicle components normally operate with outer skin temperatures that exceed 800 °F (427 °C), a twin agent system utilizing dry chemical agent for quick fire knockdown, and LVS liquid agent (see LVS manual, Part No. 427109) for cooling, should be considered.

► The following are examples of typical vehicle fire hazards that require consideration:

► **Engine Compartment** – (Turbochargers, exhaust manifolds, etc.) The engine compartment contains an assortment of fluids, fuels, oils, and greases, as well as congested wires, hoses, and accumulated debris, all very near high heat sources.

**Battery Compartments** – Battery compartments are a potential fire hazard when combustible materials build up on the top of the battery. These materials, in the presence of moisture, can cause a short circuit.

**Transmissions, Torque Converters, and Parking Brakes** – All these components are a possible high heat source that could cause ignition to combustible material.

**High Pressure Hoses, Connections, Valve Banks, Control Valves** – Hot fluid spraying from a ruptured high pressure hose, or leaking from a loose flange or fitting could find its way to a source of ignition.

**Belly Pan** – The belly pan can accumulate not only leaking fuel from the vehicle, but external debris, and because of its unique location, a fire starting in the belly pan could quickly engulf the entire vehicle.

**Swing Gear and Articulation Areas** – These areas can contain numerous high pressure hydraulic hoses. In these areas, the hose can wear and/or be pinched, causing high pressure flammable liquid to spray into potential high heat areas.

**Hydraulic/Fuel Pumps** – Because of the high pressures involved with these pumps, fluid spraying from a leaking pump could find its way to a heat source and cause ignition.

After completing the hazard analysis, determine nozzle coverages.

► **Note:** Fires occasionally occur in the operator's compartment (cab area) due to electrical shorts or other causes. Fires in this area will need to be suppressed using hand portable fire extinguishers.

## SECTION IV – SYSTEM DESIGN – VEHICLE

6-1-07 Page 4-2

REV. 3

### NOZZLE COVERAGE AND LOCATION

The first step is to determine which nozzles are needed and where they should be placed to best protect the hazard.

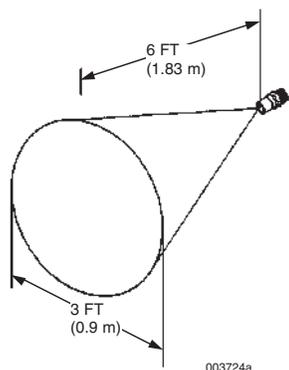
Nozzle selection can be made by first determining the size of the hazard and then comparing that to the nozzle's effective discharge pattern.

**C-1/2 Nozzle Part No. 53791** – The cone-shape discharge pattern of the C-1/2 nozzle will widen to a 3 ft (0.9 m) diameter at the maximum effective discharge range of 6 ft (1.8 m). See Figure 1.

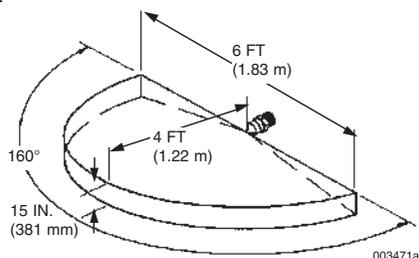
**V-1/2 Nozzle Part No. 56748** – The V-1/2 nozzle creates a fan-shaped discharge pattern of 160° and has a maximum effective discharge range of 4 ft (1.2 m) in length by 15 in. (381 mm) in height with a maximum width of 6 ft (1.8 m). See Figure 1.

**F-1/2 Nozzle Part No. 16449** – The F-1/2 nozzle also produces a fan-shaped discharge pattern, but with a 180° pattern at a maximum effective range of 33 in. (838 mm) in length by 15 in. (381 mm) in height with a maximum width of 5 ft 6 in. (1.7 m). See Figure 1.

#### C-1/2 NOZZLE



#### V-1/2 NOZZLE



#### F-1/2 NOZZLE

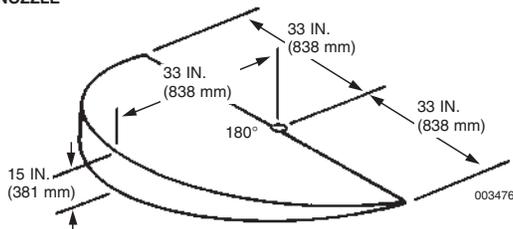


FIGURE 1

#### NOTICE

When using any of the nozzle types, make certain no obstructions interfere with the discharge pattern as it is directed to the hazard

The following rules apply to selecting nozzles and nozzle locations:

- When choosing the proper nozzle, remember the entire hazard area must be within the nozzle's pattern and maximum effective discharge range.
- The narrow pattern and longer discharge range of the C-1/2 nozzle make it a good selection for protecting small areas or hazards that are distant from the nozzle mounting location.
- Larger hazard areas may require the use of V-1/2 or F-1/2 nozzles.
- Some areas may exceed the area coverage of one nozzle and may require an additional nozzle(s) for protection.
- In some cases, a single nozzle can cover more than one area of a common hazard such as a transmission and torque converter. **Note:** Both areas must be within the discharge pattern of the nozzle.
- When planning nozzle locations, make certain the effective flow of dry chemical to all recognized hazard areas will not be obstructed.
- If obstructions cannot be avoided, an additional nozzle(s) may be needed to provide proper coverage.
- Nozzle placement should be such as to avoid impinging discharge patterns that may reduce nozzle's effective range.
- Never settle for less than full coverage of each fire hazard.

After establishing nozzle locations and number required, the quantity of LT-A-101-50/125/250 tanks can be determined.

### TANK QUANTITY AND SIZE REQUIREMENTS

Knowing the number of nozzles required, next determine the number and size of tanks required.

#### Tank Quantity

**Each LT-A-101-50/125/250 tank requires the use of a specific number of nozzles. These quantities of nozzles must be used for proper agent distribution. Note: 24 nozzle systems are allowed only on LT-A-101-250 size tanks.**

- Match nozzle groups of 8, 12, or 16 to individual tanks. If the last group of nozzles is not equal to 8, 12, or 16, additional nozzles must be added to the system design so that all tanks include an 8, 12, or 16 nozzle piping distribution network.

**Exception:** An LT-A-101-50 can utilize a 4 nozzle system for extended discharge.

#### Tank Size

The LT-A-101-125 tank will discharge dry chemical for approximately 10 seconds where 16 nozzles are used. If, during the hazard analysis it was determined that more time is required to allow the operator to safely egress the vehicle, then the LT-A-101-250 tank can be utilized. This agent tank contains twice the amount of dry chemical, therefore it offers a discharge time of approximately 20 seconds.

When the number of tanks have been determined based on the number of nozzles for total protection, the next step in the design process is to determine the distribution hose network required.

## DISTRIBUTION SYSTEM REQUIREMENTS

After the tank(s) and nozzle(s) location(s) have been determined, it is necessary to sketch the hose routings to each nozzle to make certain they can be run without interfering with vehicle components and that the length of the supply line(s) and branch line(s) are not exceeded.

### ► Hose and Fittings Specifications

To ensure proper performance of the ANSUL A-101 system, the hose used must meet either SAE 100 R5 or 100 R1 hose specifications as a **minimum**. The hose must have an operating temperature of  $-40^{\circ}\text{F}$  to  $+200^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$  to  $+93^{\circ}\text{C}$ ). The following list of appropriate standards is for reference.

SAE Selection, Installation, and Maintenance of Hose and Hose Assemblies J1273 (latest revision)

SAE Hydraulic Hose Fitting Standard J516 (latest revision)

SAE Hydraulic Hose Standard J517 (latest revision)

SAE Test and Procedures For J343 (latest revision)

SAE 100R Series Hydraulic Hose and Hose Assembly Standard

For underground mining applications, hose must comply with USBM specified flame resistance acceptance and all applicable SAE requirements.

### Hydraulic Hose Couplings

Before connecting a hydraulic hose to the A-101 fire suppression system, it must first be assembled utilizing a hose coupling attached to each end of the hose. Hose couplings installed on hydraulic hose can be the permanent crimp-on type or the reusable type. Female or male swivel hose couplings of either the crimp-on type or the reusable type are also acceptable. All couplings used with SAE 100R1 or SAE 100R5 hydraulic hose must be suitable for the hose chosen and must comply with Hydraulic Hose Fitting Standard J516 as a minimum.

When attaching a hose coupling to a hose, it is very important to follow all manufacturer's installation instructions. SAE J1273, Selection, Installation, and Maintenance of Hose and Hose Assemblies, paragraph 3.2, requires that the manufacturer's assembly instructions be followed. SAE J1273, paragraph 2.10, Proper End Fitting, states that, "Care must be taken to insure proper compatibility exists between the hose and coupling selected based on the manufacturer's recommendations substantiated by testing to industry standards such as SAE J517."

Many hose manufacturers require only the couplings that they supply to be used with their hose. One manufacturer warns that they "will not be responsible when interchanging their hose and/or couplings with hose and/or couplings of any other manufacturer." Another states that "Under no circumstances should hose and couplings from different suppliers be interchanged."

### Permanent Crimp-on Hose Couplings

A permanent crimp-on hose coupling is installed as a one-piece assembly attached to the hose end and crimped on. The crimp is made using a machine that will hydraulically or electrically crimp the coupling permanently to the hose end.

When using permanent crimp-on type couplings, lubricate the hose end, if necessary, and push the hose end all the way into the fitting in accordance with hose and hose coupling assembly instructions. Then place the hose end in the appropriate crimping machine and crimp the coupling. Follow all hose crimping machine operating instructions.

### Reusable Hose Couplings

Reusable hose couplings can be attached to new hose in the field with no other tools than a wrench and a vise (or two wrenches). When reusable hose couplings are used, make certain the corresponding couplings and the assembly procedures used are in accordance with the manufacturer's specifications. **Failure to follow the manufacturer's instructions in their entirety may result in plugged nozzle orifices at system discharge due to chips and pieces of rubber cut from the inside of the hose during improper assembly.**

Reusable hose couplings include a coupling shell that fits over the end of the hydraulic hose and a coupling insert that installs inside the end of the hose and mates with the coupling shell threads. A mandrel tool may be required when using 1/4 in. through 1/2 in. SAE 100R5 hose to facilitate installation of the coupling insert.

To attach a reusable coupling to the hose, clamp the coupling shell in a vise and turn the end of the hydraulic hose counterclockwise into the coupling shell until the end is seated against the bottom of the shell. Then, back off 1/4 to 1/2 turn to allow for expansion.

**Note:** Some-rubber covered hydraulic hose ends must be skived (stripped of the rubber cover) before attaching the coupling. Refer to the appropriate manufacturer's instructions.

Lubricate the hose, coupling insert, and mandrel tool (when required) in accordance with manufacturer's instructions and screw the insert clockwise into the coupling shell and hose. Wrench tighten the insert until the hex on the insert contacts the shell. If a female swivel end is being used, use the appropriate assembly tool and leave approximately 1/32 in. to 1/16 in. (0.8 to 1.6 mm) clearance between the nut and the shell to allow the nut to swivel.

**Note:** It is important to lubricate only those surfaces specified by the manufacturer of the hose and coupling used. The lubricant will minimize the risk of cutting or shaving the inside of the hose. **Failure to use the proper lubricant or follow the appropriate lubrication instructions may result in pieces of hose plugging the gas tube in the agent storage tank or plugging a discharge nozzle orifice. Improper lubricant or lubrication procedures may also result in contamination of the hose due to the use of an incompatible lubricant.**

After attaching hose couplings to the hose, make certain that the hose is clean, dry and oil free. Use a solvent that is compatible with the hose, such as Stoddard Fluid or Varsol, to dissolve any oil remaining in the hose. Using dry air or nitrogen, blow out each hose length until dry and clear of metal or rubber shavings and any foreign matter before making any connections to the A-101 system.

**SECTION IV – SYSTEM DESIGN – VEHICLE**

**DISTRIBUTION SYSTEM REQUIREMENTS (Continued)**

**JIC Hose Fittings and 150 lb. Fittings**

JIC hose fittings meeting Hydraulic Hose Fitting Standard J516 can be used in most applications. When using JIC hose fittings as elbows, use only elbows that have a long radiused bend. 150 lb NPT elbows and tees can also be used to assemble hose or pipe and attach hose or pipe to the discharge nozzles. Make certain that all elbows used in the agent distribution line, are of the same type (i.e., either all JIC or all 150 lb NPT elbows). Refer to the Installation Section for maximum and minimum elbow requirements.

**Note:** When figuring the maximum and minimum amount of elbows in the A-101/LT-A-101 system, two (2) 45 ° fittings can be counted as one 90° fitting.

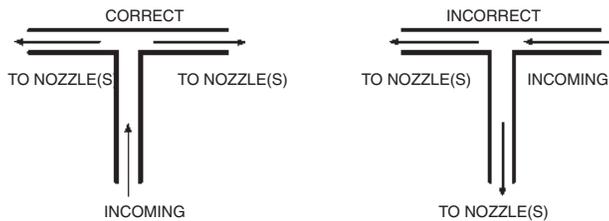
**Heat Resistant Fire Jacket for Hydraulic Hose**

All hose assemblies, including actuation lines, expellant gas lines, and agent distribution hose that will be normally exposed to or located in areas with temperatures exceeding 200 °F (93 °C), should be sleeved with an extreme temperature heat-resistant fire jacket. (Do not route actuation or expellant gas hose through fire hazard areas. If this cannot be avoided, the hose must be fire jacketed.) Information concerning fire jacketing should be available through your local hose supplier. If not, Bentley Harris manufactures a fire jacket that will withstand continuous operating temperatures from -65 °F to 500 °F (-54 °C to 260 °C) and short term exposures up to 2000 °F (1093 °C). For a listing of distributors in your area, call Bentley Harris at either 610-363-2600 or, 800-321-2295.

**Dry Chemical Flow Characteristics**

The assembly of piping (hose) for a dry chemical system probably lends itself to the greatest chance for error when installing the system. Dry chemical-gas mixtures do not flow like liquids, and, as a result, certain basic rules must be followed to assure correct dry chemical distribution to the nozzles.

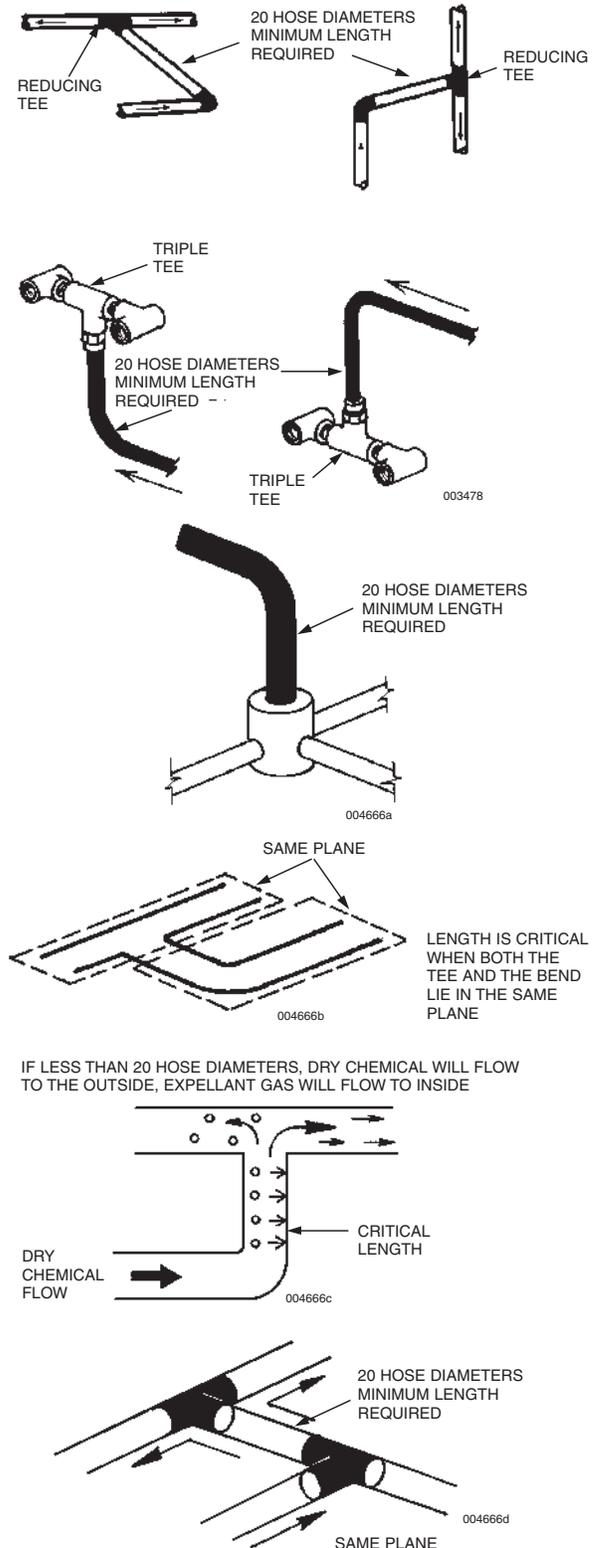
In order to obtain equal distribution at a tee, the dry chemical must enter the center opening (bull) of the tee and exist the two side opening which are 180° apart. See Figure 2.



**FIGURE 2**  
003477

When dry chemical makes a change of direction through an elbow, a tee, or a hose bend, a separation of the dry chemical and gas mixture occurs. If a tee follows this change of direction where separation can occur, and if this tee lies in the same plane as the change in direction through an elbow, tee, or hose bend, more dry chemical will discharge through one of the tee outlets and more gas will discharge out the other tee outlet. A certain minimum length of hose must be allowed from the bend (elbow) to the tee or from the first tee to the second tee in order to permit the dry chemical and gas to intermix before striking the tee. The minimum length required is equal to 20 hose diameters. 30 in. (762 mm) is required for 1 1/2 in. hose, 20 in. (508 mm) is required for 1 in. hose, 18 in. (457 mm) is required for 7/8 in. hose, 15 in. (381 mm) is required for 3/4 in. hose, and 10 in. (254 mm)

is required for 1/2 in. hose. See Figure 3. **Note:** When using the distribution tee, Part No. 25031, a minimum length of 30 in. (762 mm) of 1/2 in., 20 in. (508 mm) of 1 in., 15 in. (381 mm) of 3/4 in., or 18 in. (457 mm) of 7/8 in. hose will always be required between any bend or elbow and the distribution tee.

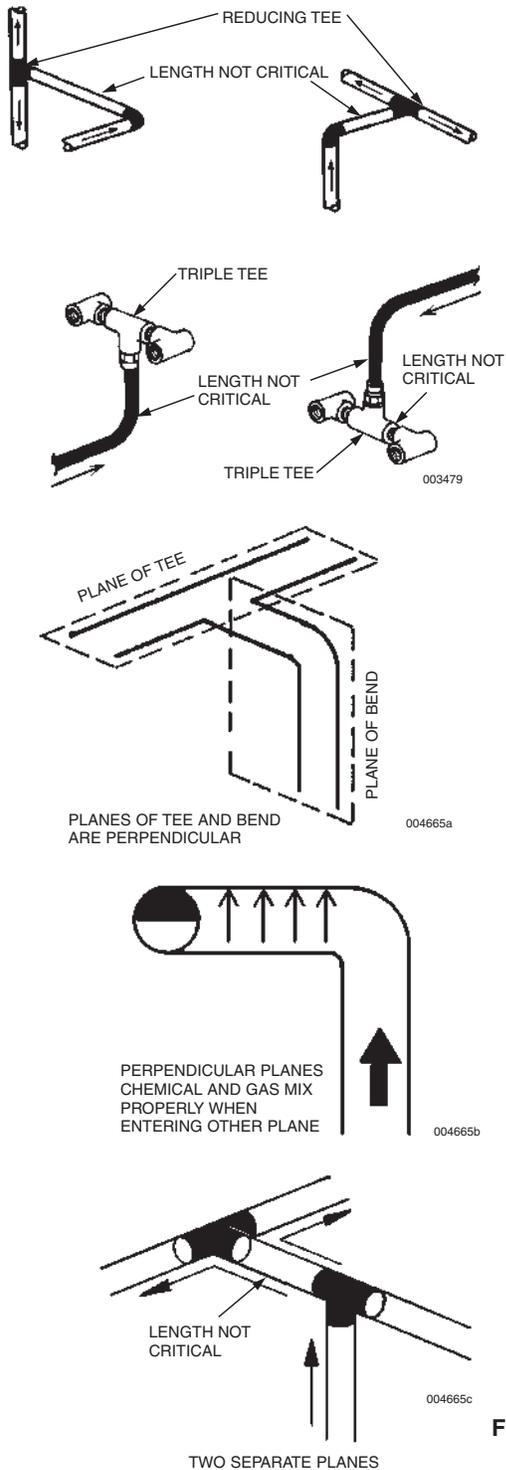


**FIGURE 3**

**DISTRIBUTION SYSTEM REQUIREMENTS (Continued)**

**Dry Chemical Flow Characteristics (Continued)**

If a tee follows a change in direction through an elbow, another tee, or a hose bend and the direction of the tee before branching, intermixing of the dry chemical and gas will occur through turbulence and the length of hose from the bend (elbow) or tee preceding it is not critical. See Figure 4.



**FIGURE 4**

**SECTION IV – SYSTEM DESIGN – VEHICLE**

6-30-05 Page 4-6

REV. 2

**DISTRIBUTION SYSTEM REQUIREMENTS (Continued)**

**4 Nozzle Systems – LT-A-101-50**

**Supply Line Requirements (LT-A-101-50)**

- The primary supply line can utilize a maximum of 3 ft of 1 in. pipe or hose from the tank outlet to the 1 x 3/4 in. primary supply line reducing coupling.
- The secondary supply line is 3/4 in. hose, which runs from the 1 x 3/4 in. primary supply line reducing coupling to the 3/4 in. secondary supply line tee. The maximum length of the secondary supply line is 40 ft (12.2 m).
- A maximum of 2 elbows are allowed in the 1 in. line between the tank and the 1 x 3/4 in. reducing bushing.
- A maximum of 4 elbows are allowed between the 1 x 3/4 in. reducing bushing and any nozzle.

**Branch Line Requirements (LT-A-101-50)**

**BALANCED SYSTEMS:**

- Maximum total length from 1 x 3/4 in. primary supply line reducing coupling to any nozzle is 50 ft (15.2 m)
- Length of 3/4 in. primary branch line on one side of the 3/4 in. secondary supply line tee must be within 10% of the length of the other 3/4 in. primary branch line sharing the same tee.
- Length of 1/2 in. secondary branch line on one side of 3/4 x 1/2 in. primary branch line tee must be within 10% of the length of the other 1/2 in. secondary branch line sharing the same tee.
- Any combination of V-1/2, C-1/2, or F-1/2 nozzles is acceptable.

**UNBALANCED SYSTEMS:**

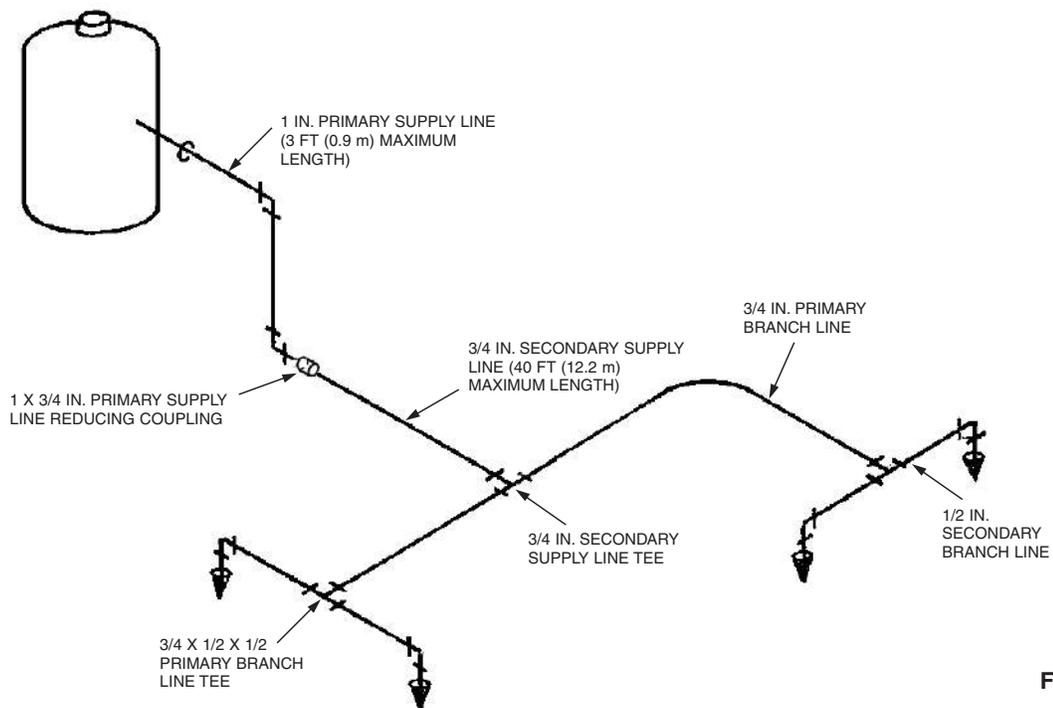
- The longest branch line length (which includes a primary and two (2) secondary branch lines) can be a total maximum length of 18 ft. (5.5 m) and must not exceed a 3:1 ratio of any other branch line within the tank distribution system.
- Any combination of V-1/2, C-1/2, and F-1/2 nozzles is acceptable.

**Note:** Balanced and unbalanced requirements can be intermixed on the same tank as long as the total combined hose length of each group does not exceed the 3:1 ratio requirement.

**LT-A-101-50 4 NOZZLE**

BALANCED – 50 FT (15.2 m) MAXIMUM LENGTH FROM PRIMARY SUPPLY LINE REDUCING COUPLING TO ANY NOZZLE.

UNBALANCED – 18 FT (5.5 m) MAXIMUM LENGTH PER BRANCH LINE



**FIGURE 5**  
007295

DISTRIBUTION SYSTEM REQUIREMENTS (Continued)

▶ 4 Nozzle Systems – LT-A-101-50

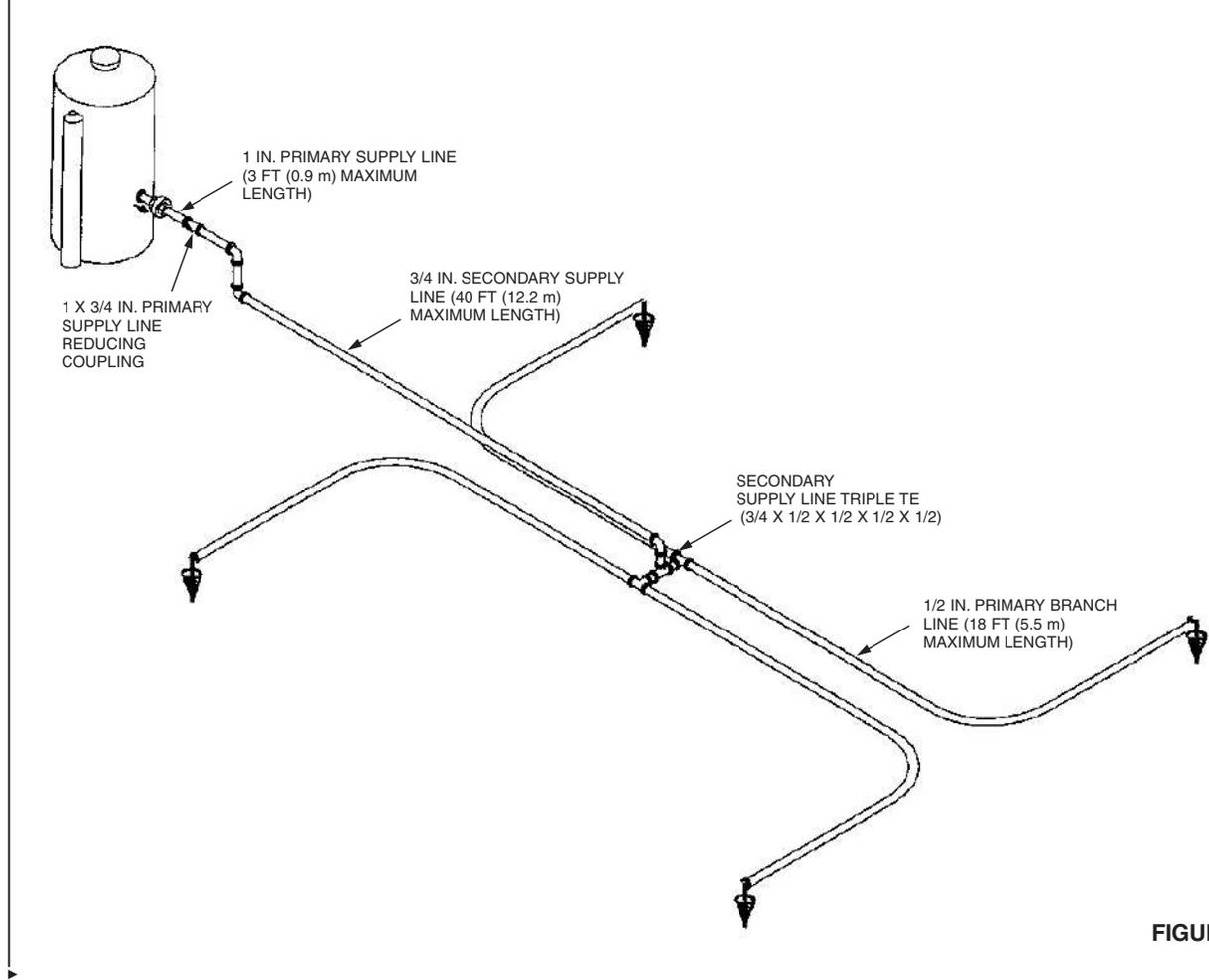


FIGURE 5 – Continued

007296

**SECTION IV – SYSTEM DESIGN – VEHICLE**

6-30-05 Page 4-8

REV. 2

**DISTRIBUTION SYSTEM REQUIREMENTS (Continued)**

**6 Nozzle Systems – LT-A-101-50**

**Primary Supply Line Requirements**

- Maximum length of 1 in. primary supply line from tank to the 1 in. primary supply line distribution tee is 10 ft (3.1 m).
- Maximum number of elbows in the 1 in. primary supply line is 2.

**Secondary Supply Line Requirements**

- Maximum length of each 3/4 in. secondary supply line is 40 ft (12.2 m)
- Maximum number of elbows from the primary supply line distribution tee to any nozzle is 4.

**Branch Line Requirements**

**BALANCED SYSTEMS:**

- Maximum total length from the 1 in. primary supply line distribution tee to any nozzle is 50 ft (15.2 m).
- Length of the 1/2 in. primary branch line on one side of the 3/4 x 1/2 in. secondary supply line tee must be within 10% of the length of the other 1/2 in. primary branch line sharing the same tee.

- Maximum number of elbows in a primary branch line is 2.
- Any combination of V-1/2, C-1/2, or F-1/2 nozzles is acceptable.

**UNBALANCED SYSTEMS:**

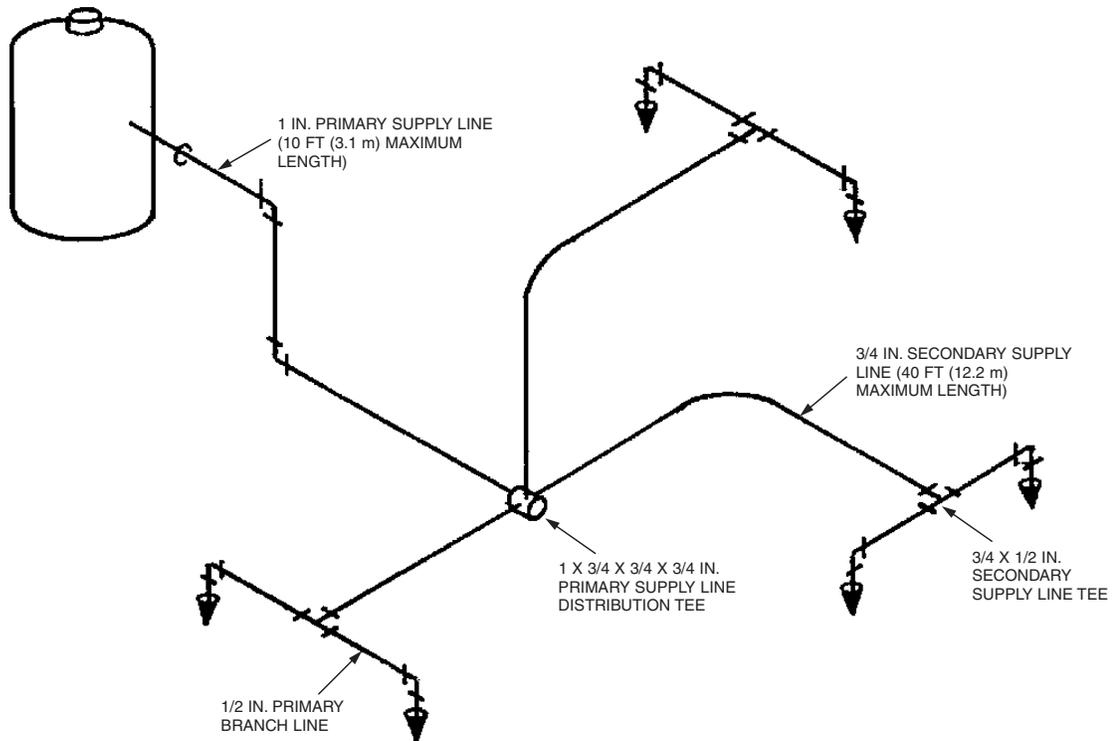
- Maximum primary branch line length is 18 ft (5.5 m) per branch line.
- Two \_ in. primary branch lines (sharing the same tee) must not exceed a 3:1 ratio between each other.
- Maximum number of elbows in a primary branch line is 2.
- Any combination of V-1/2, C-1/2, or F-1/2 nozzles is acceptable.

**Note:** Balanced and unbalanced requirements can be intermixed on the same tank as long as the total combined hose length of each group does not exceed the 3:1 ratio requirement.

**LT-A-101-50 6 NOZZLE**

BALANCED – 50 FT (15.2 m) MAXIMUM LENGTH FROM PRIMARY SUPPLY LINE DISTRIBUTION TEE TO ANY NOZZLE.

UNBALANCED – 18 FT (5.5 m) MAXIMUM LENGTH PER BRANCH LINE



**FIGURE 6**  
007297

**DISTRIBUTION SYSTEM REQUIREMENTS (Continued)**

**8 Nozzle Systems – LT-A-101-50**

**Primary Supply Line Requirements**

- Maximum length of 1 in. primary supply line from tank to primary supply line triple tee or reducing tee is 10 ft (3.1 m).
- Maximum number of elbows in the primary supply line is 2.

**Secondary Supply Line Requirements**

- Maximum length of each 3/4 in. secondary supply line is 40 ft (12.2 m)
- Maximum number of elbows from the primary supply line tee (triple or reducing) to any nozzle is 4.

**Branch Line Requirements**

**BALANCED SYSTEMS:**

- Maximum total length from primary supply line tee (triple or reducing) to any nozzle is 50 ft (15.2 m).
- Length of the 3/4 in. primary branch line on one side of the 3/4 in. secondary supply line tee to the primary branch line tee (Option 3 only) must be within 10% of the length of the other 3/4 in. primary branch line sharing the same tee.
- Length of the 1/2 in. secondary branch line on one side of the primary branch line tee (Option 3 only) must be within 10% of the length of the other 1/2 in. secondary branch line sharing the same tee.
- Length of the 1/2 in. primary branch line on one side of the secondary supply line tee or triple tee (Option 1 and 2 only) must be within 10% of the length of the other 1/2 in. primary branch line sharing the same tee.

- Maximum number of elbows in a primary branch line is 2.
- Maximum number of elbows in a secondary branch line is 2.
- Any combination of V-1/2, C-1/2, or F-1/2 nozzles is acceptable.

**UNBALANCED SYSTEMS:**

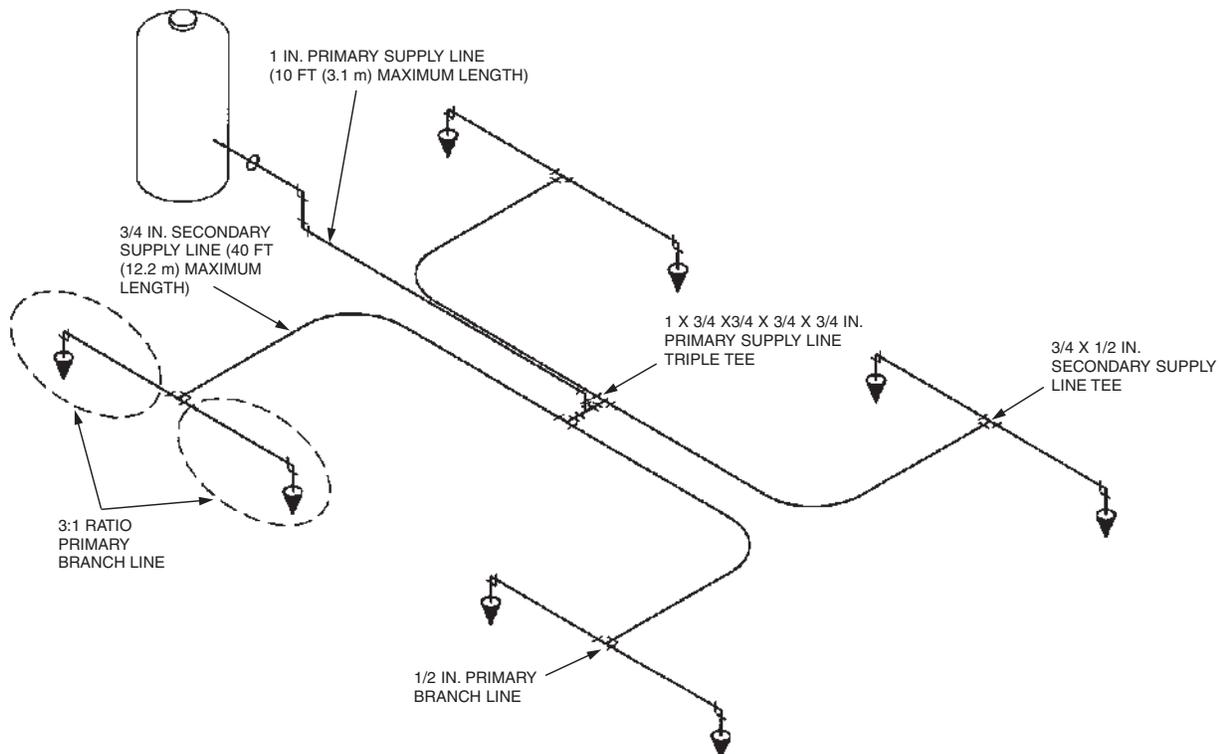
- (Options 1 and 2) The longest branch line length can be a total maximum length of 18 ft. (5.5 m) and must not exceed a 3:1 ratio of any other branch line(s).
- (Option 3 only) The longest branch line length (which includes a primary and two (2) secondary branch lines) can be a total maximum length of 18 ft (5.5 m) and must not exceed a 3:1 ratio of any other branch line(s).
- Two primary branch lines (sharing the same tee) must not exceed a 3:1 ratio between each other.
- Two secondary branch lines located in the same branch (sharing the same tee) must not exceed a 3:1 ratio between each other.
- Maximum number of elbows in a primary branch line is 2.
- Maximum number of elbows in a secondary branch line is 2.
- Any combination of V-1/2, C-1/2, or F-1/2 nozzles is acceptable.

**Note:** Balanced and unbalanced requirements can be intermixed on the same tank as long as the total combined hose length of each group does not exceed the 3:1 ratio requirement.

**LT-A-101-50 8 NOZZLE – OPTION 1**

BALANCED – 50 FT (15.2 m) MAXIMUM LENGTH FROM PRIMARY SUPPLY LINE TRIPLE TEE TO ANY NOZZLE.

UNBALANCED – 18 FT (5.5 m) MAXIMUM LENGTH PER PRIMARY BRANCH LINE



**FIGURE 7**

007298

**SECTION IV – SYSTEM DESIGN – VEHICLE**

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REV. 1

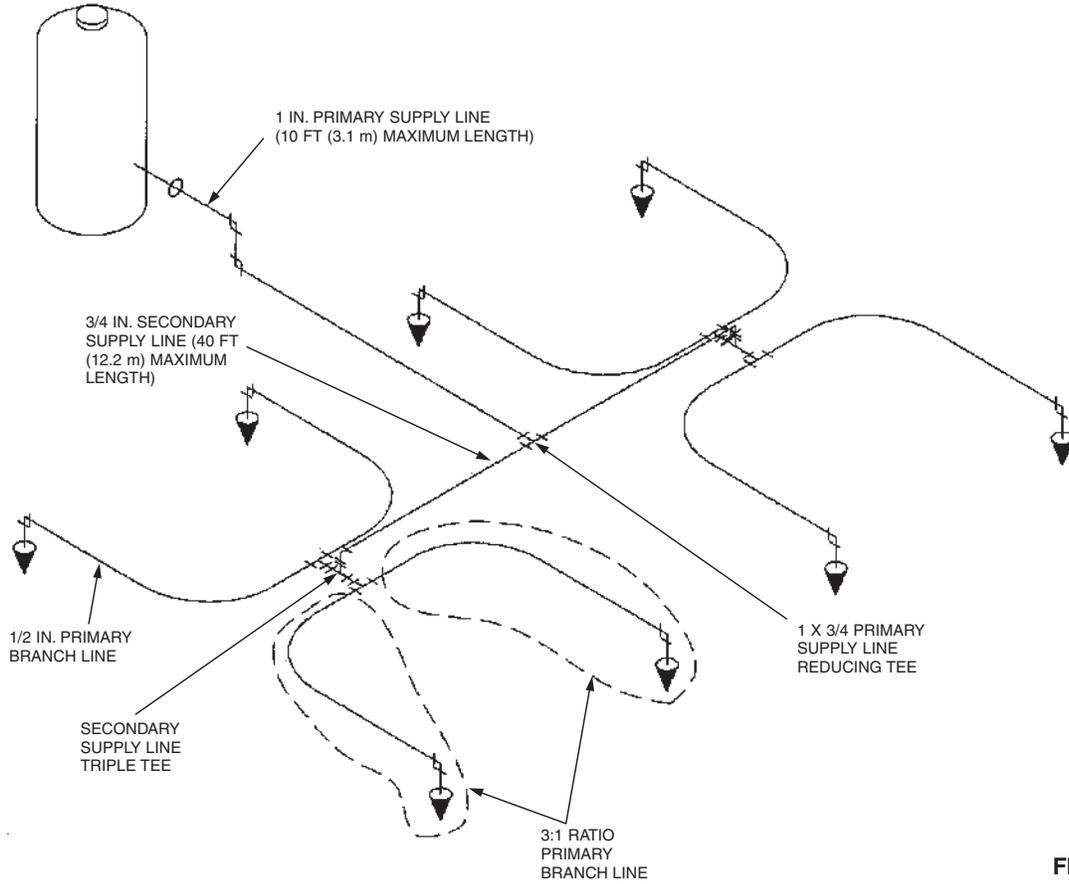
**DISTRIBUTION SYSTEM REQUIREMENTS (Continued)**

**8 Nozzle Systems – LT-A-101-50 (Continued)**

**LT-A-101-50 8 NOZZLE – OPTION 2**

BALANCED – 50 FT (15.2 m) MAXIMUM LENGTH FROM PRIMARY SUPPLY LINE REDUCING TEE TO ANY NOZZLE.

UNBALANCED – 18 FT (5.5 m) MAXIMUM LENGTH PER EACH PRIMARY BRANCH LINE



**FIGURE 7 – Continued**

007299

DISTRIBUTION SYSTEM REQUIREMENTS (Continued)

8 Nozzle Systems – LT-A-101-50 (Continued)

LT-A-101-50 8 NOZZLE – OPTION 3

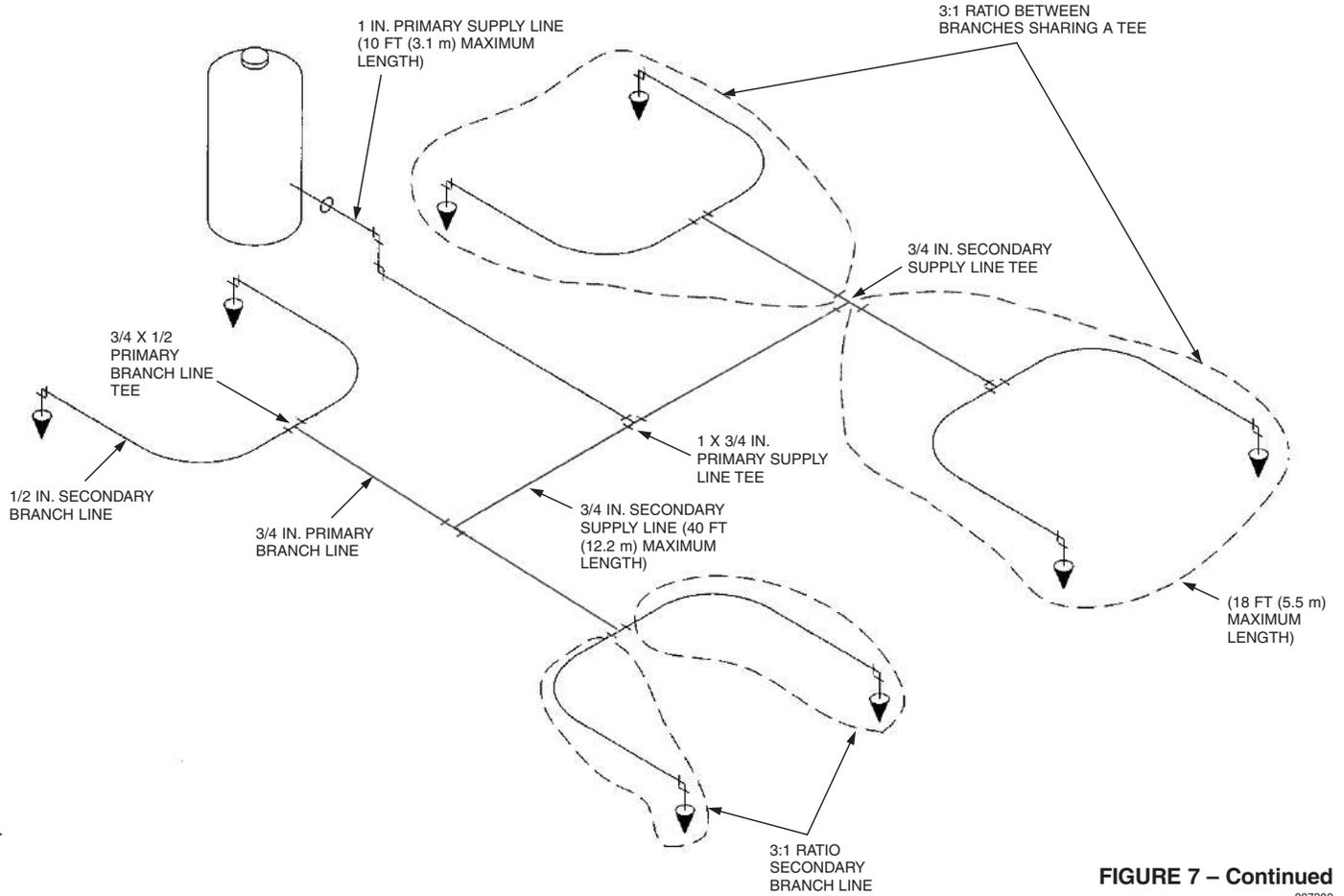


FIGURE 7 – Continued

007300

**SECTION IV – SYSTEM DESIGN – VEHICLE**

**DISTRIBUTION SYSTEM REQUIREMENTS (Continued)**

- ▶ **Primary Supply Line Requirements (LT-A-101-125/250) (8, 12, 16, or 24 Nozzle Systems) See Figure 8.**
  - Maximum 1 1/2 in. primary supply line length from tank to triple tee or distribution tee is 20 ft (6.1 m). The 20 ft (6.1 m) total must not exceed 10 ft (3.1 m) of 1 1/2 in. hose and 10 ft (3.1 m) of 1 1/2 in. pipe.
  - A 1 1/2 in. x 1 in. bell reducer is required to reduce to 1 in. before entering the 1 in. inlet on the distribution tee on 12 nozzle systems.
  - Maximum number of 1 1/2 in. elbows in the primary supply line is 2.
- ▶ **Secondary Supply Line Requirements (LT-A-101-125/250) (8, 12, 16, or 24 Nozzle Systems) See Figure 8.**
  - Maximum length of each 3/4 in. secondary supply line is 40 ft (12.2 m).
  - Maximum number of elbows from the primary supply line tee (triple or distribution) to any nozzle is 4.
- ▶ **Branchline Requirements (LT-A-101-125/250) (8, 12, 16, or 24 Nozzle Systems) See Figure 8.**

**BALANCED SYSTEMS:**

- Maximum total length from primary supply line tee to farthest nozzle is 50 ft 0 in. (15.2 m).
- Linear length of the primary branch line on one side of the primary tee to the secondary tee must be within 10% of the linear length of the other primary branch line from the primary tee to the secondary tee.

Also, the linear length of the secondary branch line on one side of the secondary tee must be within 10% of the linear length of the other secondary branch line sharing the same tee.

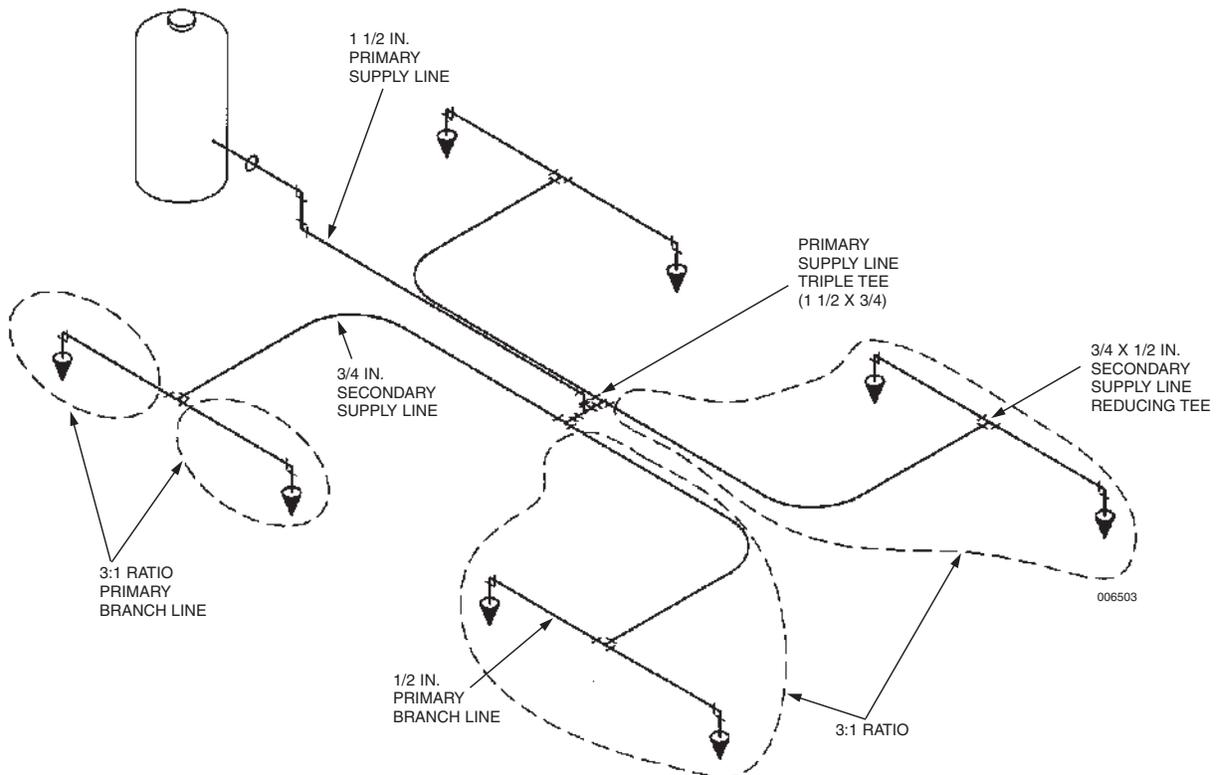
- Maximum number of elbows in a primary branch line is 2.
- Maximum number of elbows in a secondary branch line is 2.
- Any combination of F-1/2, C-1/2, or V-1/2 nozzles are acceptable.

**UNBALANCED SYSTEMS:**

- The longest branch line (including one primary plus two secondary) length is 18 ft (5.5 m) and must not exceed a 3:1 ratio of any other branch line(s).
- Two secondary branch lines located on the same branch line (sharing the same tee) must not exceed a 3:1 ratio between each other but are not required to be within a 3:1 ratio with secondary branch lines located on other branch lines.
- Maximum number of elbows in a primary branch line is 2.
- Maximum number of elbows in a secondary branch line is 2.
- Any combination of F-1/2, C-1/2, or V-1/2 nozzles are acceptable.

**Note:** Balanced and unbalanced requirements can be inter-mixed on the same tank as long as the total combined hose length of each group does not exceed the 3:1 ratio requirement.

▶ 8 NOZZLE SYSTEM (OPTION 1) (LT-A-101-125/250)

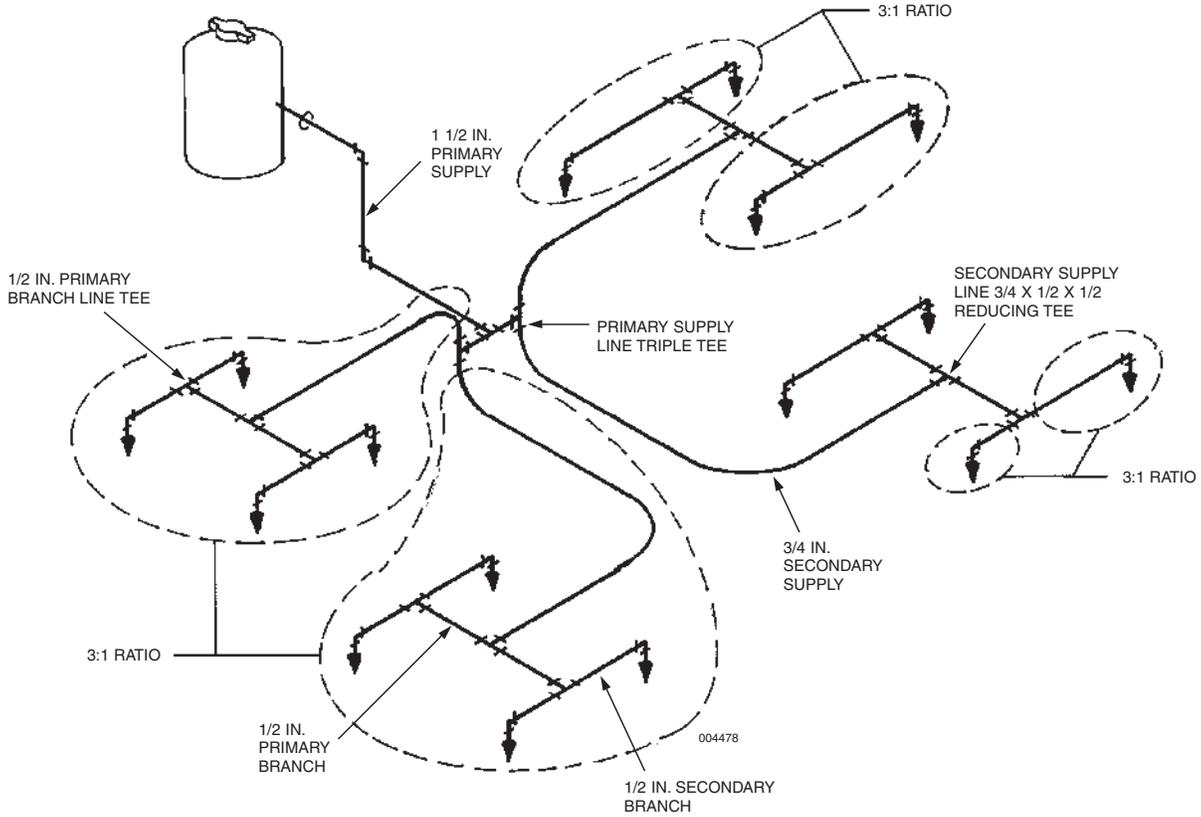


**FIGURE 8**  
006503



DISTRIBUTION SYSTEM REQUIREMENTS (Continued)

16 NOZZLE SYSTEM (LT-A-101-125/250)



24 NOZZLE SYSTEM (ONLY WITH LT-A-101-250 TANK)

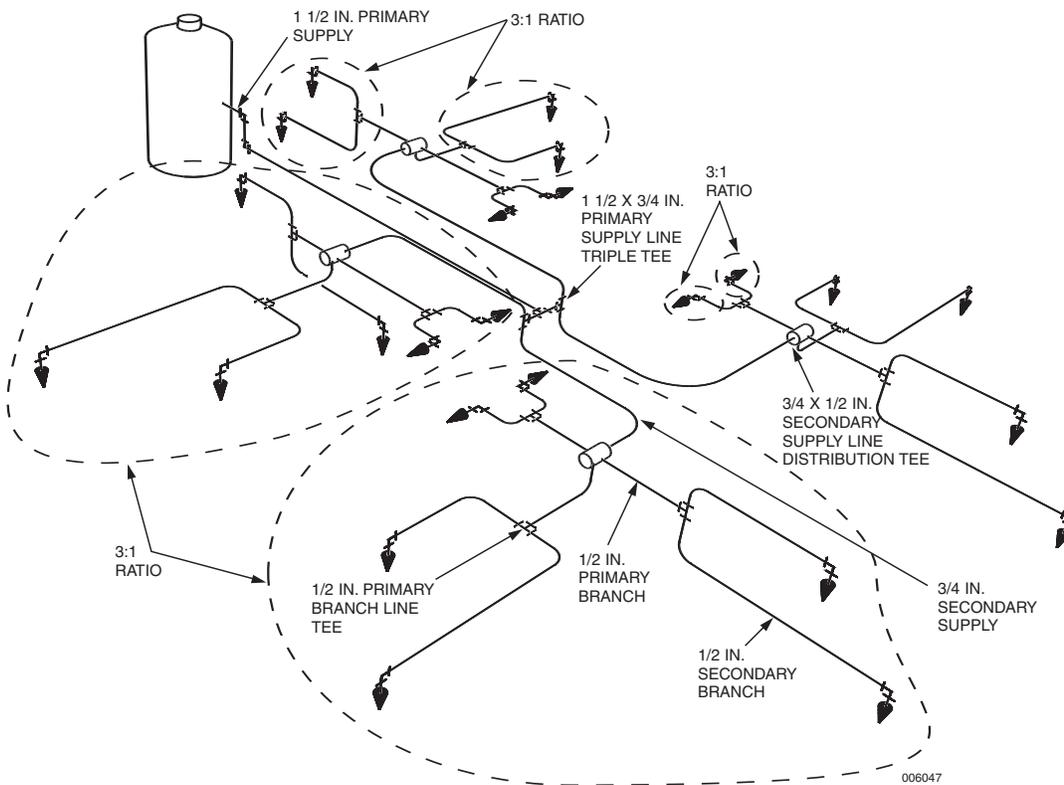


FIGURE 8 – Continued

## ACTUATION AND EXPELLANT GAS LINE REQUIREMENTS

### Actuation Line

The actuation gas line is the line from the manual remote actuators and/or the gas cartridge on the automatic detection system to the gas cartridge actuator located on the last LT-A-101-50/125/250 tank. The maximum number of actuators that can be actuated from a single actuator cartridge is ten (10). The actuation line can be a maximum of 100 ft (30.5 m) when using an LT-10 cartridge. When more than one actuation cartridge is in the system, a 1/4 in. check valve, Part No. 25627, must be installed to prevent the loss of actuation gas from an actuator that may have a cartridge removed. See Figure 9.

If more than one actuator is in the system, the total length of actuation line allowed from the actuator to the last tank must also include any amount of hose in the other actuation lines up to the check valves located in those lines.

The hose for the actuation system must meet the same specifications as the hose used for the dry chemical distribution network.

▶ See Figure 9 for hose and fitting specifications.

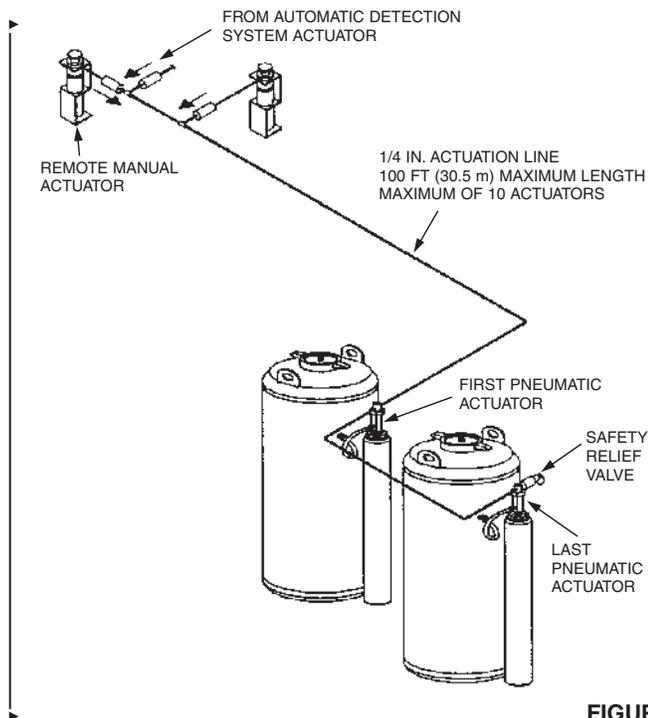


FIGURE 9

007226

## DETECTION SYSTEM REQUIREMENTS

Several types of automatic detection are available for use with the ▶ LT-A-101-50/125/250 Fire Suppression System.

See the following Installation Manuals for detailed information on each type of system:

- CHECKFIRE MP-N ELECTRIC SYSTEM – Manual Part No. 427310
- CHECKFIRE SC-N ELECTRIC SYSTEM – Manual Part No. 423522
- CHECKFIRE ELECTRIC SERIES 1 SYSTEM – Manual Part No. 54894

## SHUTDOWN REQUIREMENTS

### CAUTION

Before designing any shutdown or venting method, consult the vehicle manufacturer for specific instructions on the correct method for vehicle shutdown.

When protecting any vehicle, especially vehicles with large amounts of hydraulic fluid and fuel on board, the engine must be ▶ shut down and hydraulic pumps shut off and fuel and hydraulic ▶ tanks vented, if possible. To accomplish this, it is necessary to wire the shutdown of these devices into the CHECKFIRE Module ▶ shutdown relay contacts or use contacts in a pneumatically operated pressure switch. The following is a brief description of how this may be accomplished:

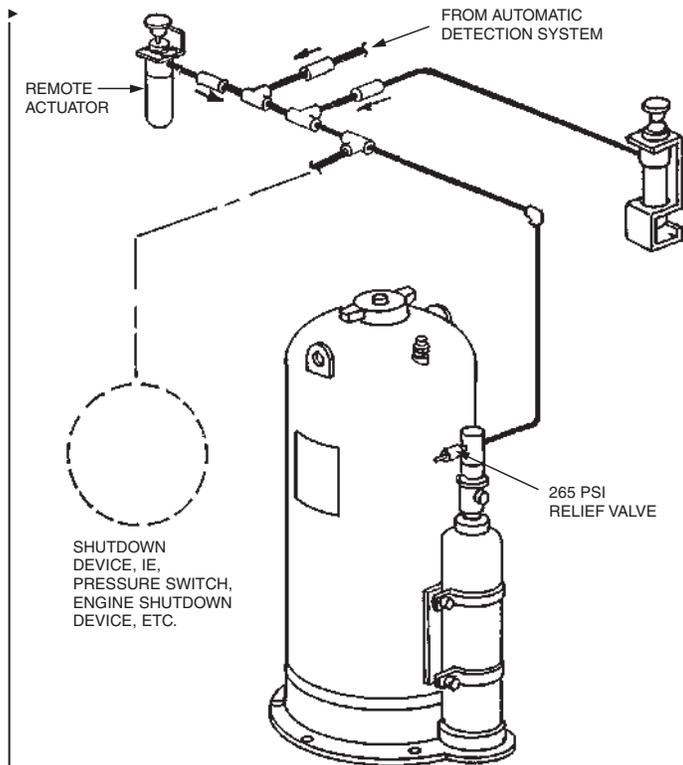
▶ **Engine Shutdown** – Engine shutdown may be accomplished through a normally energized fuel solenoid (supplied by others) which is wired in series with the normally closed “shutdown” relay ▶ contacts of the CHECKFIRE SC-N Control Module or in a pressure switch. These “shutdown” relay contacts will operate (open) after the first time delay cycle is complete on the module. If the system does not contain automatic detection (manual actuation ▶ only) a pressure switch should also be included for vehicle shutdown. Discuss shutdown options with either vehicle maintenance ▶ personnel and/or the vehicle manufacturer or dealer. Final shutdown connection should be performed by trained authorized personnel.

▶ **Note:** A fuel shutoff valve can also be added to the outlet of the fuel tank to minimize gravity draining of fuel from the tank in event ▶ of a ruptured fuel line.

**SHUTDOWN REQUIREMENTS (Continued)**

**Hydraulic Fluid Tank Air Shut Off and Venting** – Solenoid valves (supplied by others) can be used to vent the hydraulic tank. They can be wired to NO contacts on a relay (supplied by others). A solenoid (supplied by others), connected to the air supply line, if used, going to the hydraulic tank, can be wired to NC contracts of the same relay. The coil to the relay is wired in series with NC pressure switch contacts. The pressure switch is connected to the pneumatic actuation line of the dry chemical system. The relay coil is normally energized. When the pressure switch is activated by pressure in the actuation line, the switch contacts will open. Loss of power or an open circuit will cause the solenoid valves to transfer, thus shutting down the air supply.

- ▶ Another means available for fuel shutdown on some vehicles is to shut down the fuel rack by venting the hydraulic pressure through the “safety system”. This can be accomplished by installing the ANSUL Engine Shutdown Device, Part No. 427425, in the actuation line. (This is normally only an option on some underground mining applications.) When the ANSUL fire suppression system is actuated, the actuation pressure opens the check valve located in the engine shutdown device, allowing the safety system pressure to bleed into the holding tank. The drop in pressure causes the valves in the fuel rack to close, thus shutting down the engine. See Figure 10.



**FIGURE 10**  
004668

**ACCESSORIES**

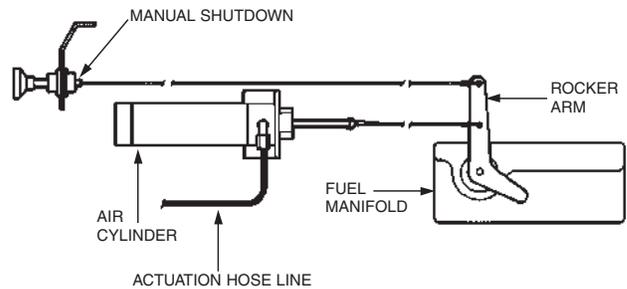
Accessories can be added to the pneumatic actuation line to mechanically shut off fuel, electrically shut off engines, and electrically sound alarms.

**Air Cylinder**

This component is a system accessory whose function is to shut off the fuel supply to the engine when the fire suppression system is actuated.

The fuel shut-off is a spring-return rocker arm on the side of the engine which has a cable link to the vehicle dashboard. The air cylinder rod will tie into this rocker arm, in parallel to, but not interfering with, the operator's cable control. See Figure 11.

**NOTE:** WHEN USING AN LT-10 CARTRIDGE, AT 125 FT OF HOSE, THE MAXIMUM FORCE AT THE AIR CYLINDER IS 70 LB



**FIGURE 11**  
003489

**Pressure Switch**

Three styles of pressure switches are available for various electrical functions:

**PRESSURE SWITCH PART NO. 46250 (Weatherproof)** – This pressure switch is a double pole, single throw (DPST) pressure switch constructed with a gasketed, water tight housing. The switch is rated at 10A – 125V, 5A – 250 VAC. This switch is suitable for outdoor applications.

**PRESSURE SWITCH PART NO. 43241** – This pressure switch is a double-pole, double-throw (DPDT) pressure switch. The switch is constructed with an explosion-proof housing suitable for hazardous environments. The switch contacts are rated at 10 amp at 125 VAC or 5 amp at 250 VAC.

**Note:** When installing pressure switches in the actuation line, the hose running to the switch must always be located downstream of any actuation check valves.

The following are typical industrial type hazards which can be protected by using the total flooding method: flammable liquid storage, dip tanks, solvent cleaning tanks, transformer vaults, quench tanks, and furnace rooms.

### HAZARD ANALYSIS

A thorough hazard analysis is required to determine the type and quantity of protection required.

Review each of the following requirements when doing a hazard analysis:

#### 1. Hazard Type

Record the size of the hazard, any obstructions, unclosable openings, size and location of external ductwork or anything else which would concern system performance. Briefly describe the type of hazard being protected. If protecting pre-fabricated booths, record the manufacturer model number and anything unique about the hazard.

#### 2. Hazard Atmosphere

- ▶ The LT-A-101-50/125/250 system can be used in most industrial environments. If the hazard atmosphere is considered corrosive, such that the solvents, chemicals, or gases present are damaging to the LT-A-101-50/125/250 system tank or actuators, the hardware should not be located in the hazard. When protecting an area defined as hazardous per NFPA 70 National Electric Code, Article 500, only equipment that has been listed or approved for the hazardous location, may be located in that area.

#### 3. Hazardous Materials

- ▶ The LT-A-101-50/125/250 system uses FORAY (ABC) dry chemical as the extinguishing agent. The agent effectiveness and limitation is based on its ability to suppress the fire with the design parameters of the pre-engineered system.

- a. FORAY dry chemical is effective on the following types of fire materials:

**Class A – Surface Fires:** These fires involve ordinary combustible materials such as cloth, paper, rubber, and many plastics.

**Class B – Flammable Liquid and Gas Fires:** These fires involve such materials as oils, grease, tars, oil-based paints, lacquers, and gasoline.

**Class C – Energized Electrical Equipment Fires:** Common Class C devices include control rooms, transformers, oil switches, circuit breakers, rotating equipment, pumps, and motors

- b. FORAY dry chemical is **NOT** effective on the following types of fire materials:

**Deep-seated Class A Materials:** Deep-seated or burrowing fires in ordinary combustibles where the FORAY dry chemical cannot reach the point of combustion.

**Class D – Combustible Metals:** Class D type materials are reactive such as sodium, potassium, magnesium, and titanium.

**Chemicals Capable of Rapid Oxidation:** Chemicals or mixtures of chemicals such as cellulose nitrate.

#### 4. Ventilation Considerations

The hazard ventilation system is very important when considering total flooding application, but should also be considered for local application overhead and tankside.

The ventilation system should be shut down and/or damped before or simultaneously with the start of the LT-A-101-50/125/250 system discharge.

#### 5. Electrical Considerations

It is recommended that all electrical power sources associated with the protected hazard be shut down before system discharge. This eliminates the potential of a fire being electrically-reignited.

#### 6. Temperature Range

The following temperature ranges must be determined and noted to ensure proper placement and operation of the A-101 system:

**Hazard Area:** Determine the minimum and maximum temperature of the hazard to be protected. This temperature may be any temperature that the distribution piping and detectors can withstand – only if the agent tank and accessories are located outside of the hazard area.

**Agent Tank:** The temperature range for all applications is –65 °F to +130 °F (–54 °C to +54 °C).

### DISTRIBUTION SYSTEM REQUIREMENTS

The distribution system for industrial hazards must follow the same requirements as listed for vehicle systems. See Section IV, SYSTEM DESIGN – VEHICLE, for detailed hose requirements for agent distribution and actuation/expellant gas lines.

**Exception:** For industrial hazards, only F-1/2 nozzles, Part No. 16449, are approved for total flood.

### NOZZLE COVERAGE

- ▶ The only nozzle approved for use with LT-A-101-50/125/250 industrial total flooding protection is the F-1/2 nozzle.

### Single System Capabilities – Total Flooding

- ▶ LT-A-101-50/125/250
  - Each set of (4) four nozzles will protect a 1000 cu. ft. (28.3 cu m) maximum hazard utilizing either a 4, 8, 12, 16, or 24 nozzle system.
  - Maximum linear hazard size for each set of (4) four nozzles is 10 ft x 10 ft x 10 ft (3.0 x 3.0 x 3.0 m) utilizing either a 4, 8, 12, 16, or 24 nozzle system.
- ▶ See Figure 1 for nozzle layouts.

SECTION V – SYSTEM DESIGN – INDUSTRIAL

6-30-05 Page 5-2

REV. 1

NOZZLE COVERAGE (Continued)

► LTA-101-50/125/250 FIRE SUPPRESSION SYSTEM – TOTAL FLOODING APPLICATION

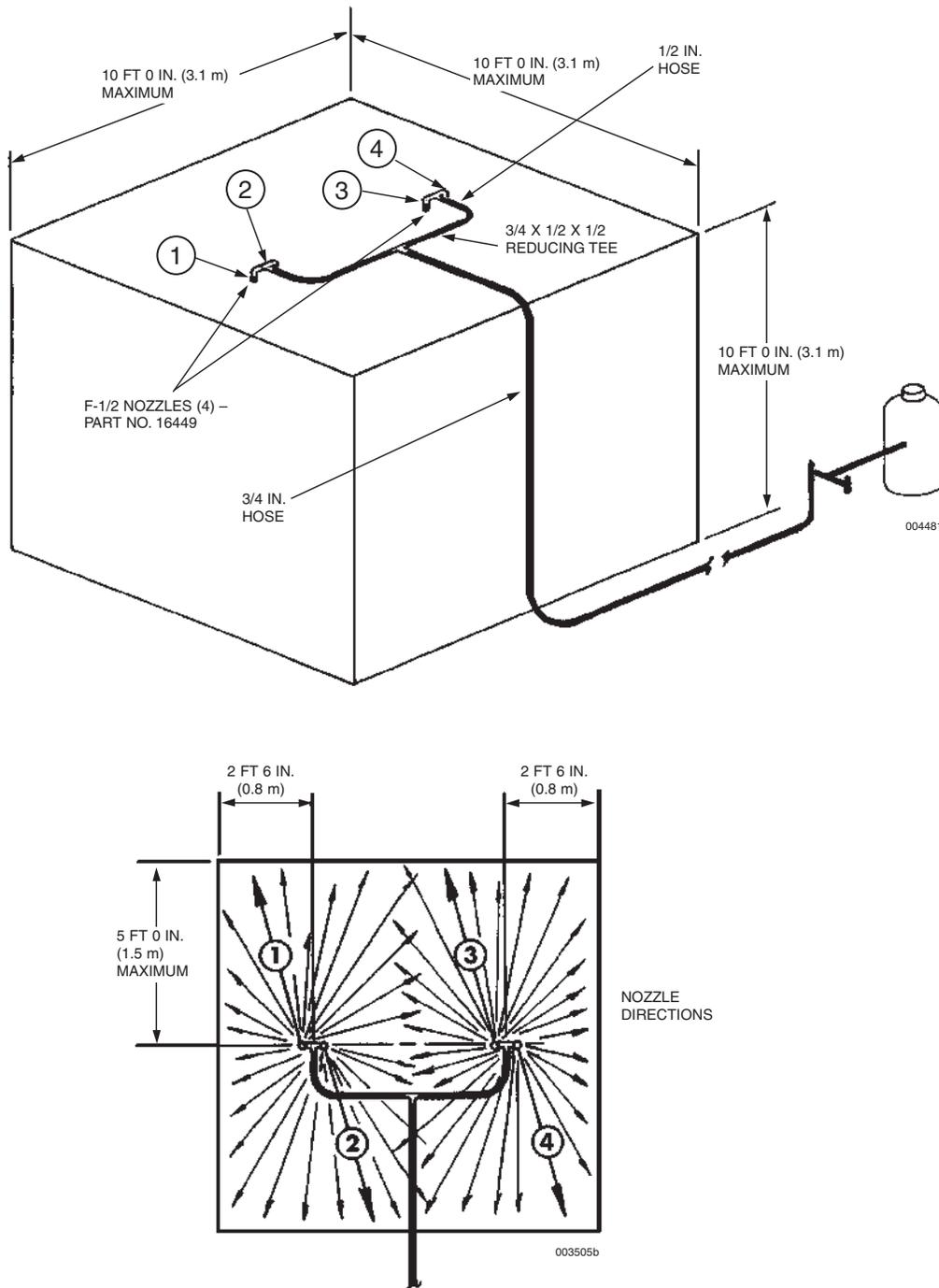


FIGURE 1

► The installation of an ANSUL LT-A-101-50/125/250 Fire Suppression system is based on the sketch developed in the System Design Section IV.

When deciding on locations for mounting the agent tanks, pneumatic actuators and manual actuators, locate areas where the components will not be abused or will not interfere with vehicle operation. Keep in mind not only the requirements for each individual component, but how the components are connected, and the maximum hose lengths required between each component.

Although the sequence of installation steps may vary with each installation, a basic LT-A-101-50/125/250 installation consists of four general procedures: mounting the brackets, installing the components, connecting the hoselines, and finally, installing the gas cartridges.

**MOUNTING THE BRACKETS**

**Nozzle Bracket**

Based on the layout sketch, locate a secure place for mounting the nozzle bracket so that the nozzle will be properly aimed, and weld or bolt the bracket to the mounting surface. When welding the bracket, make certain there is enough weld to keep the bracket properly in place.

Nozzles should be used to position the bracket for appropriate aiming of the nozzle. Tack weld the bracket and re-insert the nozzle to verify the aim. Then, remove the nozzle and fully weld the bracket.

If welding is not possible, the bracket can be drilled and bolted to the mounting surface with the appropriate fasteners. Make certain the bolting method does not allow the mounting bracket to rotate out of position or interfere with the nozzle discharge.

**Note:** A minimum of two bolts is required for proper mounting.

► **Tank Mounting Ring and Tank – LT-A-101-125/250**

**NOTICE**

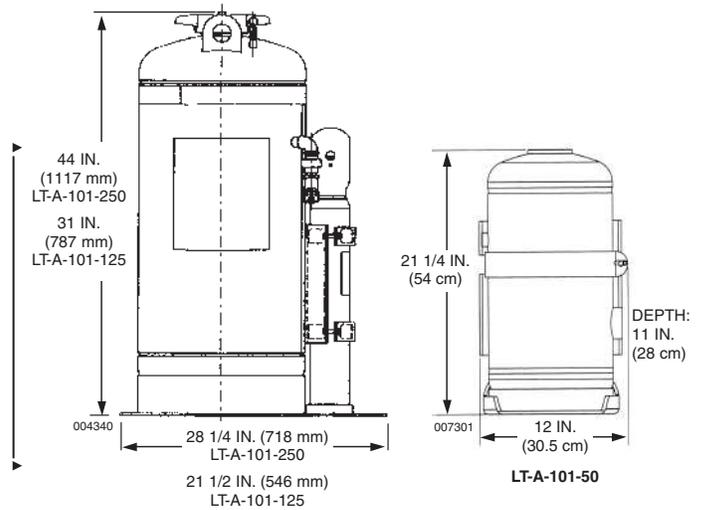
► The location of the LT-A-101-50/125/250 tank must not cause the hose length limitations to be exceeded.

**NOTICE**

► When mounting the tank(s), make certain the mounting surface is a rigid surface capable of supporting a 515 lb (234 kg) LT-A-101-250, a 297 lb (135 kg) LT-A-101-125 tank assembly, or a 105 lb (48 kg) LT-A-101-50 tank assembly and that it is allowed by the vehicle manufacturer to secure to that surface.

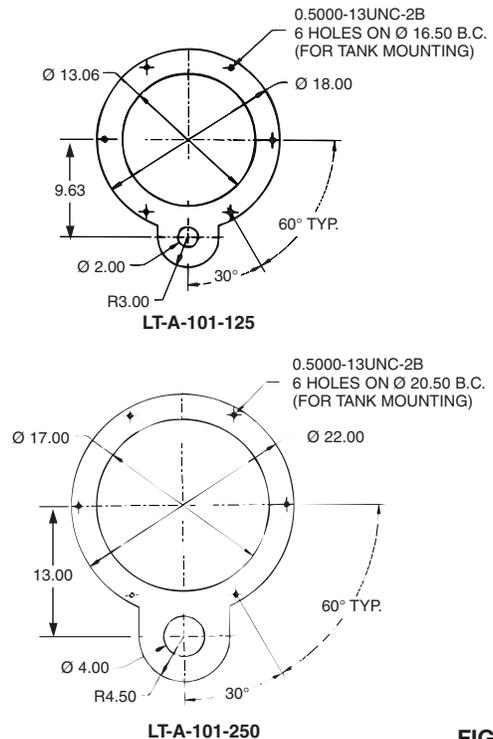
► To properly fasten the tank, the base of the tank must be bolted to the surface on which the tank is located, or on to the optional mounting ring.

1. Position the tank against a rigid surface capable of supporting the weight of the full tank assembly, making sure there is no interference with any components. See Figure 2.



**FIGURE 2**

2. If the location is suitable, remove the tank from that area and weld the mounting ring, Part No. 428405 (for LT-A-101-250) or Part No. 428404 (for LT-A-101-125), in position. See Figure 3.



**FIGURE 3**

3. With the mounting ring securely in place, position tank on ring and bolt tank flange to mounting ring using (6) six 1/2 in. x 1 in. (25 mm) long bolts with washers and lock washers.

**SECTION VI – INSTALLATION INSTRUCTIONS**

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REV. 1

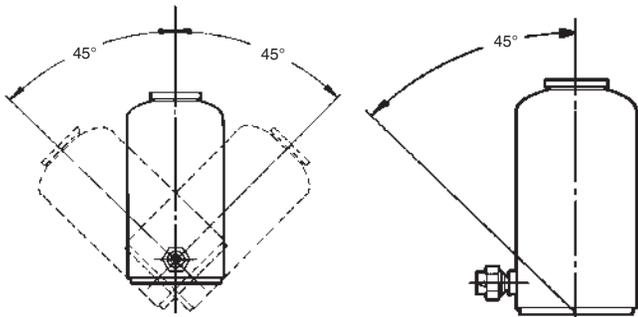
**MOUNTING THE BRACKETS**

▶ **Tank Mounting Ring and Tank (Continued)**

- ▶ 4. After the tank(s) has been properly mounted, if necessary, fill each tank with the proper amount of FORAY dry chemical. The LT-A-101-125 tank requires 112 lb (50.8 kg) of chemical and the LT-A-101-250 tank requires 225 lb (102.1 kg) of chemical. Once filled, securely hand tighten the fill cap. **Note:** Make certain the indicator stem in the fill cap is in the “down” position.

▶ **Tank Bracket and Tank – LT-A-101-50**

When deciding on a mounting location for the agent tank, locate a rigid area where the tank can be mounted in an upright position capable of supporting a 105 lb (48 kg) tank assembly. If necessary, the tank can be mounted up to 45° tilted to the left or right of true vertical, or tipped 45° forward from true vertical. The agent tank cannot be tipped backwards. See Figure 4.



**FIGURE 4**  
007302

- 1. If necessary, remove the agent tank from the bracket and weld the bracket to the mounting surface. The bracket can be secured at the base, at the back, or both, depending on the mounting surface. If the bracket cannot be welded, bolting is acceptable. 7/16 in. (1.1 cm) mounting holes are provided in the bracket to accommodate 3/8 in. fasteners. Make sure when mounting bracket that there is access to the bolts holding the clamp arm in place.

When utilizing the back frame for mounting, use all four mounting holes. When utilizing the bottom for mounting, use all four mounting holes. If conditions require, use all eight holes. Use Grade 5 minimum bolts.

**Note:** When tightening bolt in clamp arm, tighten until contact is made between both arm surfaces.

**LT-A-101-30 Cartridge Bracket**

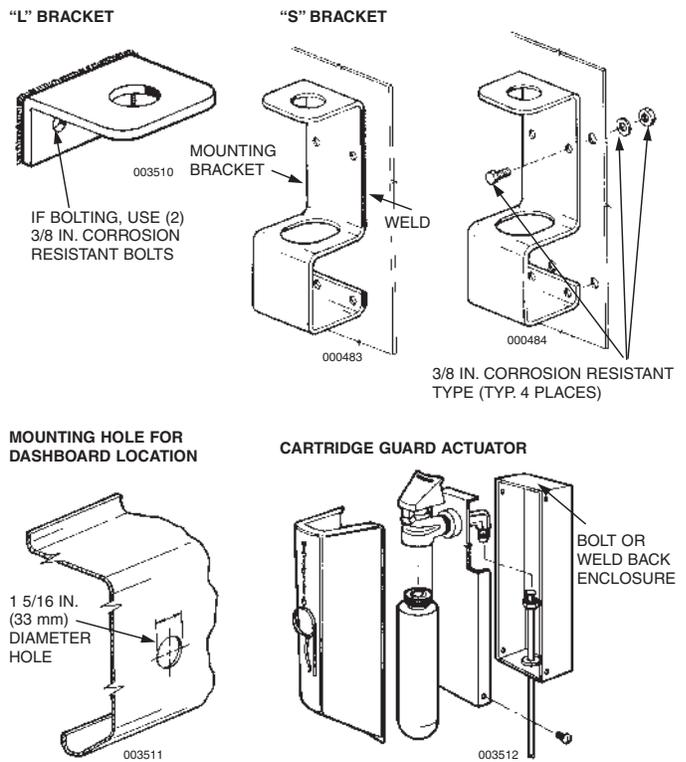
- 1. If necessary, remove the cartridge from the bracket. Locate a rigid, protected surface and weld or bolt the cartridge bracket securely. When bolting the bracket, use 5/16 in. fasteners. Make certain the mounting location allows for easy removal of the cartridge when required.

**Remote Actuator Bracket**

A remote manual actuator must be located in the drivers compartment within reach of the operator, and a remote manual actuator should be located at a point on the vehicle accessible from ground level. When mounting any actuator, make certain the length of hose between the actuator and the tank or remote expellant gas cartridge does not exceed 100 ft (30.5 m) for LT-10 cartridges. Also, make certain there is enough room for cartridge removal.

**Note:** The actuator must be located in an area that will not exceed temperature limitations or be subject to fire or damage. Try to avoid mounting actuator near engine compartment.

- 1. Choose a suitable mounting location and weld or bolt each actuator bracket in place. If bolting the bracket(s), use 3/8 in. fasteners. If welding, to avoid corrosion, paint welded surface. See Figure 5.
- 2. If mounting the remote manual actuator in the dashboard of a vehicle, the actuator can be mounted by drilling a 1 5/16 in. (33.3 mm) diameter hole as shown in Figure 5. Make certain there is enough room for the actuator body, cartridge and 1/4 in. actuation line connection under the dash.



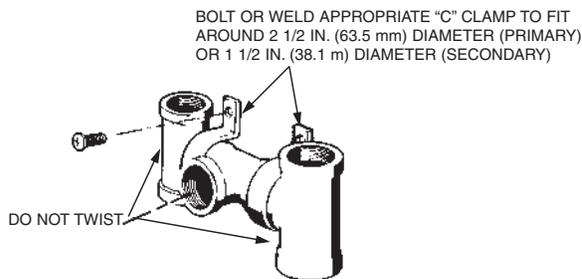
**FIGURE 5**

### MOUNTING THE TRIPLE, DISTRIBUTION, AND REDUCING TEES

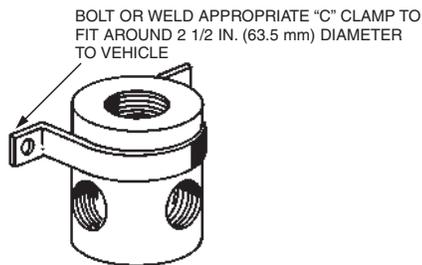
Based on the sketch done in the Design Section, locate each tee at a point which will not cause the supply line and branch line lengths to be exceeded.

1. All distribution network fittings must be welded or clamped to the mounting surface. See Figure 6. All welds must be made before any hose has been installed to avoid damage to the hose due to high welding temperatures.
2. When locating tees, make certain the locations do not cause the hose to be exposed to extreme heat or physical abuse.
3. Make certain the end tees on the triple tee are not twisted from their original position. See Figure 6.

#### TRIPLE TEE



#### DISTRIBUTION TEE



#### REDUCING TEE, 1/2 IN. X 1/2 IN. X 3/4 IN.

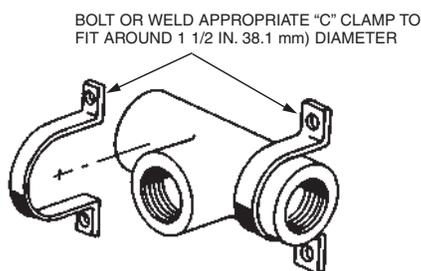


FIGURE 6  
003513

### INSTALLING THE COMPONENTS

#### Installing the Nozzles

1. Refer to this system layout sketch from the Design Section IV. This sketch should give you the information concerning what nozzle to use where and the correct aiming point.
2. Choose the correct nozzle(s) for each hazard area.
3. Install nozzle(s) in bracket by using two lockwashers, and either 1/2 in. elbow(s) or coupling. See Figure 7. **Aim the nozzle correctly and securely tighten.**

#### NOTICE

If the bracket does not allow for proper aiming of the nozzle, two (2) elbows will be needed to aim correctly.

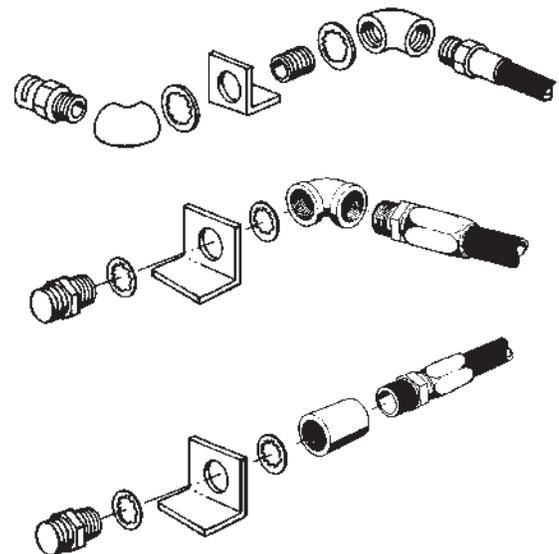


FIGURE 7  
003515

4. Either install nozzle blow-off cap(s) or pack nozzle opening(s) with silicone grease to avoid build-up of foreign materials. **Note:** The F-1/2 nozzle is the only nozzle in which silicone grease can be used in the opening.

#### Installing Manual Actuators

Three types of manual actuators brackets are available for the A-101 system: "S" bracket, "L" bracket, and cartridge guard. Location of all actuators must be visible and easily reached by operator. Location must not expose actuator to physical abuse. Actuators using the "S" bracket and the cartridge guard type bracket are suitable for both internal and external mounting. The "L" type bracket is not suitable for external mounting.

#### REMOTE MANUAL ACTUATOR WITH "S" BRACKET

1. If not already done, weld or bolt mounting bracket to the selected surface. If welding, to avoid corrosion, paint welded surface. See Figure 4.

#### NOTICE

Where bolting the mounting bracket is performed, use 3/8 in. (corrosion-resistant) bolts of appropriate length with lockwashers and nuts.

2. Unscrew the RED actuator button from the actuator stem, remove locknut, and slide actuator body through mounting hole on bracket. See Figure 8.

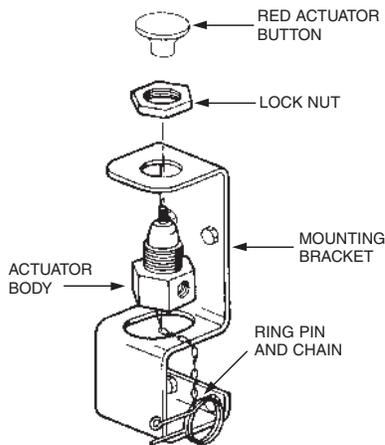
## SECTION VI – INSTALLATION INSTRUCTIONS

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### INSTALLING THE COMPONENTS (Continued)

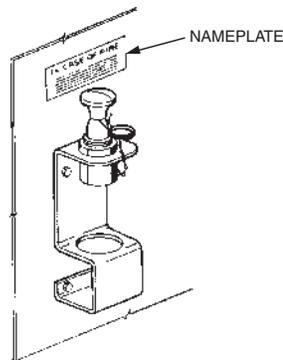
#### Installing Manual Actuators (Continued)

3. Rotate actuator body for desired location of actuation hose outlet connection. Screw locknut firmly onto actuator body and insert ring pin. Apply a non-permanent thread adhesive, such as Loctite 242 or equal, to the RED actuator button threads and then screw button onto the stem. See Figure 8.



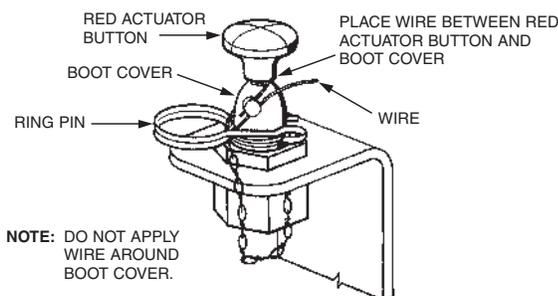
**FIGURE 8**  
000485

4. Affix the appropriate operating nameplate adjacent to the manual actuator so that it is visible to attending personnel. See Figure 9.



**FIGURE 9**  
000486

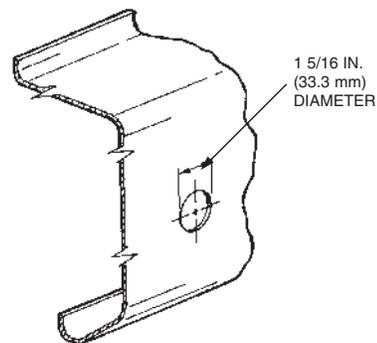
5. Make certain ring pin is inserted through the RED actuator button to ensure safe cartridge installation. See Figure 10.
6. Seal ring pin to actuator stem with visual inspection seal, Part No. 197. Make certain visual inspection seal is looped through ring pin and around actuator stem. Do not wrap seal around the boot cover. See Figure 10. **DO NOT INSTALL CARTRIDGE AT THIS TIME.**



**FIGURE 10**  
000487

#### REMOTE MANUAL ACTUATOR MOUNTED IN DASHBOARD

1. Punch or drill a 1 5/16 in. (33.3 mm) diameter hole for mounting the actuator body. See Figure 11. Make certain there is enough room under the dash for the actuator body, cartridge, and the 1/4 actuation hose connection.

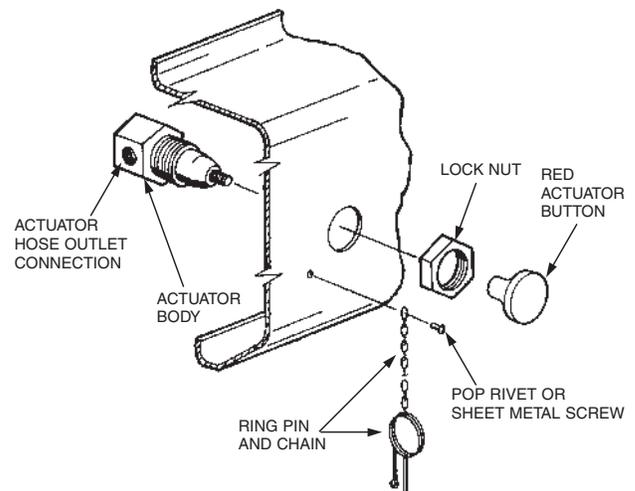


**FIGURE 11**  
003511

2. Unscrew RED actuator button from actuator stem, remove locknut, and slide actuator body through mounting hole. See Figure 12.
3. Rotate actuator body for desired location of actuation hose outlet connection. Screw locknut firmly onto actuator body and insert ring pin. Apply a non-permanent thread adhesive, such as Loctite 242 or equal, to the RED actuator button threads and then screw the button onto the stem. See Figure 12.

#### NOTICE

The ring pin chain may not be long enough in certain dashboard mounted locations. When this occurs, remove the chain from the drive pin in actuator body and attach it to an appropriate location using either a pop rivet or a sheet metal screw. See Figure 12.

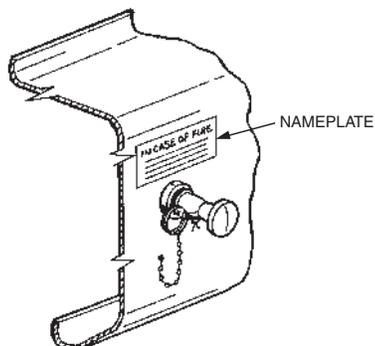


**FIGURE 12**  
003517

4. Affix the appropriate operating nameplate adjacent to the manual actuator and visible for attending operator. See Figure 13.
5. Make certain ring pin is inserted through the RED actuator button to ensure safe cartridge installation. See Figure 13.

**INSTALLING THE COMPONENTS (Continued)****Installing Manual Actuators (Continued)****REMOTE MANUAL ACTUATOR MOUNTED IN DASHBOARD (Continued)**

6. Seal ring pin to actuator stem with visual inspection seal, Part No. 197. Make certain visual inspection seal is looped through ring pin and around actuator stem. Do not wrap seal around the boot cover. See Figure 13. **DO NOT INSTALL CARTRIDGE AT THIS TIME.**

**FIGURE 13**

003518

**REMOTE MANUAL ACTUATOR WITH "L" BRACKET**

1. If not already done, weld or bolt mounting bracket to the selected surface. If welding, to avoid corrosion, paint welded surface. See Figure 5. **Note:** Bracket must be installed in a way that will provide protection for the exposed cartridge.

**NOTICE**

Where bolting the mounting bracket is performed, use 3/8 in. (corrosion-resistant) bolts of appropriate length with lockwashers and nuts.

2. Unscrew the RED actuator button from the actuator stem and slide actuator body through mounting hole on bracket.
3. Rotate actuator body for desired location of actuation hose outlet connection. Screw locknut firmly onto actuator body and insert ring pin. Apply a non-permanent thread adhesive, such as Loctite 242 or equal, to the RED actuator button threads and then screw button onto the stem.
4. Affix the appropriate operating nameplate adjacent to the manual actuator so that it is visible to attending personnel.
5. Make certain ring pin is inserted through the RED actuator button to ensure safe cartridge installation.
6. Seal ring pin to actuator stem with visual inspection seal, Part No. 197. Make certain visual inspection seal is looped through ring pin and around actuator stem. Do not wrap seal around the boot cover. See Figure 10. **DO NOT INSTALL CARTRIDGE AT THIS TIME.**

**REMOTE MANUAL ACTUATOR WITH CARTRIDGE GUARD**

1. Remove back box from actuator assembly.
2. If not already done, weld or bolt back enclosure to the selected surface. If welding, to avoid corrosion, paint welded surface. See Figure 5.

**NOTICE**

Where bolting the back enclosure is performed, use 3/8 in. (corrosion-resistant) bolts of appropriate length with lockwashers and nuts.

**INSTALLING THE DISTRIBUTION NETWORK****General Requirements**

Refer to the system layout sketch completed in the Design Section IV. Make certain all hose lengths do not exceed the maximum allowed.

When installing the distribution hose, once again remember the following:

1. Make certain the proper type and size of hose is used.
2. In order to obtain equal distribution at a tee, the center opening must be used as an inlet and the opposing openings used as outlets.
3. When any 90° bend or elbow is located in the distribution hoseline preceding a tee, a minimum length of 20 hose diameters may be required between the 90° bend and the tee. This length of hose is called a "critical length" and exists only when the 90° bend and the tee lie in the same plane.
4. The use of street elbows is not allowed.
5. Per SAE J1273, "Care must be taken to insure that fluid and ambient temperatures, both static and transient, do not exceed the limitations of the hose. Special care must be taken when routing near hot manifolds."
6. Use of 90° elbows is allowed if the following requirements are not exceeded:
  - Maximum number of 1 1/2 in. or 1 in. elbows in the primary supply line is 2.
  - Maximum number of elbows from the primary supply line tee to any nozzle is 4.
  - Maximum number of elbows in a primary branch line is 2.
  - Maximum number of elbows in a secondary branch line is 2.
7. When bends are formed in the distribution hose, the following minimum bend radius must not be exceeded:
 

Hose Size	100RI	100R5
1/4 in.	4 in. (102 mm)	3 in. (76 mm)
1/2 in.	7 in. (178 mm)	5 1/2 in. (140 mm)
3/4 in.	9 1/2 in. (241 mm)	—
1 in.	12 in. (305 mm)	—
1 1/2 in.	20 in. (508 mm)	—

**Note:** Minimum bend radius measured to inside of hose radius.
8. If pipe is used, a 1 1/2 in. union must be installed after the burst disc nipple to allow for replacement of the nipple after discharge.
9. If necessary, the primary supply line triple tee, Part No. 428065, can be installed immediately after the burst disc nipple. (See Step 8 above.)

## SECTION VI – INSTALLATION INSTRUCTIONS

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REV. 2

### INSTALLING THE DISTRIBUTION NETWORK (Continued)

#### Distribution Hose Installation

1. Starting at the tank outlet, connect the 1 1/2 in. primary supply line distribution hose or pipe from the bursting disc nipple to the triple or distribution tee. Make certain hose is routed in an orderly manner and avoid routing hose through fire hazard areas if possible.
2. In environments with excessive amounts of moisture, tape all joints. When applying tape, start at the second male thread and wrap the tape (two turns maximum) clockwise around the threads, away from the pipe opening.

#### NOTICE

Do not allow tape to overlap the pipe opening as the pipe and nozzles could become plugged.

3. After hose has been connected, tighten the union. Then, install 3/4 in. secondary supply hose from the primary supply line tee to the 3/4 in. triple tee or reducing tee.
4. Follow the sketch (completed in Hazard Analysis portion of Design Section IV) and complete all hose branch line runs.
5. When connecting the hose to each nozzle, make certain the aiming angle of each nozzle is not disturbed. Reaim, if necessary.
6. When routing hose through bulkheads, take precautions to protect the hose from wear due to constant vehicle vibration.
7. While routing distribution hose, make certain all fittings are wrench tightened.
8. Finally, clamp the discharge hose securely at least every five feet using industrial duty cable ties or conduit clamps.
9. When passing through bulkheads or grates, Schedule 40 nipples up to 6 in. in length may be used in the distribution line. Refer to NFPA17, Section 2-5 (Pipe and Fittings).

### INSTALLING PNEUMATIC ACTUATOR AND ACTUATION AND EXPELLANT GAS LINES

#### General Requirements

1. Use only 1/4 in. hose for actuation and expellant gas lines when used on mobile or vibrating type of installations. Hose must meet the specifications noted in Design Section.
2. On non-mobile or non-vibrating type installations, 1/4 in. pipe is acceptable. Pipe must be 1/4 in. Schedule 40 black iron, hot-dipped galvanized, chrome-plated, or stainless steel pipe and fittings conforming to ASTM A120, A53, or A106. Refer to Design Section for maximum allowable lengths.
3. When using pipe, make certain all ends are carefully reamed and blown clear of chips and scale. Inside of pipe and fittings must be free of oil and dirt.
4. When using pipe, the pipe and fitting connections must be sealed with pipe tape. When applying pipe tape, start at the second male thread and wrap the tape (two turns maximum) clockwise around the threads, away from the pipe opening.

#### NOTICE

Do not allow tape to overlap the pipe opening, as this could cause possible blockage of the gas pressure. **Thread sealant or compound must not be used.**

5. When passing through bulkheads or grates, up to 6 in. of Schedule 40 pipe may be used in the actuation and/or expellant gas lines. Refer to NFPA17, Section 2-5 (Pipe and Fittings).

6. Avoid routing actuation gas hose through fire hazard areas. If this is not possible, make certain to protect the hose with a high heat resistant fire jacketing.
7. Cast iron pipe and fittings are not allowed.
8. Per SAE J1273, "Care must be taken to insure that fluid and ambient temperatures, both static and transient, do not exceed the limitations of the hose. Special care must be taken when routing near hot manifolds."

### Installing The Actuation Gas line(s) and Pneumatic Actuator(s) (LT-A-101-125/250)

#### NOTICE

When installing actuation gas lines, teflon tape must be utilized on all male threads. Do not allow tape to overlap the pipe opening, as this could cause possible blockage of the gas pressure. **Thread sealant or compound must not be used.**

The actuation gas line is the 1/4 in. hose installed from the remote manual/automatic actuator(s) to the pneumatic actuator(s) on the 125/250 tank nitrogen cartridge(s). See Figure 14.

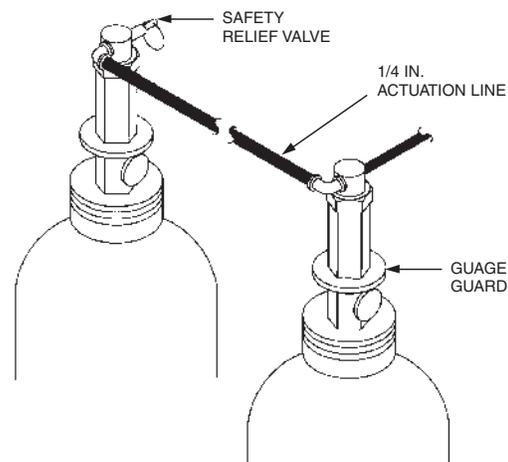


FIGURE 14

006434

- ▶ The maximum total length of an actuation line pressurized by a single LT-10 cartridge is 100 ft (30.5 m).

If more than one remote actuator is in the system, the total length of actuation line allowed from the actuator to the last tank must also include any amount of hose in the other actuation lines up to the check valves located in those lines.

Complete the installation of all dry chemical actuation lines and components by completing the following:

1. Install all pneumatic actuators as follows:
  - a. When removing actuator from the carton, check pin to make certain it is in the upright position. See Figure 15.

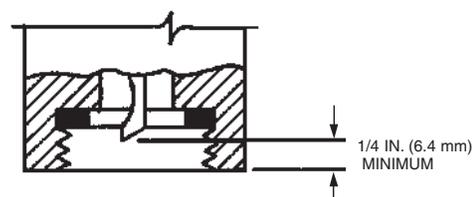


FIGURE 15

004357

**INSTALLING PNEUMATIC ACTUATOR AND ACTUATION AND EXPELLANT GAS LINES (Continued)**

**Installing The Actuation Gas line(s) and Pneumatic Actuator(s) (LT-A-101-125/250) (Continued)**

- b. Securely hand tighten the pneumatic actuator cartridge body to cartridge. **Note:** Make certain gauge guard is in position above gauge. See Figure 14.
- c. Position actuator and cartridge assembly into bracket.
- d. Using two wrenches, one on the swivel nut and one on the bottom portion, loosen the swivel nut, and rotate the top portion of the actuator to the correct position to align the two actuation line ports with the incoming and outgoing 1/4 in. actuation line(s).

**CAUTION**

Each actuator contains two (2) 1/4 in. actuation ports. If both ports are not utilized, the open port must be plugged with a 1/4 in. pipe plug. Failure to plug the port will cause loss of actuation gas pressure upon system actuation.

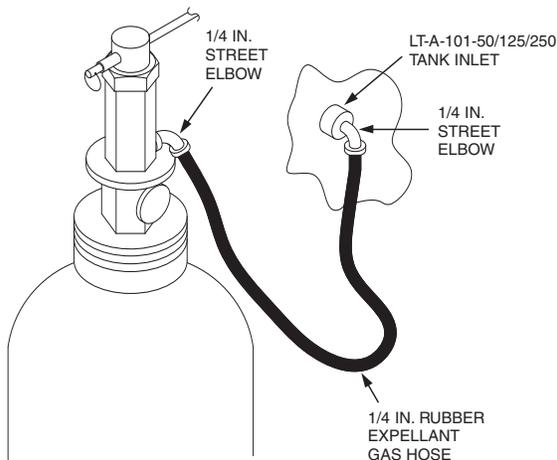
- 2. Install required 1/4 in. actuation lines from the remote actuator outlet port outlet to all actuation ports on the upper portion of each pneumatic actuator.
- 3. Once all lines are securely installed, wrench tighten the swivel nut on the upper portion of each pneumatic actuator.

**▶ Installing Expellant Gas Line(s) (LT-A-101-125/250)**

The expellant gas line is located between the pneumatic actuator on the nitrogen cartridge and the pressure inlet on the tank. This line is a 24 in. (61 cm), 1/4 in. rubber hose (included with 125/250 tank shipping assembly). This expellant gas line is located between the bottom outlet port of the pneumatic actuator and the pressure inlet port on the side of the tank.

Before installing the expellant gas hose, install the 1/4 in. street elbow (included) into the inlet coupling on the side of the dry chemical tank and install a second 1/4 in. street elbow (include) into the bottom port of the pneumatic actuator. See Figure 16. Use teflon tape on the male elbow threads. Position the elbows to insure a smooth transition into the 1/4 in. hose when attached.

Securely attach the hose as shown in Figure 16.



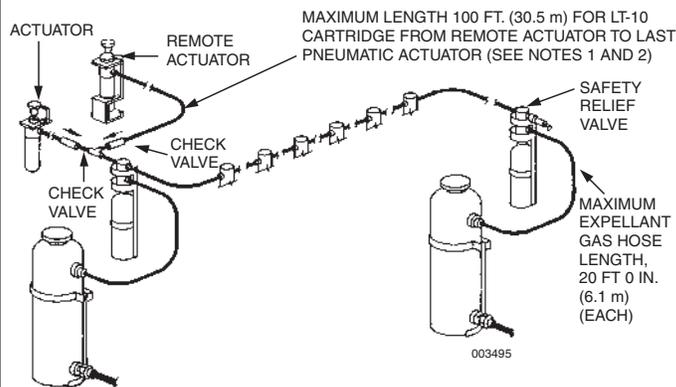
**FIGURE 16**  
004469

**▶ Installing The Actuation Gas line(s) and Pneumatic Actuator(s) (LT-A-101-50)**

**NOTICE**

When installing actuation gas lines, teflon tape must be utilized on all male threads. Do not allow tape to overlap the pipe opening, as this could cause possible blockage of the gas pressure. **Thread sealant or compound must not be used.**

The actuation gas line is the 1/4 in. hose installed from the remote manual/automatic actuator(s) to the pneumatic actuator(s) on the agent tank expellant gas cartridge(s). See Figure 17.



**NOTE:** REDUCE THE MAXIMUM ALLOWABLE NUMBER OF BASIC EXTINGUISHING UNITS BY ONE FOR EACH NON-EXTINGUISHING PNEUMATICALLY OPERATED DEVICE EMPLOYED, I.E., BRAKE CONTROL VALVE, FUEL CONTROL AIR CYLINDER.

**FIGURE 17**  
003495

If more than one remote actuator is in the system, the total length of actuation line allowed from the actuator to the last tank must also include any amount of hose in the other actuation lines up to the check valves located in those lines.

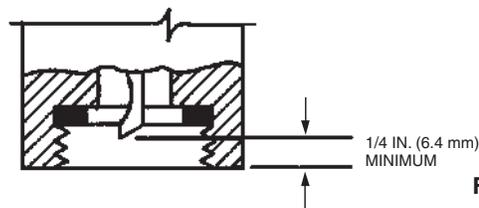
**Note 1:** If only eight (8) or less actuators are used, the actuation line can be extended to 125 ft (38.1 m) when using an LT-10 nitrogen cartridge.

**Note 2:** The actuation line can also utilize an LT-5 cartridge. When this is done, only eight (8) actuators or less can be used, with a maximum length of 75 ft (22.9 m).

Complete the installation of all dry chemical actuation lines, expellant gas cartridges (LT-A-101-50), and components by completing the following:

**Note:** Before proceeding with the following steps, weigh each expellant gas cartridge to make certain it is within the weight specifications stamped on the cartridge body. This weight check must be performed with the shipping cap removed.

- 1. Install all pneumatic actuators as follows:
  - a. When removing actuator from the carton, check pin to make certain it is in the upright position. See Figure 18.



**FIGURE 18**  
004357

## SECTION VI – INSTALLATION INSTRUCTIONS

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REV. 1

### ▶ INSTALLING PNEUMATIC ACTUATOR AND ACTUATION AND EXPELLANT GAS LINES (Continued)

#### Installing The Actuation Gas Line(s) and Pneumatic Actuator(s) (LT-A-101-50) (Continued)

- b. Securely hand tighten the pneumatic actuator body to expellant gas cartridge.
- c. Position actuator and expellant gas cartridge assembly into bracket.
- d. Using two wrenches, one on the swivel nut and one on the bottom portion, loosen the swivel nut, and rotate the top portion of the actuator to the correct position to align the two actuation line ports with the incoming and outgoing 1/4 in. actuation line(s).



#### CAUTION

Each actuator contains two (2) 1/4 in. actuation ports. If both ports are not utilized, the open port must be plugged with a 1/4 in. pipe plug. Failure to plug the port will cause loss of actuation gas pressure upon system actuation.

2. Install required 1/4 in. actuation lines from the remote actuator outlet port to all actuation ports on the upper portion of each pneumatic actuator.
3. Once all lines are securely installed, wrench tighten the swivel nut on the upper portion of each pneumatic actuator.

#### Installing Expellant Gas Line(s) (LT-A-101-50)

The expellant gas line is the 1/4 in. line between the remote expellant gas cartridge and the agent tank.

The maximum length of 1/4 in. expellant gas line is 20 ft (6.1m).

- ▶ Make certain the hose meets all the requirements as stated in the Design section.

### INSTALLING THE DETECTION SYSTEM

Automatic detection should be part of the total system design. See the appropriate Design, Installation Manual for detailed Information.

- CHECKFIRE SC-N ELECTRIC SYSTEM – Manual Part No. 423522
- CHECKFIRE MP-N ELECTRIC SYSTEM – Manual Part No. 427310

### INSTALLING ACTUATION CARTRIDGES

1. Weigh each manual actuator cartridge to make certain it is within the weight specifications stamped on the cartridge body. This weight check must be performed with the shipping cap removed. Refer to appropriate manual for detailed installation instructions if the system contains an automatic CHECKFIRE Detection System.
2. Check that the puncture pin in each manual actuator is fully retracted so that the pin will not pierce the cartridge seal during installation.
3. Install an LT-10 nitrogen cartridge into each manual actuator and hand tighten firmly.
4. At this time, the cartridge may be installed in the CHECKFIRE detection system actuator.
5. Finally, document the entire installation with drawing, photographs, and/or written description of the entire vehicle system and store these documents in a permanent file for future reference.

## INSPECTION

Inspection is a “quick check” that the system is operable. It is intended to give reasonable assurance that the system is fully charged and will operate. This is done by seeing that the system has not been tampered with and there is no obvious physical damage, or condition, to prevent operation. The value of an inspection lies in the frequency, and thoroughness with which it is conducted.

- ▶ Inspection frequency shall be performed monthly, or sooner,
- ▶ depending on operating and/or environmental conditions.

To provide reasonable assurance that your ANSUL

- ▶ LT-A-101-50/125/250 system is charged and operable:
  1. Note general appearance of system components for mechanical damage or corrosion.
  2. Check all hose to make certain it is securely fastened and not cut or show signs of abrasion.
  3. Make certain all hose fittings are tight.
  4. Make certain the nozzles are correctly aimed, openings are clean and not obstructed and the blow-off caps are properly installed. If nozzles appear to be aimed improperly, immediately contact the authorized ANSUL distributor. **Note:** Blow-off caps must be replaced annually.
- ▶ 5. Check nameplate(s) and additional remote labels for readability and make certain they are properly attached.
- ▶ 6. Make certain the indicator stem on the fill cap is in the “down” position (LT-A-101-125/250).
- ▶ 7. Check the gauge on the nitrogen cartridge (LT-A-101-125/250). Make certain the arrow is pointing within the correct pressure range.
- ▶ 8. The automatic detection system should be inspected per the instructions listed in the appropriate CHECKFIRE manual. See Section III, “System Components,” Page 3-8.
- ▶ 9. Check to make certain hazard size or components being protected have not changed since original installation.
- ▶ 10. If there are any broken or missing lead and wire seals, or any other deficiency is noted, immediately contact the authorized ANSUL Distributor.
- ▶ 11. Keep a permanent record of each inspection.

**NOTES:**

**MAINTENANCE**

Maintenance is a "thorough check" of the system. It is intended to give maximum assurance that the system will operate effectively and safely. It includes a thorough examination and any necessary repair or replacement. It will normally reveal if there is a need for hydrostatic testing of the tank.

Maintenance shall be performed semi-annually or sooner, depending on operating and/or environmental conditions. The fire suppression system including alarms, shutdown and associated equipment shall be thoroughly examined and checked for proper operation by the fire protection manufacturer, authorized distributor or their designee in accordance with this manual.

**SEMI-ANNUAL MAINTENANCE**

To provide maximum assurance that your ANSUL A-101 system will operate effectively and safely:

1. Check to see that the hazard has not changed.
2. Remove all cartridges, install safety shipping caps, and put in a safe place for future reinstalling.
3. Note the general appearance of the system components checking for mechanical damage or corrosion, and check that the components are securely fastened and all hose fittings are tight.
4. Check nameplates and additional labels to make certain they are clean, readable, and properly attached.
5. Remove tank fill cap(s) and check that the agent tank is filled to the proper level with ANSUL FORAY dry chemical. The following table indicates the proper level for each size tank.

**Note:** All measurements should be taken from the TOP of the fill opening (top of threaded fill collar).

Tank Size	Maximum Depth of Dry Chemical	
	in.	(mm)
LT-A-101-50	8 1/2	(216)
LT-A-101-125	9 1/2	(241)
LT-A-101-250	19	(483)

**Important:** If the depth of dry chemical exceeds the maximum, **do not add additional dry chemical.** Tank(s) must be emptied and refilled with the correct amount of dry chemical as specified in Section IX, RECHARGE.

Check the dry chemical for lumps. If lumps are present, drop one from a height of 4 in. (102 mm) onto a hard surface. If the lump does not break up completely, the dry chemical must be replaced.

6. Inspect threads on fill cap and on tank fill opening for nicks, burrs, or cross-threading.
7. Check fill cap gasket and quad ring for elasticity, cuts, or checking, and lightly coat them with an extreme temperature silicone grease, such as Dow Corning No. 4 or equal, if equipped. Make certain indicator stem is in the "down" position. Reinstall fill cap and hand tighten.
8. Disconnect the union and examine the disc in the seal burst disc assembly or burst disc nipple to ensure that it is not damaged in any way and then reconnect the union. **Note:** Before reconnecting, blow all lines clear with dry air or nitrogen.
9. Check that the nozzle openings are not obstructed and that the nozzles are properly aimed and have not rotated out of position.

- ▶ 10. **Make certain each nozzle has a blow-off cap properly installed** (the opening of an F-1/2 nozzle can be packed with an extreme temperature silicone grease, such as Dow Corning No. 4 or equal, to avoid build-up of foreign material) and check that the caps are pliable and free of cuts and checks. **Note: Blow-off caps must be replaced annually.**
- ▶ 11. Remove the pneumatic actuator(s) from the nitrogen cartridge on the LT-A-101 tank(s) and inspect all threaded areas for nicks, burrs, and cross threads.
- ▶ 12. Clean actuator(s) as follows: (see Figure 1):
  - Using two wrenches, one positioned on the swivel nut, and one positioned on the bottom portion of the actuator, loosen the swivel nut and remove the top portion of the actuator.
  - Using a wooden dowel, push pin assembly and spring out of the actuator body.
  - Remove the gasket from inside the cartridge thread port. Inspect, clean, apply a good grade of low temperature grease, such as Dow Corning No. 4, or equal, and reinstall the gasket. Replace if necessary.
  - Remove the O-Rings from the pin assembly and swivel adaptor. Inspect, clean, apply a good grade of low temperature grease, such as Dow Corning No. 4, or equal, and reinstall the O-Rings. Replace if necessary.
  - Apply a small amount of grease to the puncture pin shaft. There is a U-Cup guide inside the actuator body and when the pin is reinstalled into the body, the grease on the shaft will lubricate the U-Cup.
  - Clean the inner surface of the actuator body and, using a small diameter wire, clean the vent hole. **Make certain not to scratch the inner surface.**
  - Reinstall spring onto puncture pin shaft and insert into actuator body. Push pin down several times to allow grease to coat U-Cup. When positioned back in body, make certain the tip of the pin is above the gasket in the bottom of the actuator.
  - Reinstall the actuator unto the cartridge. Hand tighten.
  - Reinstall swivel adaptor in the correct position for the actuation lines and wrench tighten the swivel nut. Make certain all actuation and expellant lines are properly tightened into the actuator.

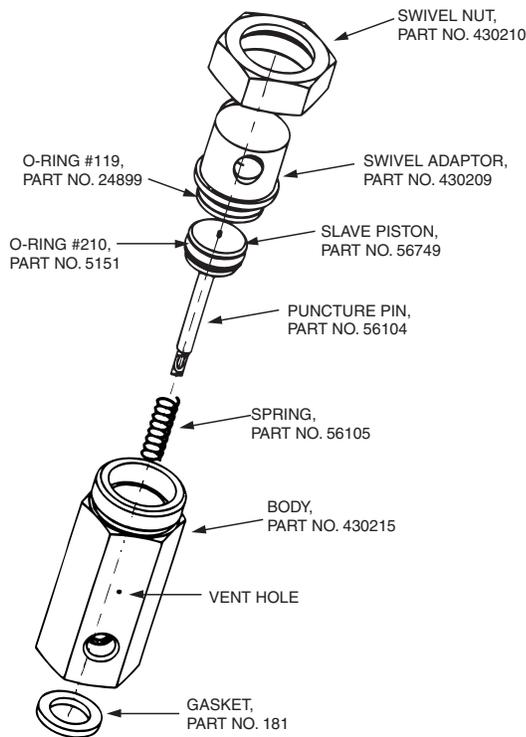
## SECTION VIII – MAINTENANCE

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REV. 3

### SEMI-ANNUAL MAINTENANCE (Continued)

- Secure the assembly into the bracket.



**FIGURE 1**

006195

13. Check the gauge on the 23 cu ft and 55 cu ft nitrogen cartridge located on the LT-A-101-125/250 tanks. The needle must be in the "normal" operating range.
14. Remove and weigh the nitrogen cartridge from the LT-A-101-50 tank. It must be  $\pm 1/2$  oz. from the weight stamped on the cartridge. Weigh cartridge with shipping cap removed.
15. Weigh the actuation gas cartridge(s) which was removed earlier. It must be  $\pm 1/4$  oz. from the weight stamped on the cartridge. Weigh cartridge with shipping cap removed.
16. Next, remove the gaskets from the manual remote actuators. Examine them for elasticity, cuts, and checking and lubricate them with a light coat of extreme temperature silicone grease, such as Dow Corning No. 4 or equal. Reinstall gasket(s).
17. Inspect the threaded areas for nicks, burrs, or cross threading and clean them with a stiff bristle brush.
18. Make certain cartridge is removed. Pull the ring pin and operate the manual actuator to test the puncture lever for free movement.
19. Next, remove the puncture pin by disassembling the actuator and examine the pin to ensure it is sharp, straight, free of corrosion.
20. Lubricate the puncture pin O-ring and reassemble the actuator.
21. Insert ring pin and install visual seal, Part No. 197, to each actuator stem.
22. Install cartridge into each remote actuator. Hand tighten.
23. Refer to appropriate manual for detailed maintenance instructions if the system contains an automatic CHECKFIRE Detection System. See Section III, "System Components," Page 3-8.
24. After all actuation devices are re-armed, record date of maintenance and inform personnel that the system is back in operation.

### 5/10 YEAR MAINTENANCE EXAMINATION

- ▶ The LT-A-101-30 nitrogen cartridge, 23 cu ft nitrogen cartridge (LT-A-101-125) and the 55 cu ft nitrogen cartridge (LT-A-101-250) require hydrostatic testing at either 5 or 10 years. Refer to Ansul Technical Bulletin No. 50, "Hydrostatic Retest Requirements For ANSUL Portables, Wheeled Units, and Pre-Engineered Vessels," for detailed requirements.

### 12-YEAR MAINTENANCE EXAMINATION

At the 12-year maintenance examination, along with completing the semi-annual maintenance requirements, some LT-A-101 components require hydrostatic testing.

The components requiring hydrostatic testing are:

- Tank – 600 psi (40.8 bar) hydro pressure
- Actuation hose – 1000 psi (69 bar) hydro pressure
- Actuation/expellant gas cartridges – After properly discharging cartridge, return to ANSUL for hydrotesting

See appropriate hydrotest requirements in NFPA 17, "Standard For Dry Chemical Extinguishing Systems," and Ansul Technical Bulletin No. 50, "Hydrostatic Retest Requirements for ANSUL Portables, Wheeled Units, and Pre-Engineered Vessels," Form No. F-81301.

The first concern in Recharge is to determine the cause of the system discharge and to have the problem corrected before re-arming the fire suppression system.

In the event of system discharge, the vehicle must not be returned to service until the system has been recharged.

The system must be recharged immediately after use. A fire condition could cause damage to the hose and nozzles and possibly support members. Check all hose supports, hose, and all fitting connections. Take the nozzles off, inspect for damage, corrosion, or obstructions, clean and re-install, making certain they are aimed correctly. Blow-off caps must also be replaced.

1. Pull ring on safety relief valve to relieve actuation pressure.
2. Loosen seal burst disc assembly union nut or pipe union near bursting disc nipple assembly and disconnect.
3. Remove seal burst disc assembly or complete burst disc nipple and discard. Replace with new assembly. See Section III, "System Components," Page 3-8. Reconnect union and hose.  
**Note:** Before reconnecting hose, blow all lines clear with dry air or nitrogen.
4. Remove the tank fill cap and fill each tank to its rated capacity with ANSUL FORAY dry chemical.

#### Fill Weight and Tolerance

Tank Size	Amount of Recharge
101-50	45.0 lb +1/-0 (20.4 kg +.5/-0)
101-125	112.0 lb +1/-0 (50.8 kg +.5/-0)
101-250	225.0 lb +1/-0 (102.1 kg +.5/-0)

5. Before securing the fill cap, brush the dry chemical from the threads on the fill cap and tank, and clean the gasket seating surface on the tank opening. Coat the gasket lightly with a good grade of extreme temperature silicone grease, such as Dow Corning No. 4 or equal.
6. Reset indicator stem on LT-A-101-125/250 tank fill cap(s).
7. Secure the fill cap(s); hand tighten.
8. Loosen the bolts on the expellant gas cartridge bracket on the tank, or on the cartridge bracket.
9. Unscrew and remove the empty expellant gas cartridge.
10. Disassemble and clean the cartridge actuator by following the instructions stated in Step No. 12, Section VIII – Maintenance.
11. Install new expellant gas nitrogen cartridge onto pneumatic actuator(s). Make certain gauge guard is in place (LT-A-101-125/250). The LT-A-101-125 tank requires a 23 cu ft (0.65 cu. m) cartridge, Part No. 428060, and the LT-A-101-250 tank requires a 55 cu ft (1.6 cu m) nitrogen cartridge, Part No. 428061. Make certain needle on gauge is in the correct range. For the LT-A-101-50, weigh replacement cartridge, Part No. 423491. Weight must be +/- 1/2 oz. from the weight stamped on the cartridge. Weigh cartridge with shipping cap removed. Install onto pneumatic actuator(s).
12. Securely tighten the cartridge in the mounting clamps on the tank.
13. Depending on the type of remote actuator, either pull up the red button or pull up the puncture lever.
14. Remove spent cartridge. Weigh new LT-10 cartridge. It must be within +/- 1/4 oz. of weight stamped on the cartridge. Weigh cartridge with shipping cap removed.

15. Hand tighten the cartridge into the remote actuator.
16. Insert ring pin in actuator stem and seal with visual seal, Part No. 197.
17. If system discharged automatically, additional procedures must be followed as per the appropriate CHECKFIRE manual. See Section III, "System Components," Page 3-8.
18. Notify operating personnel that the system is back in service and record the date of recharge.

**SECTION IX – RECHARGE**

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**NOTES:**

## EXCAVATOR PROTECTION

Excavators can be classified into three categories, depending on their hydraulic fluid capacity. ANSUL has researched the hydraulic fluid capacities in regard to size of equipment (operating weight).

With the introduction of the LVS™ Liquid Agent Suppression System (not FM Approved), we can now offer an enhanced protection scheme for large excavators, as well as other non-road mobile equipment. **The following protection schemes are required for excavator of these specified sizes. They are as follows:**

- **Standard Discharge Application: Small Equipment (Operating Weight: 99,000 to 200,000 lb (44,906 to 90,720 kg))**

Standard discharge application of an A-101 dry chemical system can be used for this smallest class of excavators. Design of the suppression system shall be in accordance with the LT-A-101-30 or LT-A-101-50/125/250 Installation, Recharge, Inspection, and Maintenance Manual.

Excavators that fall into this class of machine include but are not limited to:

- Caterpillar: 345BL-VG, 350, 350L, 375, 375L, 5080
- Hitachi: UH261, UH30
- Komatsu/DeMag: H65, PC 750-6
- Liebherr: R982
- Link-Belt: 5800, 6000
- O&K: RH 25D, RH 30E
- Poclain: 300, 400

- **Twin-Agent Application: Mid-Size Equipment [Operating Weight 200,000 to 1,000,000 lb (90,720 to 453,600 kg)]**

Use of a twin-agent system consisting of the LVS liquid agent system connected to an A-101 dry chemical (extended or standard discharge) system. The A-101 system can utilize LTA-101-250's, LT-A-101-125's, LT-A-101-50's, and LT-A-101-30's.

**Note 1:** When utilizing only a standard dry chemical discharge design, all hazard areas will require protection using both dry chemical and wet chemical agents.

**Note 2:** When utilizing an extended dry chemical discharge design in all hazardous locations except for the engine and hydraulic pump areas, the liquid portion of the twin-agent scheme need only protect the engine(s) (turbo chargers, exhaust manifolds, etc.) and hydraulic devices (i.e., pumps, control valves, valve banks).

**Note 3:** Existing systems installed in compliance with Product Service Bulletin No. 77 utilizing an extended discharge design, do not need to be changed to twin-agent systems. However, for new system installations or major changes to an existing hydraulic excavator, the design must follow the guidelines in this manual using a twin-agent system.

Excavators that fall into this class of machine include but are not limited to:

- Caterpillar: 5110, 5130, 5130B, 5130ME, 5130FS, 5230, 5230ME
- DeMag: H95, H135S, H185S, H255S, H285S
- Hitachi: EX1000, EX1100, EX1200, EX1800, EX1900, EX2500, EX3500, EX3600, UH501, UH80, UH801
- Komatsu: PC1000-6, PC1100-6, PC1400, PC1500-1, PC1600-1, PC1800-6, PC 3000, 3560 B, PC4000

- Liebherr: R984, R992, R991, R994, R995
- NW Engineering: 100-DH
- O&K: RH 40E, RH 75, RH 90C, RH 120C, RH 170
- Poclain: 600, 1000
- P&H: 1200

- **Twin-Agent Application: Large Equipment [Operating Weight: 1,000,000 lb (453,600 kg) and greater]**

Use of a twin-agent system consisting of the LVS liquid agent system connected to an A-101-125/250 dry chemical (extended discharge) system.

**Note 1:** The liquid portion of the twin-agent scheme, at a minimum, must protect the engine(s) and hydraulic devices (i.e., pumps, control valves, valve banks). Additional LVS liquid agent systems may be added at the designer's discretion to cover other areas.

**Note 2:** Existing systems installed in compliance with Product Service Bulletin No. 77 utilizing an extended discharge design, do not need to be changed to twin-agent system. However, for new system installations or major changes to an existing hydraulic excavator, the design must follow the guidelines in this manual using a twin-agent system.

Excavators that fall into this class of machine include but are not limited to:

- DeMag: H455S, H485S, H485SP, H655S
- Hitachi: EX5500, EX8000
- Komatsu: PC5500, PC8000
- Liebherr: R996
- O&K: RH 200, RH 300, RH340, RH 400

## General Discussion

Special design consideration must be given when protecting large excavators to reduce the potential for reflash and provide additional time. ANSUL requires the following as a minimum:

1. The LT-A-101-125 tank can utilize an 8-nozzle extended discharge or 12- or 16-nozzle standard discharge distribution system. The LT-A-101-250 tank can utilize either an 8, 12, or 16 nozzle extended discharge or a 24 nozzle standard discharge system. Both the 125 lb and 250 lb tanks can be used where an extended discharge is required. See "Extended Discharge" to determine type of system required.
2. The LT-A-101-50 can also be used. The tank can be used for 6 or 8 nozzle standard discharge systems or used with 4 nozzles for extended discharge systems.
3. When utilizing LT-A-101-30 or A-101-30 tanks, use four nozzles maximum for each single or two-tank (when used as extended discharge) system to provide additional agent per nozzle and maximum system discharge time. Single tank, two-nozzle systems may also be used for extended discharge.
4. Fully automatic system, including automatic engine shutdown, hydraulic oil/fuel shutoff, and agent discharge.
5. Remote high level alarm and flashing alarm strobe to enhance machine operator warning.
6. A safe means of egress from the operator's compartment without having to exit past fire hazard areas.

**SECTION X – APPENDIX**

**EXCAVATOR PROTECTION (Continued)**

**General Discussion (Continued)**

- ▶ In addition to the LT-A-101 dry chemical system or LT-A-101/LVS twin-agent system with CHECKFIRE® Electric
- ▶ Detection and Control equipment, the following supplemental fire protection should be included when considering protection of large non-road mobile equipment:
  1. Cartridge operated hand portable fire extinguishers
  2. Secondary means of fire suppression
- ▶ 3. IR<sup>3</sup> Flame Detection used in combination with thermal auto-
- ▶ matic detection

For any fire protection to be effective, training is critical. As a minimum, comprehensive training for the machine operator and site representatives should include:

1. Fire suppression system operation
2. Fire suppression system performance
3. Fire suppression system capabilities
4. Fire suppression system limitations
5. Response procedures
6. Safe egress procedures

It is important to make sure the site representative understands the LT-A-101/LVS/CHECKFIRE system capabilities as well as limitations. This information needs to be discussed and reviewed with the appropriate end-user personnel.

**Extended Discharge**

- ▶ For operator's safety, it may be necessary to design the dry chemical system to be an extended discharge system. An extended discharge system discharges dry chemical at the proper nozzle flow rate but is designed to discharge for a longer period of time compared to the "normal" system discharge time. This would allow the operator more time to safely egress the equipment while the system is continuing to discharge dry chemical.

In order to determine if an extended discharge system is necessary, the time it takes the operator to get off the equipment to a safe location should be timed. Use the following approximate discharge times to determine which size system (depending what the total nozzle requirements are) will allow the operator some protection while exiting the equipment:

<u>System Size</u>	<u>Number of Nozzles</u>	<u>Approximate Discharge Time</u>
▶ 50 lb	4	22.5 seconds
50 lb	6	15.0 seconds
▶ 50 lb	8	11.3 seconds
125 lb	8	16.5 seconds
125 lb	12	13.0 seconds
125 lb	16	9.0 seconds
250 lb	8	28.0 seconds
250 lb	12	19.0 seconds
250 lb	16	16.5 seconds
250 lb	24	14.0 seconds

**SYSTEM COMPONENT INDEX****BASIC UNIT**

- ▶ 427745 LT-A-101-125 Dry Chemical Tank Assembly (CE version 434378)
- ▶ 427746 LT-A-101-250 Dry Chemical Tank Assembly (CE version 434379)
- ▶ 433788 LT-A-101-50 Dry Chemical Tank and Bracket Assembly (CE marked)
- ▶ 433487 LT-A-101-50 Dry Chemical Tank Assembly (CE marked) (Tank Only – No Agent)
- ▶ 24883 LT-A-101-30 Cartridge, Cartridge Bracket, and Pneumatic Actuator

**DISTRIBUTION TEES**

- 428065 Primary Supply Line Triple Tee (1 1/2 x 3/4 x 3/4 x 3/4 x 3/4 in.)
- 16424 Secondary Supply Line Triple Tee
- 53038 Triple Tee Package Includes: 2 Triple Tees (3/4 x 1/2 x 1/2 x 1/2 x 1/2 in.)
- 551608 Primary Supply Line Distribution Tee
- 433759 Primary Supply Line Triple Tee (8 nozzle system) (1 in. x 3/4 x 3/4 x 3/4 x 3/4)
- 53040 Reducing Tee Package Includes: 2 Reducing Tees (1/2 in. x 1/2 in. x 3/4 in.)
- 4655 Reducing Tee (1/2 in. x 1/2 in. x 3/4 in.)
- 25031 Distribution Tee (3/4 in. x 1/2 x 1/2 x 1/2)

**NOZZLES**

- 57046 C-1/2 Nozzle Package Includes: 4 Nozzles, 4 Nozzle Brackets, 4 Blow-Off Caps and 8 Lockwashers
- 57044 V-1/2 Nozzle Package Includes: 4 Nozzles, 4 Nozzle Brackets, 4 Blow-Off Caps and 8 Lockwashers
- 53042 F-1/2 Nozzle Package Includes: 4 Nozzles, 4 Nozzle Brackets, 4 Blow-Off Caps and 8 Lockwashers
- 53791 Nozzle C-1/2 Includes: Nozzle, Blow-Off Cap
- 56748 Nozzle V-1/2 Includes: Nozzle, Blow-Off Cap
- 16449 Nozzle F-1/2 Includes: Nozzle Only
- 415192 Blow-Off Cap With Retaining Strap Package Includes: 50 Blow-Off Caps (Part No. 415108) For V-1/2 and C-1/2 Nozzle Only
- 73870 Blow-Off Cap Package: Includes: 50 Blow-Off Caps, Part No. 4120, For F-1/2 Nozzle
- 73871 Nozzle Bracket, 2 in. x 3 in. Angle, 12 Pack (Contains 12, Part No. 427149)
- 427149 Nozzle Bracket, 2 in. x 3 in. Angle
- 427228 Nozzle Bracket, Straight, 4 Pack
- 73872 Nozzle Lockwasher Package: Includes: 50 Lockwashers, Part No. 25581

**ACTUATION DEVICE**

- 70584 Remote Manual Actuator Package Includes: LT-10-L (Left Hand) Cartridge, "S" Bracket, Elbow, Check Valve, Seal, Operating Instruction Labels and Installation Instructions

**ACTUATION DEVICE (Continued)**

- 71699 Remote Manual Actuator Package Includes: LT-10-L (Left Hand) Cartridge "L" Bracket, Elbow Check Valve, Seal, Operating Instruction Labels and Installation Instructions
- 57484 Remote Manual Actuator Package Includes: LT-10-R (Right Hand) Cartridge, "S" Bracket, Elbow, Check Valve, Seal, Operating Instruction Labels and Installation Instructions
- 71804 Remote Manual Actuator Package Includes: LT-10-R (Right Hand) Cartridge, "L" Bracket, Elbow, Check Valve, Seal, Operating Instruction Labels and Installation Instructions
- 70581 Remote Manual Actuator for LT-10-L (Left Hand) Cartridge Only
- 57452 Remote Manual Actuator for LT-10-R (Right Hand) Cartridge Only
- 57661 "S" Type Mounting Bracket for Dashboard Actuator, used for Part No. 70581 and 57452
- 70580 "L" Type Mounting Bracket for Remote Manual Actuator, used for Part No. 70581 and 57452
- 32747 Remote Actuator Package, Cartridge Guard Type (Left Hand) Includes: Actuator, LT-10-L Cartridge, Check Valve, Operating Instruction Labels, Lead Wire Seal
- 32739 Remote Actuator Package, Cartridge Guard Type (Right Hand) Includes: Actuator, LT-10-R Cartridge, Check Valve, Operating Instruction Labels, Lead Wire Seal
- 16033 Operating Instruction Labels for Manual Actuator Includes: Nameplate "IN CASE OF FIRE 1. SHUT OFF ENGINE 2. PULL RING PIN 3. PUSH LEVER"
- 16459 Operating Instruction Labels for Manual Actuator Includes: Nameplate "IN CASE OF FIRE 1. SHUT OFF POWER 2. PULL RING PIN 3. STRIKE BUTTON"

**ACTUATION LINE DEVICES**

- 15677 Safety Vent Relief Valve
- 53050 Safety Vent Relief Valve Package Includes: 2 Safety Vent Relief Valves
- 53051 1/4 in. Check Valve (Package of 2)
- 427425 Engine Shutdown Device
- 15733 Air Cylinder and Tubing Assembly
- 8372 Pressure Switch (Shutdown)
- 46250 Pressure Switch, Weather Proof, DPST (shutdown)
- 430221 Pneumatic Actuator

**RECHARGE EQUIPMENT AND MATERIAL**

- 53080 FORAY Multi-Purpose Dry Chemical 45 lb Pail
- 428324 Bursting Disc Nipple Assembly
- 433706 1 in. Seal Burst Disc Assembly (LT-A-101-50)
- 3923 Cartridge Scale and Hook Assembly
- 197 Lead Wire Seal
- 427865 LT-A-101-50/125/250 Installation, Recharge, Inspection and Maintenance Manual
- 53081 Owner's Manual

## APPENDIX

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REV. 2

### SYSTEM COMPONENT INDEX (Continued)

#### SYSTEM CARTRIDGES

- ▶ 428060 23 Cu Ft Nitrogen Cartridge (TC/DOT)  
(435849 TPED version)
- ▶ 428061 55 Cu Ft Nitrogen Cartridge (TC/DOT/TPED)
- 13193 LT-10-R Cartridge (DOT)
- 423423 LT-10-R Cartridge (TC/DOT)
- 13177 LT-10-L Cartridge (DOT)
- 423425 LT-10-L Cartridge (TC/DOT)
- 423491 LT-A-101-30 Nitrogen Cartridge (TC/DOT)

#### SYSTEM BRACKETS

- 433685 LT-A-101-50 Tank Mounting Bracket
- 29193 Cartridge Bracket for LT-A-101-30

#### FOR SYSTEM COMPONENT INDEX FOR THE CHECKFIRE AUTOMATIC DETECTION AND ACTUATION SYSTEMS, SEE THE FOLLOWING INSTALLATION MANUALS:

- CHECKFIRE MP-N ELECTRIC SYSTEM – Manual Part No. 427310
- CHECKFIRE SC-N ELECTRIC SYSTEM – Manual Part No. 423522
- IR3 FLAME DETECTOR – Manual Part No. 432485

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