P/N 83-131550-000
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Kidde® Sentinel™ DCS
Vehicle Fire Suppression System

Design, Installation, Operation and Maintenance Manual

FM APPROVED

FM Approvals
Project ID 3033183

Kidde Fire Systems

A UTC Fire & Security Company

Foreword

Note: This Manual, P/N 83-131550-000, is to be used by qualified and factory-trained personnel, knowledgeable of NFPA standards, and any other applicable standards in effect.

The purpose of this manual is to provide guidance to qualified technical professionals responsible for the design, installation, operation and maintenance of Kidde® Sentinel™ DCS Fire Suppression Systems.

Kidde-Fenwal assumes no responsibility for the application of any systems other than those addressed in this manual. The technical data contained herein is strictly limited for informational purposes only. Kidde-Fenwal believes this data to be accurate, but it is published and presented without any guarantee or warranty whatsoever. Kidde-Fenwal disclaims any liability for any use that may be made of the data and information contained herein by any and all other parties.

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SYSTEM AND COMPONENT NAMES

SYSTEM NAMES	
NAME	**ABBREVIATION**
Kidde Sentinel System	Kidde Sentinel
Kidde Sentinel SA1	Sentinel SA1
Kidde Sentinel NET	Sentinel NET
Kidde Sentinel LS	Sentinel LS
Kidde Sentinel DCS	Sentinel DCS

COMPONENT NAMES	
NAME	**ABBREVIATION**
Kidde Sentinel SA1 Control	Sentinel SA1
Kidde Sentinel NET Interface Module	Sentinel NIM
Kidde Sentinel NET Control Module	Sentinel NCM

Terms and Abbreviations

°C:	°Celsius
°F:	°Fahrenheit
AHJ:	Authority Having Jurisdiction
CGA:	Compressed Gas Association
DIOM:	Design, Installation, Operation, and Maintenance Manual
DOT:	Department of Transportation
FM:	Factory Mutual
ft.:	Feet
gal:	Gallon
HMIS:	Hazardous Materials Information System
in.:	Inch
lb.:	Pound
L:	Liter
m:	Meter
MAP	Monoammonium Phosphate
MSDS	Material Safety Data Sheet
mm:	Millimeter
NFPA:	National Fire Protection Association
NPT:	National Pipe Thread
P/N:	Part Number
PSI:	Pounds per Square Inch
QTY:	Quantity
TC:	Transport Canada
WHMIS:	Workplace Hazardous Materials Information System

Safety Summary

Definitions

- **Note:** Notes are used to call out information that requires extra attention.
- **Caution:** Cautions are placed throughout the manual in areas where there is a possibility of property and/or equipment damage. The general cautions in the Safety Summary should be adhered to at all times when working with a Kidde Sentinel DCS Fire Suppression pre-engineered system.
- **Warning:** Warnings are placed throughout the manual and apply to conditions where the possibility of severe property/equipment damage, system failure, personal injury, and in some cases, death could occur. The general warnings in the Safety Summary should be abided by at all times when working with a Kidde Sentinel DCS Fire Suppression System.

General Warnings

WARNING

- Always wear personal protection equipment such as safety glasses when working with pressurized cylinders. Never service the cylinder and valve assembly unless the Diffuser Plate (P/N WK-255681-000) is installed. Death, serious injury or property damage could occur.
- While performing cylinder recharge, a charged cylinder should never be allowed to “free stand” without either the charging apparatus being attached or the diffuser plate installed. If these devices are not installed, a charged cylinder must be securely clamped to a rigid structure capable of withstanding the full thrust that would result, should the valve inadvertently open.
- Do not use water or oxygen to clear pneumatic actuation lines or agent discharge lines. Moisture will cause blockage. The use of oxygen is very dangerous; the possible presence of even a minute quantity of cutting oil may cause an explosion that could cause death, serious injury and/or property damage.
- The Sentinel DCS agent cylinders contain high pressure nitrogen. If a pressurized cylinder needs to be emptied for any reason, personal protective equipment such as safety glasses must be worn. Refer to Section 5-4.2, “Disassembling and Rebuilding the Cylinder and Valve Assembly.” Failure to observe these warnings could result in bodily injury.
- Never dispose of a pressurized cylinder. Cylinders must be disposed of properly, and in conjunction with local ordinance.

General Cautions

CAUTION

- System owners should refer to the Sentinel LS Owner’s Manual, P/N 83-130551-000. No other action shall be taken by the system owner other than visual inspections. If further maintenance is required as a result of owner inspection, contact an authorized Kidde Distributor.
- Do not attempt to recharge any cylinder without first checking for its last hydrostatic test date. The U.S. Department of Transportation (DOT) and Transport Canada (TC) have ruled that any pressurized container of the type used in dry chemical systems shall not be recharged or transported without first being inspected internally and externally, and hydrostatically tested if more than twelve (12) years have elapsed since the date of the last hydrostatic test. Regardless of previous inspection dates, it is illegal to refill any pressurized container that leaks; bulges; has defective safety devices; bears evidence of physical abuse, fire, heat damage, rust, or corrosion, until it is properly repaired and requal-

ified as specified in DOT and TC regulations. For more information, refer to Compressed Gas Association (CGA) Pamphlet C-6.

General Precautions

The following general safety precautions are to be observed at all times:

1. Extra care should be taken to ensure that power is not applied to equipment at any time maintenance work is in progress.
2. Before working on electrical equipment, a voltmeter should be used to ensure that the system is not energized.
3. When working near electricity, do not use metal rulers, flashlights, metallic pencils, or similar objects that have exposed conductive material.
4. When a voltmeter is used, the voltage range should be set at a setting higher than the expected reading.

Pressurized Cylinders

Kidde Sentinel DCS fire suppression systems use pressurized equipment. Therefore, personnel responsible for fire suppression systems must be aware of the dangers associated with the improper handling, installation and maintenance of this equipment.

Fire suppression system service personnel must be thoroughly trained in the proper handling, installation and service of Kidde Sentinel DCS equipment, and must follow the instructions used in this manual and on the cylinder nameplate.

Kidde has provided warnings and cautions at appropriate locations throughout the text of this manual. These warnings and cautions are to be adhered to at all times. Failure to do so may result in property/ equipment damage, serious personal injury, and even death.

WARNING

Pressurized (charged) cylinders are extremely hazardous and if not handled properly are capable of violent discharge. This may result in death, serious personal injury, or property damage.

The operation and maintenance manuals, owners manuals, service manuals, and other instructions that are provided with the individual systems must be read and understood. All instructions in these manuals must be followed.

The following safety procedures must be observed at all times:

Moving Cylinders: Cylinders must be shipped compactly in the upright position, and properly secured in place. Containers must not be rolled, dragged or slid, nor allowed to be slid from tailgates of vehicles. A suitable hand truck, fork truck, roll platform or similar device must be used.

Rough Handling: Cylinders must not be dropped or permitted to strike violently against each other or other surfaces.

Storage: Cylinders not in service must be stored standing upright with the diffuser plate installed.

For additional information on safe handling of compressed gas cylinders, see CGA Pamphlet PI titled “Safe Handling of Compressed Gases in Containers.” CGA pamphlets may be purchased from: The Compressed Gas Association, Crystal Square Two, 1725 Jefferson Davis Highway, Arlington, VA 22202.

Diffuser Plate

WARNING

THE FOLLOWING INSTRUCTIONS MUST BE FOLLOWED, IN ORDER TO PREVENT SERIOUS INJURY, DEATH OR PROPERTY DAMAGE.

a. Each Kidde Sentinel DCS cylinder is factory equipped with a Diffuser Plate installed on the valve outlet to prevent damage. This device is a safety feature, and will provide a controlled safe discharge when installed, if the cylinder is actuated.

b. The valve diffuser plate must be installed on the valve outlet AT ALL TIMES except when the cylinders are connected into the system piping or being filled, at which time the cylinders shall be securely attached to bracket mounts.

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CHAPTER 1
GENERAL INFORMATION

1-1 INTRODUCTION

Heavy duty vehicles, used in both on-road and off-road applications, require fire suppression to avoid costly:

- Equipment replacement
- Loss of production

The Kidde® Sentinel™ DCS Dry Chemical System, hereafter referred to as the Sentinel DCS, is a dry chemical fire suppression system. The Sentinel DCS can be configured for manual, automatic and dual (automatic and manual) operation. During operation, dry chemical is discharged from a cylinder, via hose, to discharge nozzles.

This manual provides information concerning Sentinel DCS design, installation, operation and maintenance (DIOM), and related discharge hose interconnections. This manual is organized into the following chapters:

- Chapter 1 - General Information
- Chapter 2 - Component Descriptions
- Chapter 3 - System Design
- Chapter 4 - Installation
- Chapter 5 - Maintenance
- Chapter 6 - Parts List

Related Kidde Sentinel System manuals include:

- *Sentinel NET Vehicle Fire Suppression System Design, Installation, Operation and Maintenance (DIOM) Manual* (P/N 83-132555-000)
- *Sentinel SA1 Vehicle Fire Suppression System DIOM Manual* (P/N 83-132550-000)
- *Sentinel LS Vehicle Fire Suppression System DIOM Manual* (P/N 83-130550-000)

1-2 FIRE CLASSIFICATIONS

The Sentinel DCS System may be used to protect the following three classes of fires:

- Class A: includes fires involving ordinary combustible materials such as wood, cloth, paper, rubber, and many plastics
- Class B: includes fires involving flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols and flammable gases
- Class C: includes fires that involve energized electrical equipment

1-3 GENERAL CHARACTERISTICS OF MONOAMMONIUM PHOSPHATE

The dry chemical agent used in the Sentinel DCS is monoammonium phosphate (MAP) (ABC Dry Chemical). It is stable at both low and high temperatures, and various additives are mixed with the base materials to improve their storage, flow and water repellency characteristics. The system-listed operating temperature range is -65°F (-54°C) to 200°F (93°C). It is recommended that recharge containers and containers of nitrogen, whether used as part of the system, or as recharge storage, be stored between -40°F (-40°C) and 120°F (49°C).

This agent will not harm most materials and may be brushed, blown, vacuumed or washed from vehicles. It is nonconducting, physiologically inert and nonabrasive, nontoxic and noncarcinogenic. However, other physiological conditions such as minor skin and respiratory

irritation may occur as a result of exposure to this agent. Refer to the material safety data sheet (MSDS) for more detailed information, instructions, and special precautions, or contact Technical Support at 1-866-287-2531.

WARNING **When an alarm notification is received, all personnel must evacuate the protected space. Failure to do so may result in temporary respiratory difficulties, disorientation and/or personal injury.**

1-3.1 Extinguishing Properties

When ABC Dry Chemical is discharged into the combustion area, it suppresses flames almost immediately. Smothering, cooling and radiation shielding contribute to the dry chemical extinguishing efficiency, but the principal mechanism for extinguishing flames is the chemical chain-breaking properties of the dry chemical.

When ABC Dry Chemical is discharged, the decomposed monoammonium phosphate leaves a sticky residue that seals the burning material and deprives it of oxygen, thus providing fire suppression. Where re-ignition is a concern, expanding to a dual agent system should be considered. Reference paragraph *Section 1-7, "Dual Agent System"*.

1-3.2 Limitations of Dry Chemicals

Dry chemicals do not inert or secure the hazard after they are discharged. If the hazard must be secured against reignition, either an extended discharge or a different choice of agents, or both, is required.

A dry chemical system is not recommended for protecting fragile electrical or electronic equipment, such as:

- telephone switchboards
- personal computers
- printers and faxes

This type of equipment can be damaged by dry chemicals and, because of the insulating properties of the dry chemicals, the rigorous cleaning required to restore them may further damage the equipment.

1-4 SYSTEM DESCRIPTION

The Sentinel DCS consists of three subsystems:

- Cylinder Assembly Subsystem - stores dry chemical suppression agent under pressure.
- Agent Delivery Subsystem - consists of the hydraulic hoses and fixed nozzles used to deliver the dry chemical to the fire hazard.
- Actuation Subsystem - includes the components that manually and/or automatically actuate the system, causing the dry chemical to be discharged. This subsystem is covered in the applicable detection and control manual(s) listed in *Section 1-1, "Introduction"*.

1-5 SENTINEL DCS SYSTEM ACTUATION

The following actuation methods are available for the Sentinel DCS system:

- **Automatic**

The system can be actuated automatically when connected to the Kidde Sentinel NET or Kidde Sentinel SA1 systems.

• Manual

The system can be actuated manually—either pneumatically or electrically.

Note: "Manual Only" systems may be permissible only if acceptable to the authority having jurisdiction.

Note: FM Global does not allow "manual only" operation.

• Automatic and Manual

The system can be configured to include both automatic and manual actuation methods.

Refer to the Sentinel NET DIOM Manual (P/N 83-132555-000) or Sentinel SA1 DIOM Manual (P/N 83-132550-000) for information concerning the design, installation, operation and maintenance of these systems.

1-6 HAZARDOUS MATERIALS INFORMATION SYSTEM (HMIS)

Hazardous materials information sources include the U.S. Hazardous Materials Information System (HMIS), and the Canadian Workplace Hazardous Materials Information System (WHMIS).

1-6.1 Hazardous Materials Information System

The U.S. Hazardous Materials Information System (HMIS) rating for multi-purpose (ABC, monoammonium phosphate base) dry chemical is as follows:

- Health (H) = 1
- Flammability (F) = 0
- Reactivity (R) = 0

CAUTION

Dry chemical fire extinguishing agents are considered nontoxic, but are classified as a nuisance dust irritant, and may cause temporary irritation to the eyes, skin, or respiratory system. Avoid unnecessary exposure.

For the latest MSDS information, contact Technical Support at 1-866-287-2531.

1-6.2 Workplace Hazardous Materials Information System

The Canadian Workplace Hazardous Materials Information System (WHMIS) rating for the multi-purpose dry chemical is D2B, which equates to:

D = Class D materials that will cause harm to your body.

2 = the Division 2 rating under class D means that the material causes toxic effects that can be either immediate or serious, but NOT both immediate AND serious.

B = the Subdivision B indicates that the agent is a toxic material that can:

- be mutagenic to non-reproductive cells
- cause skin sensitization
- cause skin and eye irritation
- cause other toxic effects

ABC Dry Chemical was given this rating due to the possibility of immediate and temporary irritation should the agent come into contact with a person's skin or eye.

1-7 DUAL AGENT SYSTEM

A dual agent system consists of both the Sentinel DCS (dry chemical) and Sentinel LS (wet chemical) systems. Kidde Sentinel NET can actuate both the dry chemical and wet chemical systems. A dual agent system can reduce the likelihood of re-ignition in extremely hot areas such as engines, turbochargers, manifolds, hydraulic pumps, and similar devices.

1-8 CLEAN-UP

After discharge, dry chemical must be cleaned from equipment immediately. Personnel who come in contact with dry chemical agent should remove it from their skin with tap water. Refer to the MSDS.

1-9 LISTINGS AND APPROVALS

The Kidde Sentinel DCS System is approved by Factory Mutual (FM) for use on mobile machinery in accordance with applicable sections from the following standards:

- ANSI/IEC 60529-2004 – Degrees of Protection Provided by Enclosures (IP Code)
- AS 5062 – Fire Protection for Mobile and Transportable Equipment
- EN 61000-4-4 – Electromagnetic Compatibility Test
- EN 61000-4-5 – Surge Immunity Test
- FM Class 3010 – Fire Alarm Systems
- FM 3260 – American National Standard for Radiant Energy-Sensing Fire Detectors for Automatic Fire Alarm Signaling
- NEMA 250 – Enclosures for Electrical Equipment
- NFPA 17 – Standard for Dry Chemical Extinguishing Systems
- NFPA 72 – National Fire Alarm Code
- SAE J400 – Test for Chip Resistance of Surface Coatings
- SAE J1455 – Recommended Environmental Practices for Electronic Equipment Design (Heavy-Duty Trucks)
- UL 1254 – Pre-Engineered Dry Chemical Extinguishing System Units

1-10 STANDARDS

The designer/installer should be familiar with the following (as applicable):

- FM Global Property Loss Prevention Data Sheet 7-40 - Heavy Duty Mobile Equipment
- NFPA 17 – Standard for Dry Chemical Extinguishing Systems
- NFPA 70 – National Electric Code
- NFPA 72 – National Fire Alarm Code
- NFPA 121 – Standard on Fire Protection for Self-Propelled and Mobile Surface Mining Equipment
- Any standard, guideline, or law, as applied by the local Authority Having Jurisdiction

CHAPTER 2
COMPONENT DESCRIPTIONS

2-1 INTRODUCTION

This chapter provides a functional description of the components and assemblies that make up the Kidde® Sentinel™ DCS Vehicle Fire Suppression System.

2-2 FIRE EXTINGUISHER COMPONENTS

2-2.1 Cylinder and Valve Assembly, P/N 83-13140*X*-*XXX*

Each Sentinel DCS cylinder assembly includes a painted steel cylinder charged with ABC Dry Chemical, a nickel-plated valve, a siphon tube, a nickel-plated pneumatic/electric control head, and a diffuser plate, as shown in Figure 2-1 and Figure 2-2. A pressurized dry chemical cylinder is supplied as a unit and is attached to the vehicle with a mounting bracket or deck mount flange. All cylinders meet U.S. Department of Transportation (DOT) and Transport Canada (TC) specifications.

Four different cylinder sizes are available, and have different mounting orientation options:

- The DCS-25 cylinder can be:
  - wall-mounted vertically (with mounting bracket)
  - deck-mounted horizontally (with mounting bracket)
- The DCS-50S cylinder can be:
  - wall-mounted vertically (with mounting bracket)
  - deck-mounted vertically (with deck mount flange)
- The DCS-50T cylinder can be:
  - wall-mounted vertically (with mounting bracket)
- The DCS-68 cylinder can be:
  - wall-mounted vertically (with mounting bracket)
  - deck-mounted vertically (with deck mount flange)

The total height, height to center of discharge port, and diameter of the cylinders are shown as A, B and C in Figure 2-1 and listed in Table 2-1.

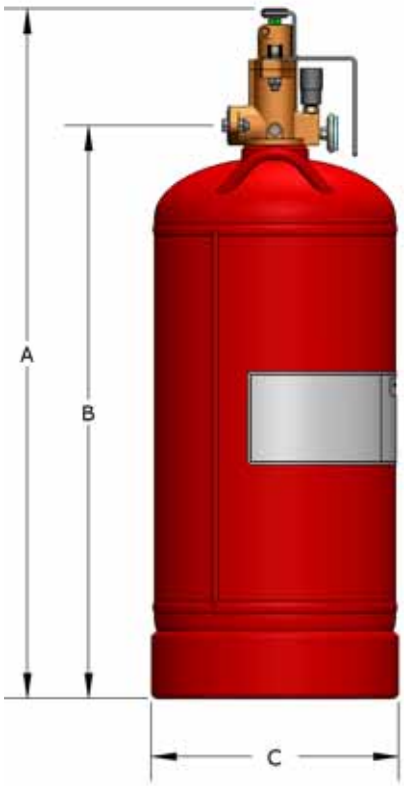

Figure 2-1. Sentinel DCS Cylinder and Valve Assembly

The number in the cylinder model designation indicates the number of pounds of the dry chemical agent charge; for example, the Sentinel DCS-25 contains 25 lbs. of agent.

Table 2-1. Cylinder Assembly Weights and Dimensions

Part Number	Pressure Switch Yes/No	Cylinder Assembly Model	Agent Fill [lbs./(kg)]	Assembly Weight [lbs./(kg)]	Dimensions [in./(mm)]		
					A	B	C
83-131400-025	Yes	Sentinel DCS-25	25 (11.3)	50 (22.6)	21.7 (551)	16.8 (427)	9.0 (229)
83-131401-025	No						
83-131400-050	Yes	Sentinel DCS-50S	50 (22.7)	84 (38.1)	24.9 (632)	20.0 (508)	12.2 (310)
83-131401-050	No						
83-131400-150	Yes	Sentinel DCS-50T	50 (22.7)	80 (36.2)	34.1 (866)	29.2 (742)	9.0 (229)
83-131401-150	No						
83-131400-068	Yes	Sentinel DCS-68	68 (30.8)	105 (47.6)	33.3 (846)	28.4 (721)	12.3 (313)
83-131401-068	No						

Notes:

1. DCS-50S is the “short” version. DCS-50T is the “tall” version.
2. A= total cylinder and valve height, B= height to the cylinder valve outlet, and C= cylinder diameter.

The pneumatic/electric control head is mounted on top of the valve body, and the nickel-plated valve is equipped with a diffuser plate, fusible plug, 360 psi pressure gauge, gauge shield, actuator shield, and (an optional) supervisory pressure switch (see Figure 2-2).

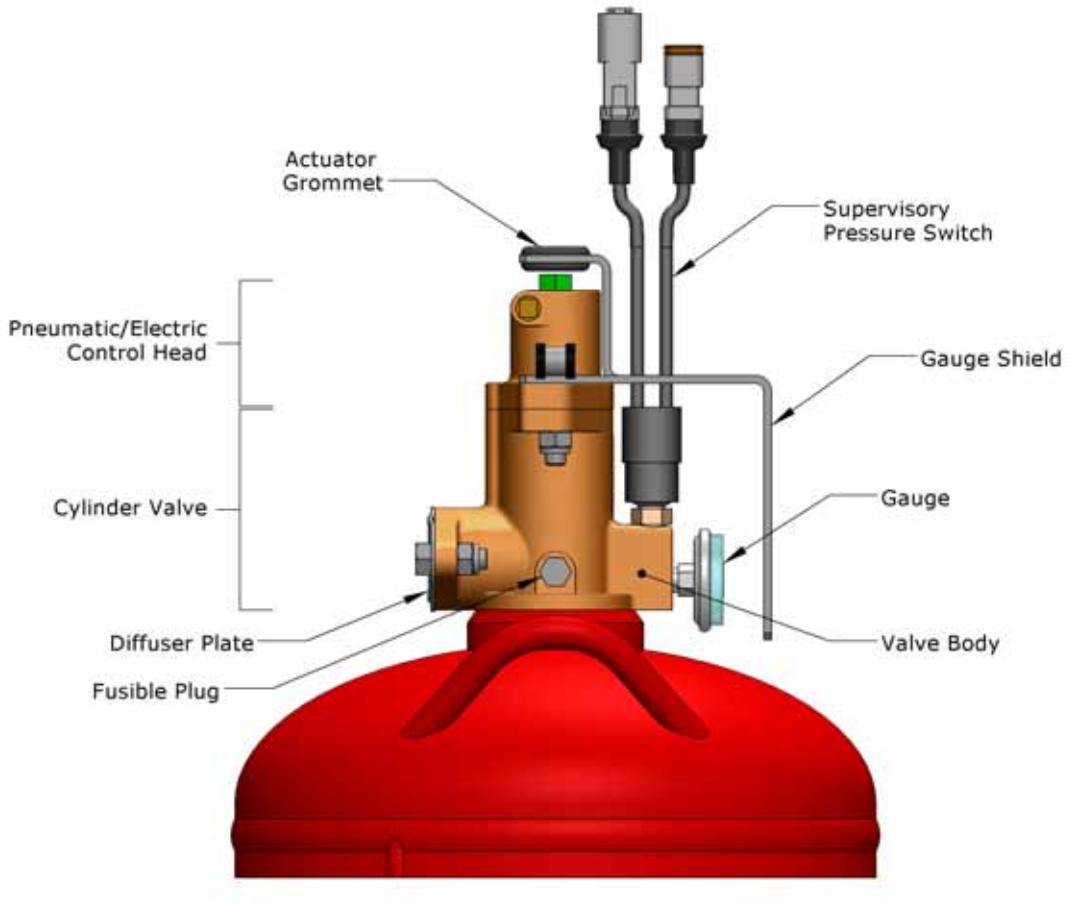

Figure 2-2. Sentinel DCS Valve Assembly Components

All cylinders are pressurized to 360 psig (24.8 bars) at 70°F (21°C) with nitrogen. If the ambient temperature is not 70°F (21°C), the cylinder pressure level will vary with the temperature as shown in Figure 5-12.

2-2.1.1 CYLINDER DISCHARGE ADAPTER KIT, P/N 83-844908-000

The cylinder discharge adapter kit allows a discharge pipe to be connected to any Sentinel DCS cylinder and valve assembly. The discharge adapter kit consists of a 3/4-in./1/2-in. NPT adapter, a steel flange plate, and an o-ring (see Figure 2-3).

Note: The nuts and bolts used to secure the diffuser plate to the valve outlet are to be used to install the cylinder discharge adapter kit.

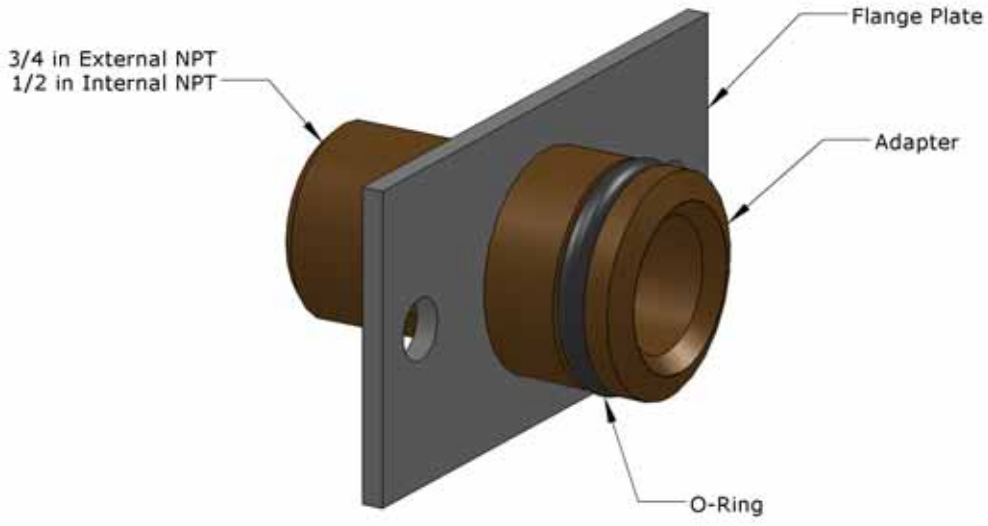

Figure 2-3. Cylinder Discharge Adapter Kit

2-2.2 Sentinel DCS-25, DCS-50S, and DCS-50T Cylinder Mounting Bracket, P/N 83-131400-5*XX*

The Sentinel DCS-25 cylinder mounting bracket may be mounted to a wall (vertically) or deck (horizontally) using four (4) 3/8-inch grade 8 bolts of a suitable length. The Sentinel DCS-50S and DCS-50T may be mounted to a wall only. The DCS-50S uses four (4) 3/8-inch grade 8 bolts and the DCS-50T uses six (6) 3/8-inch grade 8 bolts of a suitable length. Two steel clamps are used to secure the cylinder to the bracket using the hardware provided. See Figure 2-4 and Table 2-2 for dimensions and specifications.

The cylinder mounting bracket is supplied with four (4) 3/8-16 x 2.25 long hex head bolts, eight (8) 3/8 washers, and four (4) 3/8-16 lock nuts, which are used to secure the cylinder straps in place. All hardware material is zinc-plated.

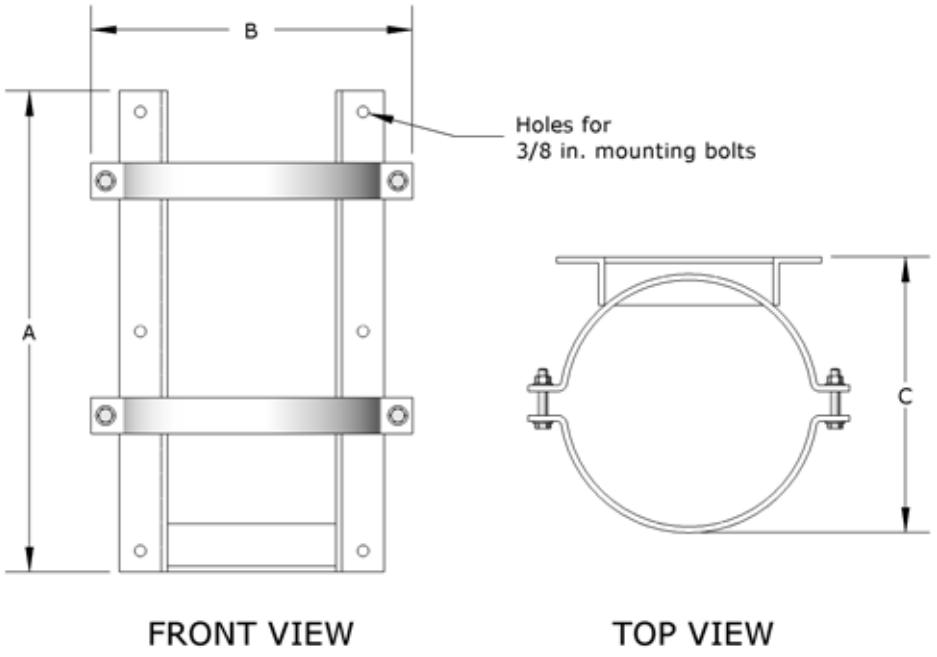

Figure 2-4. Sentinel DCS-25, DCS-50S, and DCS-50T Cylinder Mounting Bracket Dimensions

Table 2-2. Sentinel DCS-25, DCS-50S, and DCS-50T Cylinder Mounting Bracket Specifications

Part Number	Cylinder Mounting Bracket	Dimensions [in./(mm)]			Weight [lbs./(kg)]
		A	B	C	
83-131400-525	DCS-25	14.5 (368)	12.4 (315)	10.7 (272)	16.1 (7.3)
83-131400-550	DCS-50S	16.0 (406)	15.6 (396)	13.6 (345)	19.8 (8.9)
83-131400-555	DCS-50T	27.0 (686)	12.4 (315)	10.7 (272)	22.7 (10.2)
Note: A= height of the bracket, B= width of the bracket, and C= depth of the bracket.					

2-2.3 Sentinel DCS-68 Cylinder Mounting Bracket, P/N 83-130400-510

The Sentinel DCS-68 mounting bracket may be mounted to a wall, using six (6) 3/8-in. grade 8 bolts of suitable length. Dimensions and specifications are shown in Figure 2-5 and in Table 2-3.

The Sentinel DCS-68 cylinder mounting bracket is supplied with eight (8) 3/8-16 x 2.25 long hex head bolts, sixteen (16) 3/8 washers, and eight (8) 3/8-16 lock nuts, which are used to secure the cylinder straps in place. The Sentinel DCS-68 cylinder mounting bracket is also supplied with four (4) 1/2-20 x 1.50 long hex head bolts, eight (8) 1/2 washers, and four (4) 1/2-20 lock nuts, which are used to secure the cylinder flange to the cylinder mounting bracket. All hardware material is zinc-plated.

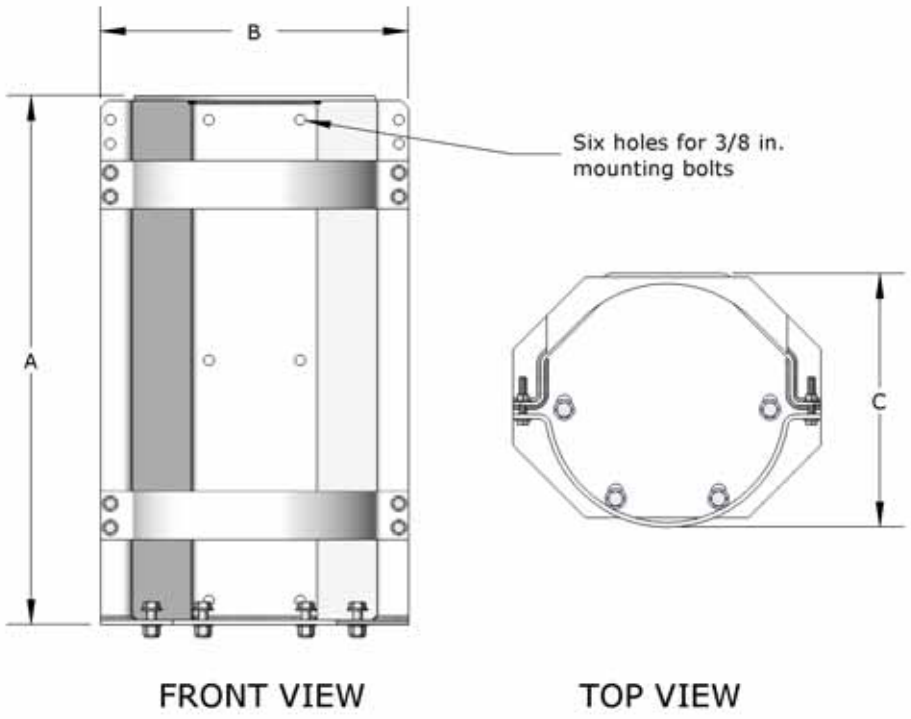

Figure 2-5. Sentinel DCS-68 Cylinder Mounting Bracket Dimensions

Table 2-3. Sentinel DCS-68 Cylinder Mounting Bracket Specifications

Cylinder Mounting Bracket P/N	Cylinder Assembly Model	Dimensions [in./(mm)]			Bracket Weight [lbs./(kg)]
		A	B	C	
83-130400-510	DCS-68	28.2 (716)	16.0 (406)	13.2 (335)	60 (27.2)

2-2.4 Sentinel DCS-50S and DCS-68 Deck Mount Flange, P/N 83-131500-568

The Sentinel DCS Deck Mount Flanges are only used for vertical deck mounting. The deck mount flange is to be welded to the vehicle deck and the cylinder bolted to the flange. The flange dimensions and weight are shown in Figure 2-6 and in Table 2-4.

The cylinder deck mount flange is supplied with six (6) 1/2-20 hex head bolts and six (6) 1/2 washers. The bolt material is steel with zinc plating, and has a minimum tensile strength of 150,000 psi. The washer material is stainless steel.

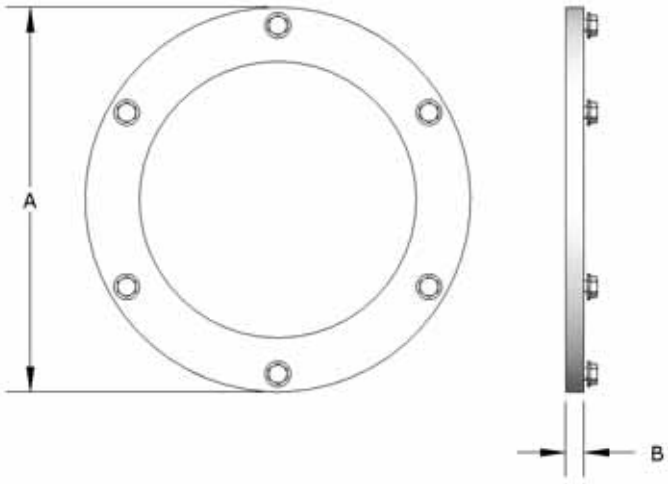

Figure 2-6. Sentinel DCS-50S and DCS-68 Deck Mount Flange Dimensions

Table 2-4. Sentinel DCS-50S and DCS-68 Deck Mount Flange Specifications

Part Number	Cylinder Assembly Model	Dimensions [in./(mm)]		Weight [lbs./(kg)]
		A	B	
83-131400-568	DCS-50S DCS-68	11.7 (297)	.75 (19)	12 lb. (5.4 kg)
Note: A= diameter of the flange, and B= thickness of the flange.				

2-3 VALVE COMPONENTS

2-3.1 Cylinder Valve Rebuild Kit, P/N 83-131411-000

The Cylinder Valve Rebuild Kit is used for disassembling and rebuilding the cylinder valve. The kit contents are listed in Table 2-5. An exploded view of the cylinder valve is provided in Figure 2-7.

Table 2-5. Cylinder Valve Rebuild Kit

Description	Quantity Included
Cylinder O-ring	1
Retaining ring	1
Spring	2
Check valve	2
Piston O-ring, .674 ID	1
Piston O-ring, .424 ID	1
Perforated disk	1
Actuator cap O-ring	1
Parker Super-O-Lube Lubricant	1
Gasket - Actuator	1

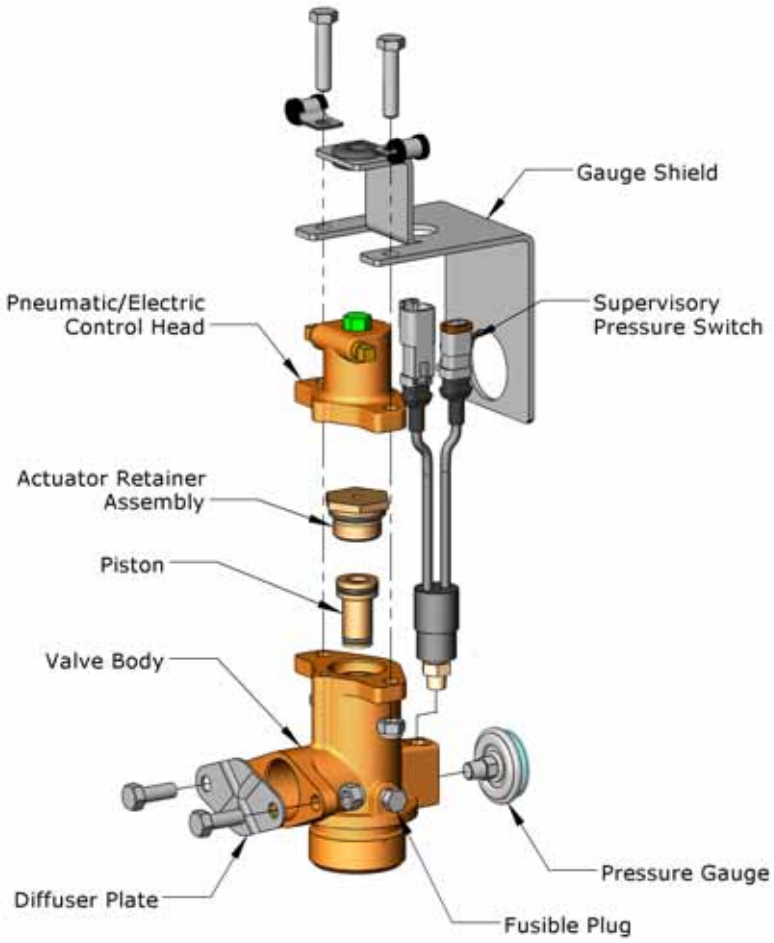

Figure 2-7. Cylinder Valve Assembly - Exploded View

2-3.2 Pressure Gauge, P/N WK-283951-000

The Sentinel DCS Pressure Gauge indicates whether the pressure in the cylinder is within required operating limits. A green area on the gauge face defines the operating pressure limits (see Figure 2-8). If the gauge pointer is outside the green area, it indicates that the cylinder valve assembly requires service, or is being exposed to temperatures outside its operating range.

Figure 2-8. Pressure Gauge

2-3.3 Supervisory Pressure Switch, P/N 83-131411-200

The (optional) Sentinel DCS Supervisory Pressure Switch (see Figure 2-9), may be used to monitor the pressure in the Sentinel DCS cylinder assembly. The switch is supplied with 16-in. long leads terminated with connectors, which allow “plug and play” installation and operation with the Sentinel NET or Sentinel SA1. The switch is normally closed during system standby, and opens when the pressure in the cylinder drops below the low-pressure limit.

Figure 2-9. Supervisory Pressure Switch

2-4 OTHER COMPONENTS

2-4.1 ABC Dry Chemical Suppression Agent, P/N WK-806411-000

P/N WK-806411-000 is a 50-pound pail of Kidde 90 Multi-Purpose ABC Dry Chemical. The pail is plastic, with a carrying handle and an o-ring seal on the lid. Once opened, the recharge agent must be dispensed into containers that prevent/retard contamination by moisture, dirt, dust, etc. If the agent is to remain in its original pail, the lid must be snapped on tightly to prevent further contamination. It is recommended that recharge containers and containers of nitrogen, whether used as part of the system, or as recharge storage, be stored between -40°F (-40°C) and 120°F (49°C).

For more information regarding the agent, consult the material safety data sheet (MSDS), or call technical support at 1-866-287-2531.

2-4.2 Nitrogen Recharge Adapter, P/N 83-130510-000

The recharge adapter is mounted in place of the pneumatic/electric control head to allow the cylinder to be repressurized. This is required after refilling the cylinder with dry chemical. Figure 2-10 shows the nitrogen recharge adapter.

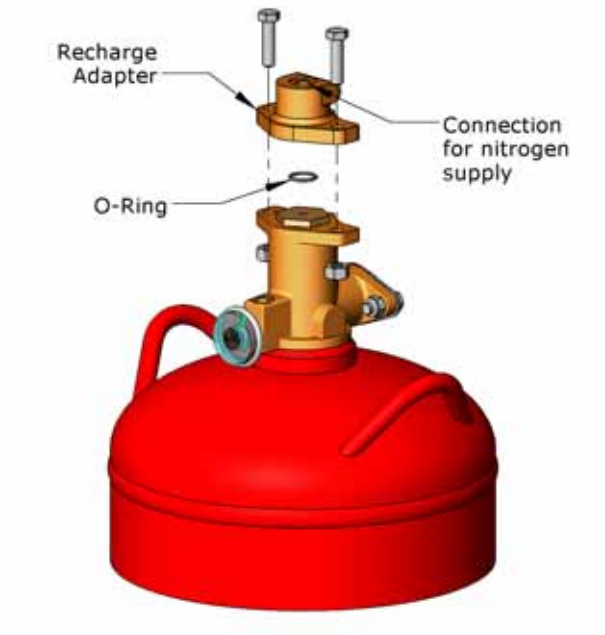

Figure 2-10. Nitrogen Recharge Adapter

2-4.3 Pneumatic/Electric Control Head, P/N 83-132500-000

The pneumatic/electric control head (see Figure 2-11), is used to directly open the cylinder valve. The pneumatic/electric control head is bolted to the top of the cylinder valve using two hex head bolts and self-locking nuts.

The pneumatic/electric control head (see Figure 2-11) mounts on top of the valve body. The electric actuator (P/N 83-132500-500) screws into the top of the control head assembly. The control head has pneumatic inlet and outlet ports for connecting multiple cylinders in series using hose or tubing. The electric actuator is not shipped with the cylinder and valve assembly.

Note: The control head is shipped with the cylinder and valve assembly.

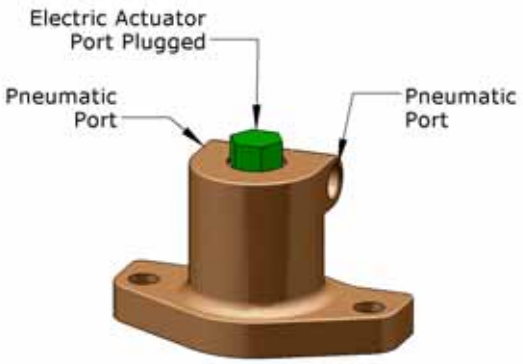

Figure 2-11. Pneumatic/Electric Control Head

2-5 DELIVERY COMPONENTS

2-5.1 Nozzles

A cone type nozzle and a low rate (LR) fan nozzle are available with the Sentinel DCS.

2-5.1.1 CONE NOZZLE AND CAP, P/N 83-844714-010

The cone nozzle is made of plated steel, and is equipped with a grey silicone cap, as shown in Figure 2-12.

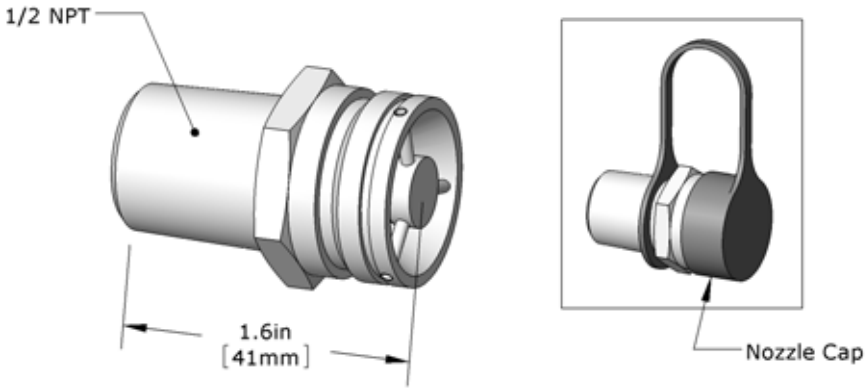

Figure 2-12. Cone Nozzle and Cap

2-5.1.2 LR FAN NOZZLE AND CAP, P/N 83-131401-000

The LR fan nozzle, shown in Figure 2-13, is a plated steel nozzle designed to deliver the same flow rate as the cone nozzle. Cone nozzles and LR fan nozzles can be mixed in the same agent

distribution piping system. The LR fan nozzle disperses dry chemical in a 180° fan-shaped pattern. The LR fan nozzle is equipped with a grey silicone cap.

Figure 2-13. LR Fan Nozzle and Cap

2-5.2 Nozzle Brackets

This section describes the three (3) nozzle brackets that are used to mount the nozzles. All brackets should be properly prepared and painted to prevent rusting.

2-5.2.1 BASIC NOZZLE BRACKET, P/N 83-131019-001

The basic nozzle bracket (see Figure 2-14), is a 2-in. x 2-in. x 1/8-inch steel 90° angle bracket. The installer may weld a fitting to this bracket for customized installation and aiming of nozzles.

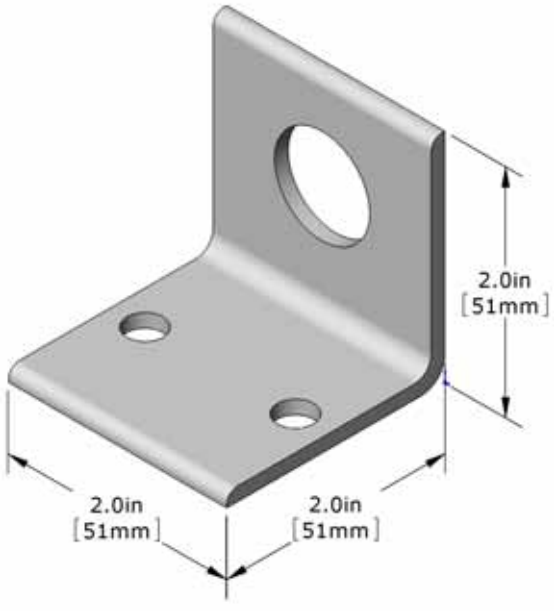

Figure 2-14. Basic Nozzle Bracket

2-5.2.2 NOZZLE BRACKET WITH 45º ELBOW, P/N WK-263362-000

This is a basic bracket that is welded to a 1/2-inch, 45° elbow (see Figure 2-15). The 45° elbow has 1/2-inch NPT female threads.

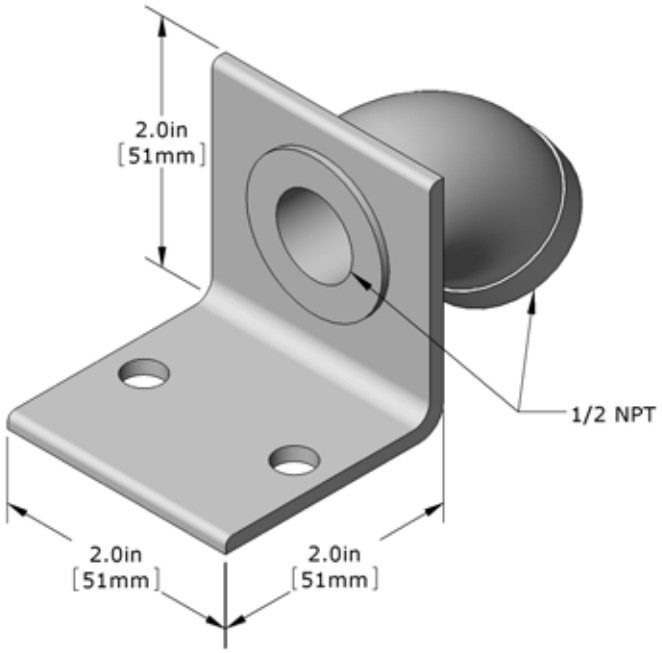

Figure 2-15. Nozzle Bracket With 45º Elbow

2-5.2.3 NOZZLE BRACKET WITH IRON COUPLING, P/N WK-263363-000

This is a basic bracket with a straight coupling welded to it (see Figure 2-16). The coupling has 1/2-inch NPT female threads.

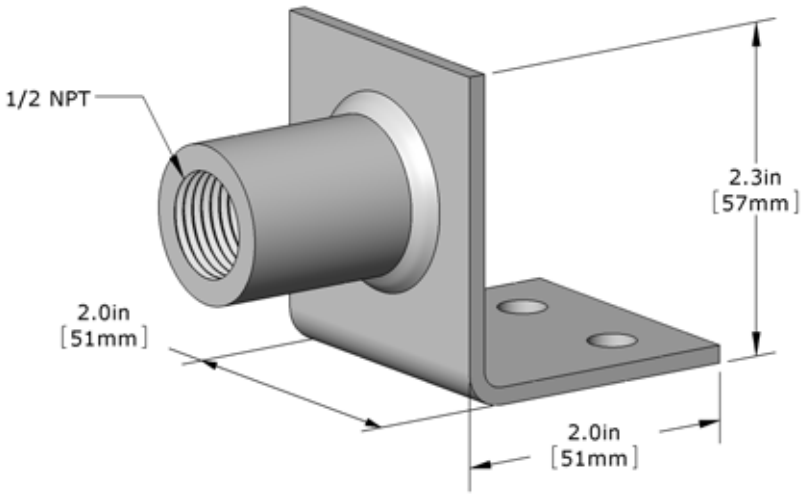

Figure 2-16. Nozzle Bracket With Iron Coupling

2-5.3 Four-Way Distributor Assembly, P/N 83-131402-000

The 4-way distributor assembly (see Figure 2-17), is provided to distribute the dry chemical agent to multiple (up to 10) nozzles. This can be done in combination with ordinary tee fittings, or by using the 4-way distributor. For more information, refer to *Chapter 3*, *"System Design"*. The distributor(s) can be bolted or welded in place.

The distributor has four 1/2-inch NPT female threaded outlet ports at right angles to each other, and a 3/4-inch NPT female threaded inlet port. The distributor should be prepared and painted to prevent it from rusting.

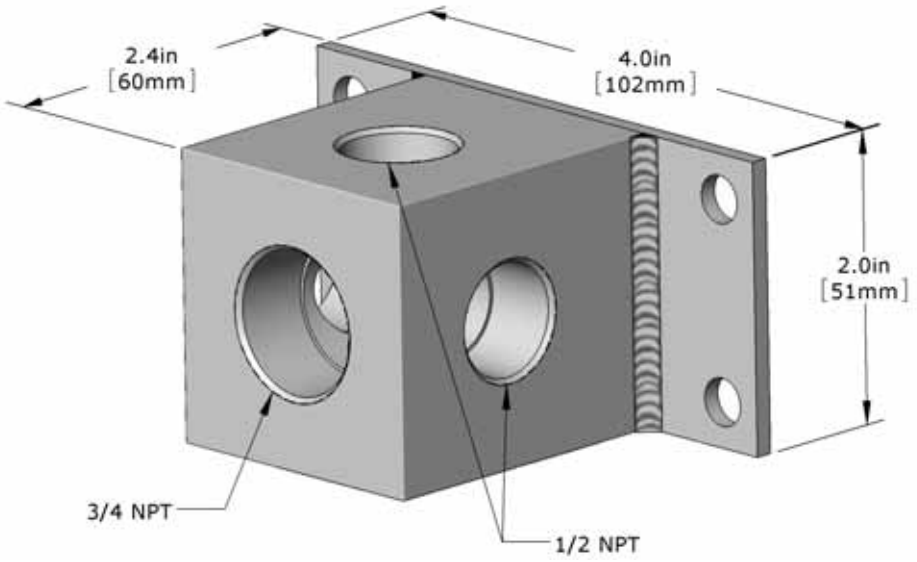

Figure 2-17. Four-Way Distributor Assembly

CHAPTER 3
SYSTEM DESIGN

3-1 INTRODUCTION

This chapter is intended for system designers, and outlines the steps required to design the system including the system hardware parameters. More detailed information concerning system design is provided in the following manuals:

- *Sentinel NET Vehicle Fire Suppression System Design, Installation, Operation and Maintenance (DIOM) Manual* (P/N 83-132555-000)
- *Sentinel SA1 Vehicle Fire Suppression System DIOM Manual* (P/N 83-132550-000)

For information concerning the Kidde® Sentinel™ LS Vehicle Fire Suppression System, refer to the *Sentinel LS Vehicle Fire Suppression System DIOM Manual* (P/N 83-130550-000).

3-2 SYSTEM DESIGN PROCEDURE

To design a Kidde Sentinel DCS System for a given vehicle, perform the following steps:

1. Perform a vehicle hazard analysis.
2. Determine the appropriate number and location of nozzles to protect the hazard(s) identified.
3. Determine the cylinder size according to the total system nozzle count.
4. Design the discharge hose system.

3-3 FIRE SUPPRESSION CONSIDERATIONS

Several points should be considered when designing the fire suppression system.

1. What is the hazard? Is it an open or closed area? This determines the type of coverage. “Total flooding” is used in enclosed areas, and a “local area application” is used in open areas.
2. What are the dimensions of the hazard area? This determines the basic nozzle coverage, and whether additional nozzles are needed.
3. Could a liquid fuel leak spread fire to other areas? If so, additional hardware may be required.
4. Are there “shadow” areas, such as areas blocked by vehicle components that would prevent the dry chemical from reaching that area? If so, additional hardware may be required. Also, care must be taken to position the nozzle so that the dry chemical will reach the shadow area.
5. Will the normal airflow from fans and vents affect the dry chemical discharge? This will affect nozzle placement and discharge direction. Place the nozzle to take advantage of the airflow. The airflow should be in the same direction as the dry chemical hazard area coverage.
6. When determining the detection system required for each hazard the following must be considered:
   - How quickly fires must be detected
   - Value of the process being protected (including downtime)
   - Value of the vehicle
   - Obstructions in the hazard area
   - Sight lines and predicted convection currents due to hot areas

  - Using a combination of detection methods may provide the best protection.

7. Refer to the associated manuals listed in Section 3-1, “Introduction”, for more detailed information concerning detection and actuation.

3-4 HAZARD ANALYSIS

The following should be carefully analyzed by a factory-trained individual:

- Fuel areas and heat sources are hazards, particularly where they overlap.
- The environment in which the vehicle is used may contain additional hazards.
- Application-specific vehicle modifications may alter sources of hazards. For example, a bulldozer used for landfill may present different hazards than an identical bulldozer used in a forestry application.
- Typical fuel hazards are gasoline, diesel fuel, engine oil, lubricating oil, and hydraulic fluid. Wood, cloth, and plastic are other fuel hazards. Leaves, coal dust, and other foreign objects represent hazards caused by the environment.
- Heat sources, such as the engine, exhaust, brakes, bearings, gears and transmissions can be hazards. Other sources include auxiliary equipment such as pumps, turbochargers, electric motors, torque converters, and other sources of ignition.
- A vehicle’s fire history is very important. The equipment installer should discuss this with the end user. Previous fire experience on similar machines should be considered in the fire risk assessment. Past experience can indicate that special hazards exist, such as hydraulic hose that frequently comes loose at a specific connection on the equipment that has an adverse fire history, or other component failures that increase fire potential. Input from the vehicle manufacturer or operator is essential.
- The installer should document all of the hazard areas requiring protection.

3-5 NOZZLE COVERAGE

The dry chemical nozzles used in the Sentinel DCS are designed for total flooding and local applications in which nozzles are arranged to discharge dry chemical agent into an enclosed volume or directly onto a fire or burning surface. Nozzles should be positioned and aimed to cover the high risk items identified in the hazard analysis. Such items may include:

- Fuel injector pumps, line, and injectors
- Oil lines, pumps, and filters
- Hydraulic lines and pumps
- Turbochargers
- Starter motors
- Exhaust components
- Alternators

In designing the appropriate nozzle coverage, determine the following:

1. Nozzle location (based on hazards identified in Hazard Analysis)
2. Nozzle aim (45º or 90º fittings may be used)
3. Distance from nozzle to hazard
4. Nozzle coverage volume/area

Each hazard is protected by using one or more nozzles. It may be that the hazard is too large to be covered by one nozzle. When this occurs, carefully space multiple nozzles to obtain maximum coverage to the hazard area. To be protected, the hazard’s entire combustion area must be within the nozzle(s) discharge pattern.

Cone nozzles and LR fan nozzles may be used interchangeably within a Sentinel DCS hose distribution network. Each nozzle provides a module of protection with the limits listed in Figure 3-1, Figure 3-2, and Figure 3-3.

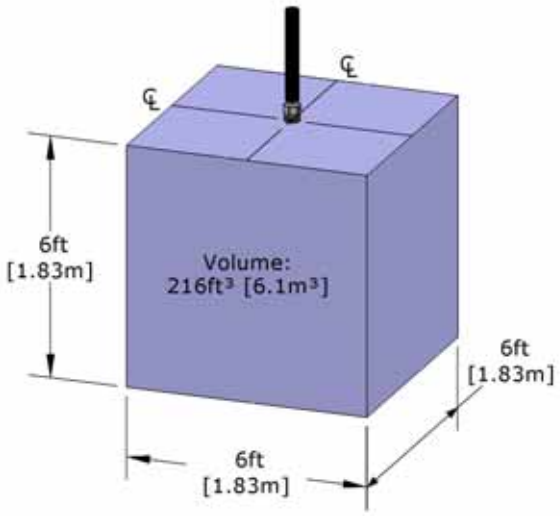

Figure 3-1. Cone Nozzle Total Flooding (Volume) Coverage

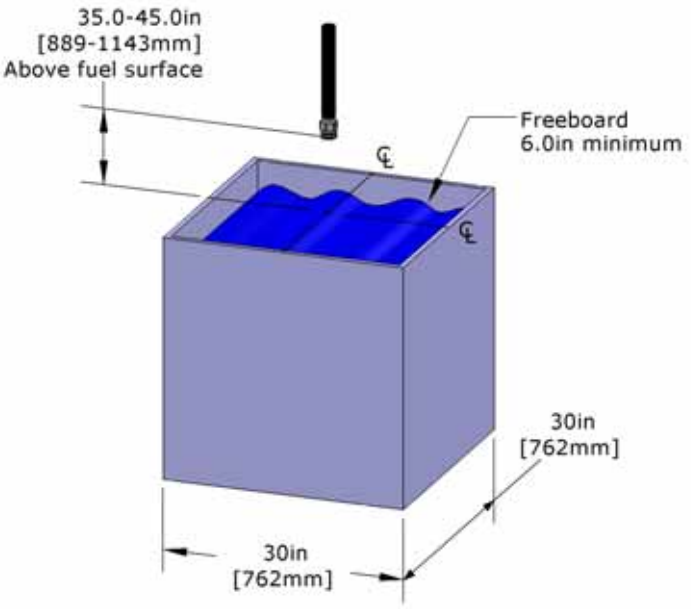

Figure 3-2. Cone Nozzle Local Application (Area) Coverage

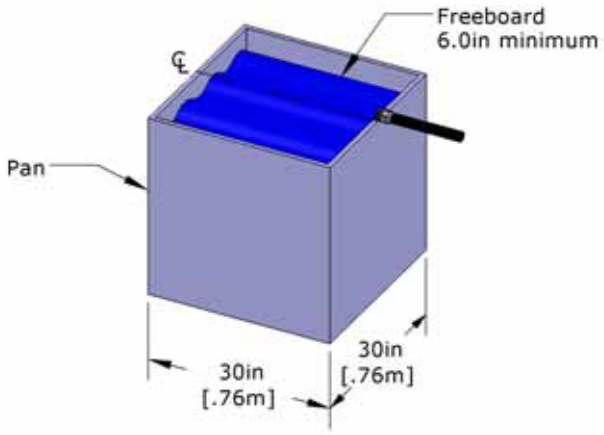

Figure 3-3. LR Fan Nozzle Local Application (Area) Coverage

Note: The fan nozzle slit must be directly over the area, and parallel to the surface.

Individual volume and area modules may be arranged in any configuration, as long as the nozzle coverages and hose lengths are not exceeded.

3-6 CYLINDER SIZES

The cylinders are available in four sizes. Each cylinder has a specific fill quantity of dry chemical agent. Determine the cylinder size based on the number of nozzles needed to protect the hazard(s).

Table 3-1. Number of Nozzles Per System

System	Number of Nozzles	
	Minimum	Maximum
DCS-25	2	6
DCS-50S DCS-50T	6	10
DCS-68	6	10

3-7 DESIGNING THE HOSE DISTRIBUTION SYSTEM

Once the cylinder and nozzle locations have been determined, hydraulic hoses are used to route the dry chemical agent to the nozzles. This can be accomplished by using a system of hydraulic hoses, pipe fittings, and/or a Four-Way Distributor.

Hoses used in the Sentinel DCS System must meet USBM flame resistance requirements as specified in MSHA 2G, as well as all other SAE requirements. The SAE standards that should be used for reference are as follows:

- SAE J516 Hydraulic Hose Fitting Standard
- SAE J517A Hydraulic Hose Standard
- SAE J343 Standard for hydraulic hose assemblies

Use SAE hose type 100 R1 AT for installations having a minimum operating temperature of -40ºF (-40ºC). Use SAE hose type 100 R14 A for installations having a minimum operating temperature of -65ºF (-54ºC).

Fittings shall be used as necessary where a hose connects to nozzles, cylinders, tees or distributors. Swivel hose couplings may be used at any location. Hydraulically crimped type fittings should be used. There are three specially designed brackets that are used to mount the nozzles and aim the dry chemical agent. These brackets are described in detail in *Chapter 2, "Component Descriptions"*.

The Sentinel DCS maximum total hose length will vary from application to application. However, the system minimum hose length for all applications is 10 feet (3.048 m). It is important to remember this when using the reference tables. The distance between each tee or distributor and a nozzle can be zero, but the minimum total hose length between the cylinder and any one nozzle must be at least 10 feet (3.048 m).

These hose length maximums and minimums must be strictly observed. If the system maximum hose length is exceeded, there may not be sufficient pressure to ensure all the nozzles receive an adequate supply of dry chemical agent. The maximums listed in each hose limitation table pertain to the maximum limits for a balanced system. These values can be exceeded for the unbalanced system provided that all other limits are not exceeded.

3-7.1 DCS-25 Two-Nozzle System

The DCS-25 two-nozzle system can only be piped using one tee. Figure 3-4 shows a DCS-25 two-nozzle system layout and Table 3-2 gives the system limitations.

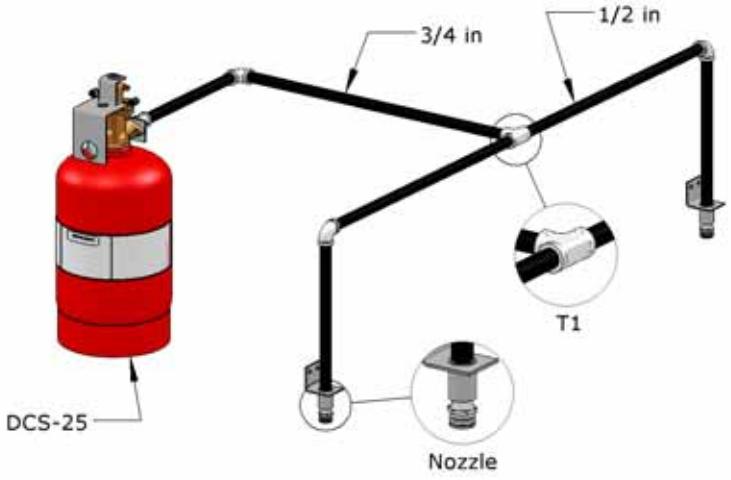

Figure 3-4. DCS-25 Two Nozzle System Layout

Table 3-2. DCS-25 Two-Nozzle System Limitations

Location	Hose ID	Hose Length		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to T1	3/4-inch	30 ft. (9 m)	0	1	0
T1 to each Nozzle	1/2-inch	15 ft.* (5 m)	0	1	0
Cylinder to each Nozzle	--	45 ft. (14 m)	10 ft. (3 m)	--	--
Total quantities of hose	3/4-inch	30 ft. (9 m)	5 ft. (2 m)	--	--
	1/2-inch	45 ft. (14 m)	0	--	--
*This system can be unbalanced in a maximum ratio of 2:1 at T1.					

3-7.2 DCS-25 Three-Nozzle System

The DCS-25 three-nozzle system can only be piped using one distributor. In this configuration, one of the outlet ports of the distributor is blocked with a 1/2-inch plug. Figure 3-5 shows a DCS-25 three-nozzle system layout and Table 3-3 gives the system limitations.

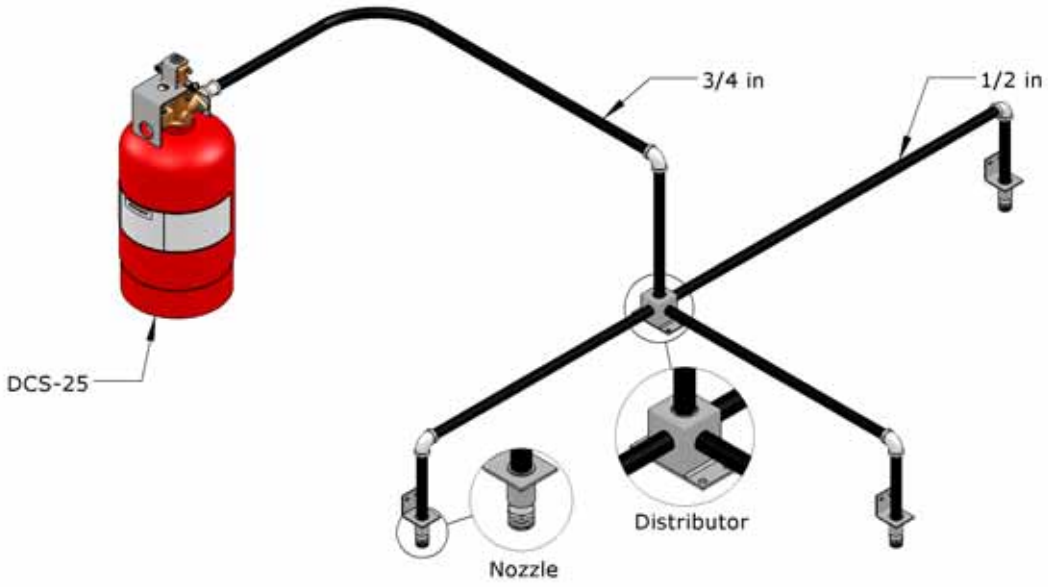

Figure 3-5. DCS-25 Three Nozzle System Layout

Table 3-3. DCS-25 Three-Nozzle System Limitations

Location	Hose ID	Hose Length		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to Distributor	3/4-inch	30 ft. (9 m)	0	1	0
Distributor to each Nozzle	1/2-inch	15 ft.* (5 m)	0	1	0
Cylinder to each Nozzle	--	45 ft. (14 m)	10 ft. (3 m)	--	--
Total quantities of hose	3/4-inch	30 ft. (9 m)	5 ft. (2 m)	--	--
	1/2-inch	45 ft. (14 m)	0	--	--
*This system can be unbalanced in a maximum ratio of 2:1 at the distributor.					

3-7.3 DCS-25 Four Nozzle System

The DCS-25 four-nozzle system can be piped using tees only or using one five-way distributor. Figure 3-6 shows a DCS-25 four-nozzle system layout with tees and Figure 3-7 shows a DCS-25 four-nozzle system layout with a distributor. Table 3-4 gives the system limitations with tees and Table 3-5 gives the system limitations with a distributor.

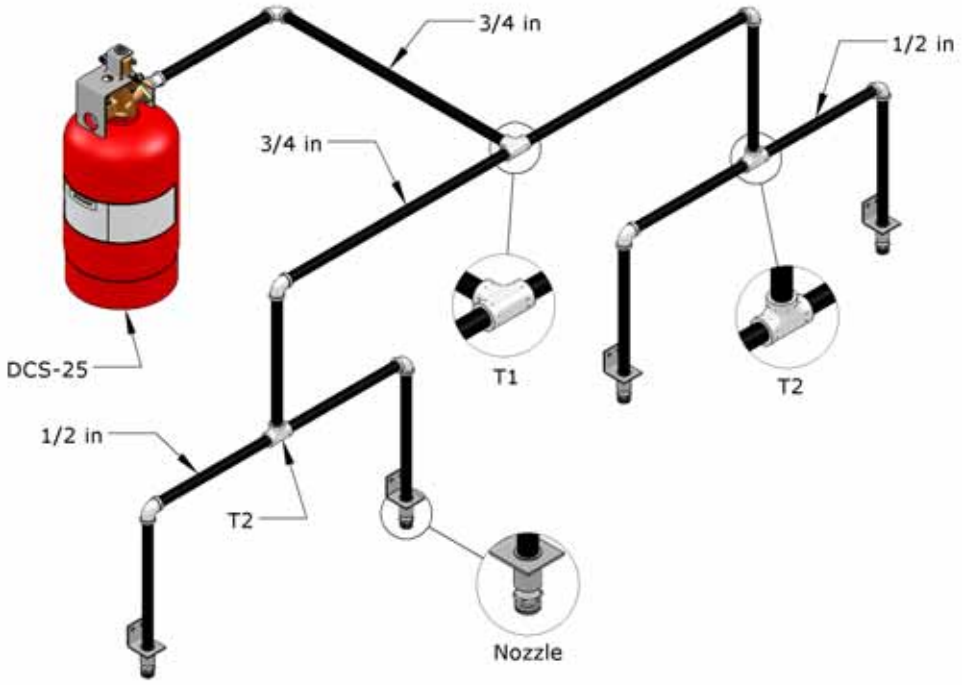

Figure 3-6. DCS-25 Four-Nozzle System Hose Layout (Tees Only)

Table 3-4. DCS-25 Four-Nozzle System Limitations (Tees Only)

Location	Hose ID	Hose Length ft. (m)		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to T1	3/4-inch	45 ft. (14 m)	0	1	0
T1 to T2	3/4-inch	20 ft.* (6 m)	0	1	0
T2 to each Nozzle	1/2-inch	15 ft.* (5 m)	0	1	0
Cylinder to each Nozzle	--	50 ft. (15 m)	10 ft. (3 m)	--	--
Total quantities of hose	3/4-inch	45 ft. (14 m)	5 ft. (2 m)	--	--
	1/2-inch	60 ft. (18 m)	0	--	--
***Note:** This hose layout can be unbalanced in a maximum ratio of 3:1 at either tee.					

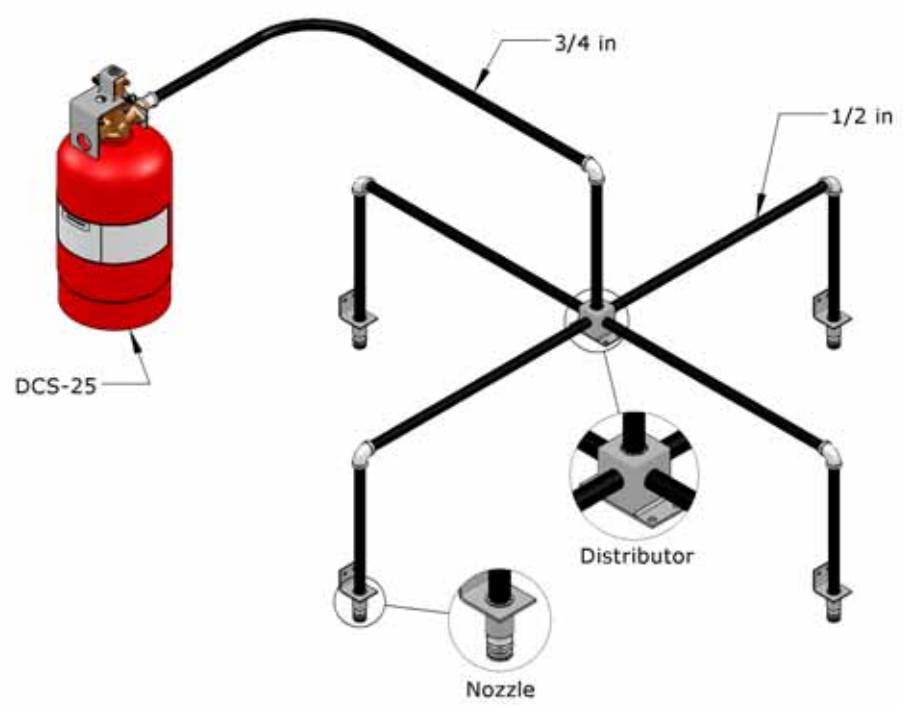

Figure 3-7. DCS-25 Four-Nozzle System Layout (Distributor Only)

Table 3-5. DCS-25 Four-Nozzle System Limitations (Distributor Only)

Location	Hose ID	Hose Length		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to Distributor	3/4-inch	45 ft.(14 m)	0	1	0
Distributor to each Nozzle	1/2-inch	15 ft.*(5 m)	0	1	0
Cylinder to each Nozzle	--	60 ft.(15 m)	10 ft.(3 m)	--	--
Total quantities of hose	3/4-inch	45 ft.(14 m)	5 ft.(2 m)	--	--
	1/2-inch	60 ft.(18 m)	0	--	--
***Note:** This hose layout can be unbalanced in a maximum ratio of 3:1 at the distributor.					

3-7.4 DCS-25 Five-Nozzle System

The DCS-25 five nozzle system can only be piped using one distributor and two tees. In this configuration, one of the outlet ports of the distributor is blocked with a 1/2-inch plug. Figure 3-8 shows a DCS-25 five-nozzle system layout and Table 3-6 gives the system limitations.

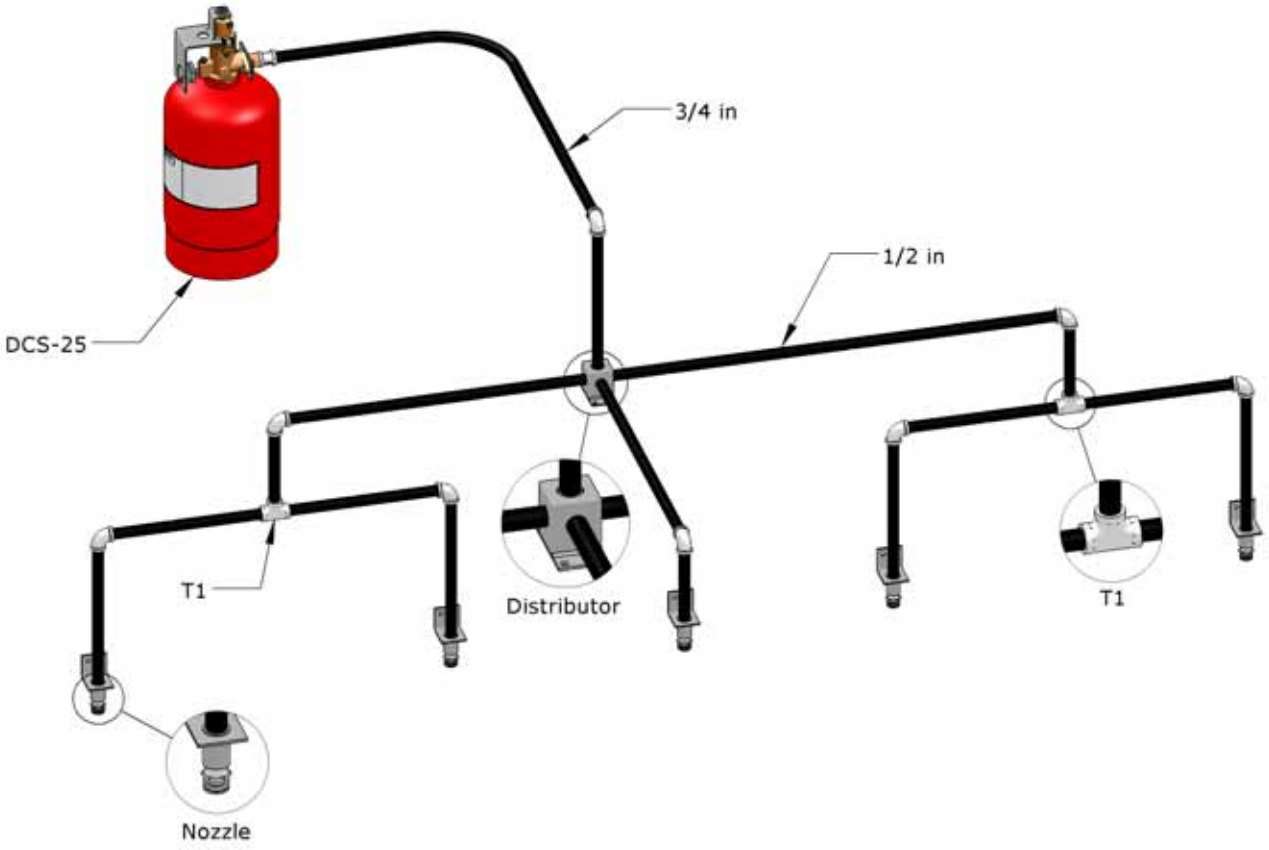

Figure 3-8. DCS-25 Five-Nozzle System Layout

Table 3-6. DCS-25 Five-Nozzle System Limitations

Location	Hose ID	Hose Length		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to Distributor	3/4-inch	30 ft. (9 m)	0	1	0
Distributor to T1	1/2-inch	10 ft.* (3 m)	0	1	0
T1 to each Nozzle	1/2-inch	10 ft.* (3 m)	0	1	0
Cylinder to each Nozzle	--	40 ft. (12 m)	10 ft. (3 m)	--	--
Total quantities of hose	3/4-inch	30 ft. (9 m)	5 ft. (2 m)	--	--
	1/2-inch	50 ft. (15 m)	0	--	--
*This system can be unbalanced in a maximum ratio of 2:1 at the distributor or T1.					

3-7.5 DCS-25 Six-Nozzle System

The DCS-25 six-nozzle system can only be piped using one distributor and three tees. In this configuration, one of the outlet ports of the distributor is blocked with a 1/2-inch plug. Figure 3-9 shows a DCS-25 six-nozzle system layout and Table 3-7 gives the system limitations.

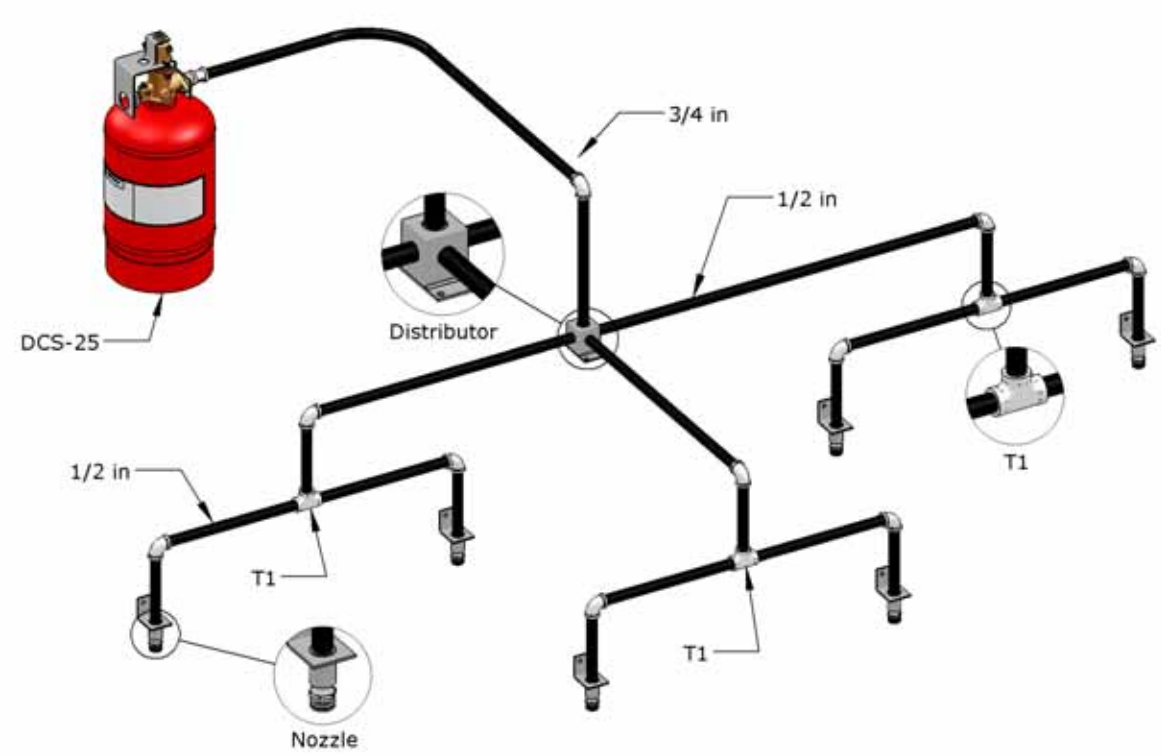

Figure 3-9. DCS-25 Six-Nozzle System Layout

Table 3-7. DCS-25 Six-Nozzle System Limitations

Location	Hose ID	Hose Length		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to Distributor	3/4-inch	15ft. (5 m)	0	1	0
Distributor to T1	1/2-inch	5 ft.* (2 m)	0	1	0
T1 to each Nozzle	1/2-inch	5ft.* (2 m)	0	1	0
Cylinder to each Nozzle	--	30 ft. (9 m)	10 ft. (3 m)	--	--
Total quantities of hose	3/4-inch	15 ft. (5 m)	5 ft. (2 m)	--	--
	1/2-inch	45 ft. (14m)	0	--	--
*This hose layout can be unbalanced in a maximum ratio of 3:1 at the distributor or T1.					

3-7.6 DCS-50 Six-Nozzle System

The DCS-50 six-nozzle system can only be piped using one distributor and three tees. In this configuration, one of the outlet ports of the distributor is blocked with a 1/2-inch plug. Figure 3-10 shows a DCS-50 six-nozzle system layout and Table 3-8 gives the system limitations. The system limits listed below pertain to both the DCS-50T and DCS-50S models.

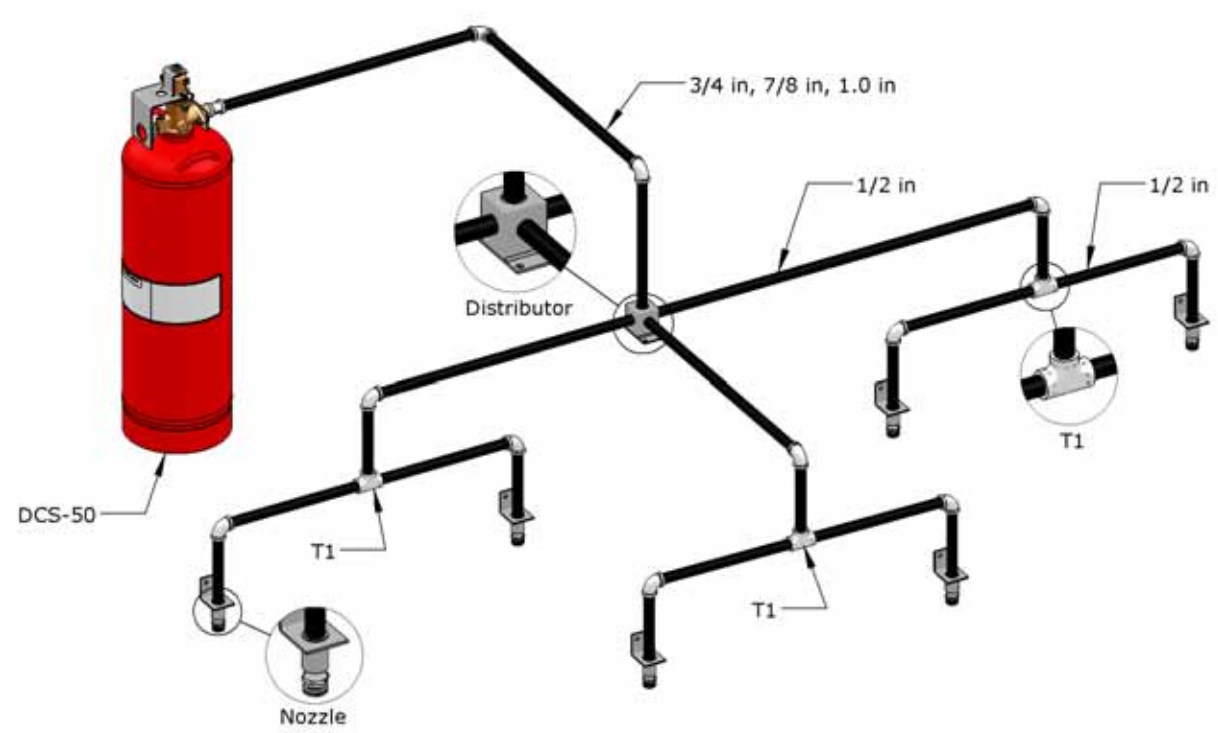

Figure 3-10. DCS-50 Six-Nozzle System Layout

Table 3-8. DCS-50 Six-Nozzle System Hose Limitations

Location	Hose ID	Hose Length		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to Distributor (do not mix hose sizes)	1-inch	45 ft. (14 m)	5 ft. (2m)	2	0
	7/8-inch				
	3/4-inch				
Distributor to T1	1/2-inch	15 ft.* (5 m)	0	1	0
T1 to each Nozzle	1/2-inch	11 ft. (3 m)*	0	1	0
Cylinder to each Nozzle	--	56 ft. (17 m)	10 ft. (3 m)	--	--
Total quantities of hose	1-inch	45 ft. (14 m)	5 ft. (2 m)	--	--
	7/8-inch				
	3/4-inch				
	1/2 -inch	66 ft. (20 m)	0	--	--
***Note:** This hose layout can be unbalanced in a maximum ratio of 3:1 at the distributor or T1.					

3-7.7 DCS-50 Eight-Nozzle System

The DCS-50 eight-nozzle system can only be piped using one tee and two distributors. Figure 3-11 shows a DCS-50 eight-nozzle system layout and Table 3-9 gives the system limitations. The system limits listed below pertain to both the DCS-50T and DCS-50S models.

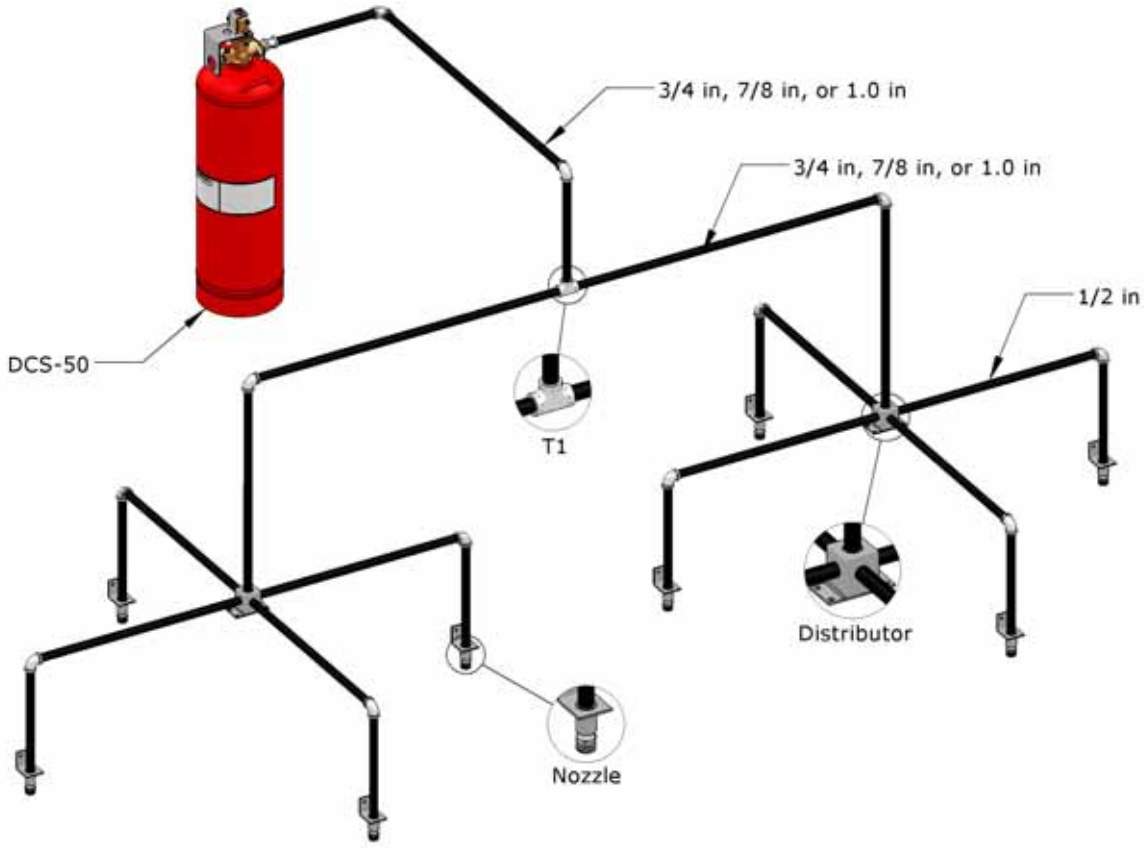

Figure 3-11. Sentinel DCS-50 Eight-Nozzle System Layout

Table 3-9. DCS-50 Eight-Nozzle System Limitations

Location	Hose ID	Hose Length		Number of Elbows / Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to T1	1-inch	40 ft. (12 m)	0	2	0
	7/8-inch				
	3/4-inch				
T1 to each Distributor (do not mix hose sizes to and from T1)	1-inch	20 ft.* (6 m)	0	1	0
	7/8-inch				
	3/4-inch				
Distributor to each Nozzle	1/2-inch	11 ft.* (3 m)	0	1	0
Cylinder to each Nozzle	--	60 ft. (18 m)	10 ft. (3 m)	--	--
Total quantities of hose	1-inch	45 ft. (14 m)	5 ft. (2 m)	--	--
	7/8-inch				
	3/4-inch				
	1/2-inch	88 ft. (27 m)	0	--	--
***Note:** This hose layout can be unbalanced in a maximum ratio of 3:1 at the distributor or T1.					

3-7.8 DCS-50 Ten-Nozzle System

The DCS-50 ten-nozzle system can only be piped using five tees and two distributors. In this configuration, one of the outlet ports of each distributor is blocked with a 1/2-inch plug. Figure 3-12 shows a DCS-50 ten-nozzle system layout and Table 3-10 gives the system limitations. The system limits listed below pertain to both the DCS-50T and DCS-50S models.

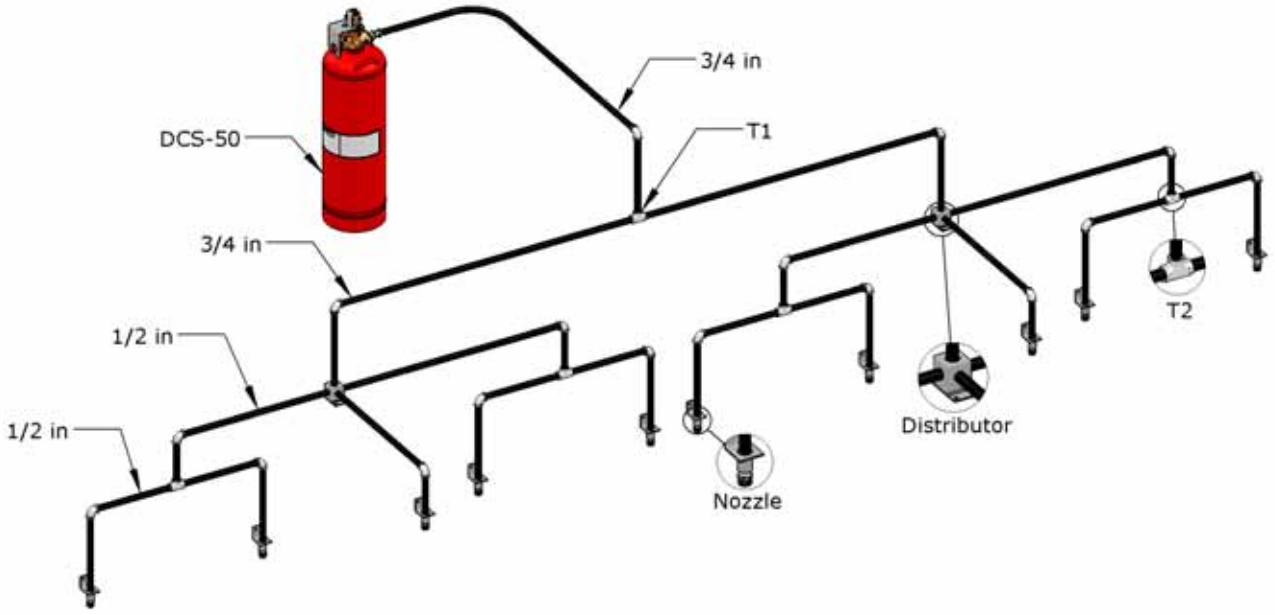

Figure 3-12. DCS-50 Ten-Nozzle System Layout

Table 3-10. DCS-50 Ten-Nozzle System Limitations

Location	Hose ID	Hose Length		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to T1	3/4-inch	10 ft. (3 m)	0	1	0
T1 to each Distributor	3/4-inch	10 ft.* (3 m)			
Distributor to T2	1/2-inch	10 ft.* (3 m)			
T2 to each Nozzle	1/2-inch	10 ft.* (3 m)	0	1	--
Cylinder to each Nozzle	--	40 ft. (12 m)	10 ft. (3 m)	--	--
Total quantities of hose	3/4-inch	30 ft. (9 m)	5 ft. (2 m)	--	--
	1/2-inch	100 ft. (30 m)	0	--	--
***Note:** This hose layout can be unbalanced in a maximum ratio of 2:1 at T1, the distributor, or T2.					

3-7.9 DCS-68 Eight-Nozzle System

The DCS-68 eight-nozzle system can only be piped using one tee and two distributors. Figure 3-13 shows a DCS-68 eight-nozzle system layout and Table 3-11 gives the system limitations.

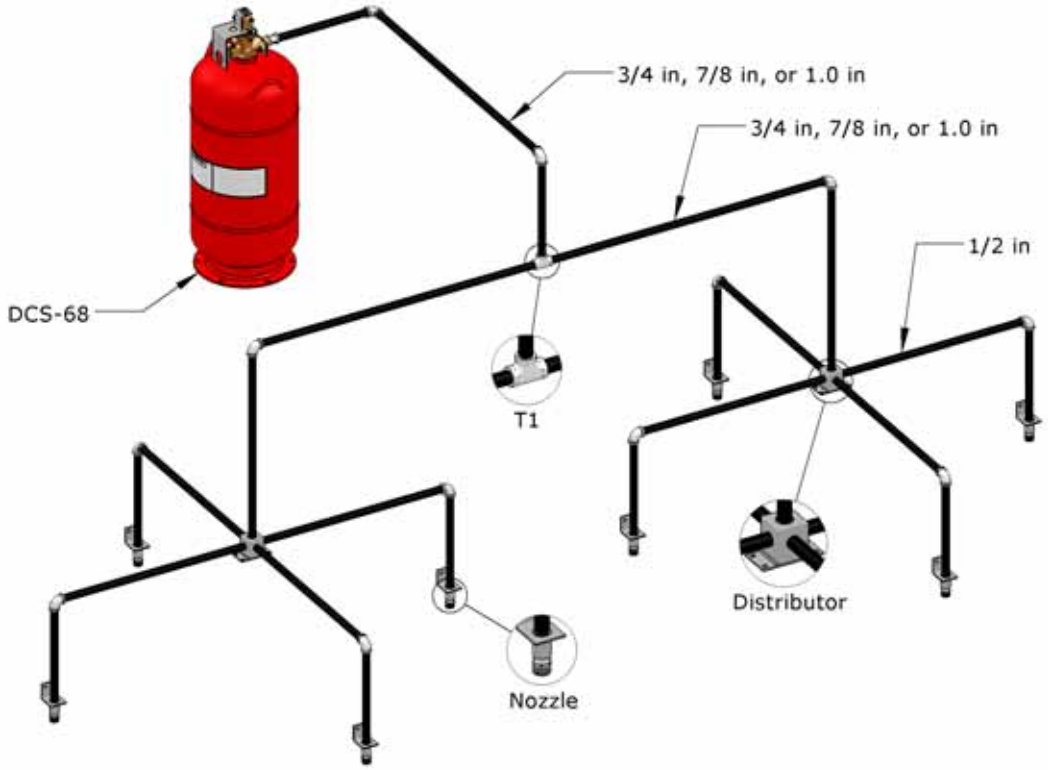

Figure 3-13. DCS-68 Eight-Nozzle System Layout

Table 3-11. DCS-68 Eight-Nozzle System Limitations

Location	Hose ID	Hose Length		Number of Elbows / Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to T1	1-inch	40 ft. (12 m)	0	2	0
	7/8-inch				
	3/4-inch				
T1 to each Distributor (do not mix hose sizes to and from T1)	1-inch	20 ft.* (6 m)	0	1	0
	7/8-inch				
	3/4-inch				
Distributor to each Nozzle	1/2-inch	11 ft.* (3 m)	0	1	0
Cylinder to each Nozzle	1-inch to Distributor	73 ft. (22 m)	10 ft. (3 m)	--	--
	7/8-inch to Distributor	60 ft. (19 m)			
	3/4-inch to Distributor				
Total quantities of hose	1-inch	50 ft. (15 m)	5 ft. (2 m)	--	--
	7/8-inch	45 ft. (14 m)			
	3/4-inch				
	1/2-inch	88 ft. (27 m)	0	--	--
***Note:** This hose layout can be unbalanced in a maximum ratio of 3:1 at T1 or the distributors.					

3-7.10 DCS-68 Ten-Nozzle System

The DCS-68 ten-nozzle system can only be piped using five tees and two distributors. In this configuration, one of the outlet ports of each distributor is blocked with a 1/2-inch plug. Figure 3-14 shows a DCS-68 ten-nozzle system layout and Table 3-12 gives the system limitations.

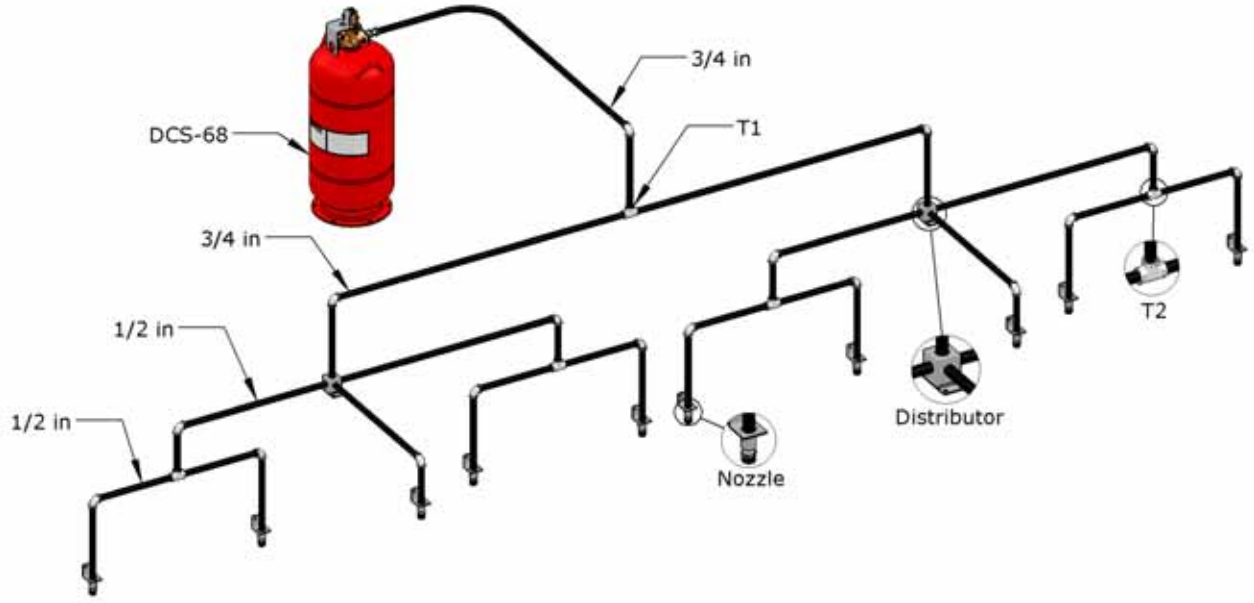

Figure 3-14. DCS-68 Ten-Nozzle System Layout

Table 3-12. DCS-68 Ten-Nozzle System Limitations

Location	Hose ID	Hose Length		Number of Elbows/ Hose Length	
		Max.	Min.	Max.	Min.
Cylinder to T1	3/4-inch	10 ft. (3 m)	0	1	0
T1 to each Distributor	3/4-inch	10 ft.* (3 m)			
Distributor to T2	1/2-inch	10 ft.* (3 m)			
T2 to each Nozzle	1/2-inch	10 ft.* (3 m)			
Cylinder to each Nozzle	--	40 ft. (12 m)	10 ft. (3 m)	--	--
Total quantities of hose	3/4-inch	30 ft. (9 m)	5 ft. (2 m)	--	--
	1/2-inch	100 ft. (30 m)	0	--	--
***Note:** This hose layout can be unbalanced in a maximum ratio of 2:1 at T1, the distributor, or T2.					

CHAPTER 4
INSTALLATION

4-1 INTRODUCTION

This chapter is intended for system installers. It outlines the specific tasks that must be performed to install the Kidde® Sentinel™ DCS Fire Suppression System.

More detailed information concerning overall system installation is provided in:

- *Sentinel NET Vehicle Fire Suppression System Design, Installation, Operation and Maintenance (DIOM) Manual* (P/N 83-132555-000)
- *Sentinel SA1 Vehicle Fire Suppression System (DIOM) Manual* (P/N 83-132550-000)

For further information concerning Sentinel LS Fire Suppression System, refer to the *Sentinel Wet Chemical Vehicle Fire Suppression System DIOM Manual* (P/N 83-130550-000)

4-2 INSTALLATION PROCEDURE SUMMARY

A summary of the major installation tasks is provided below, followed by a detailed installation procedure for each task. The tasks include:

1. Installing the cylinder mounting brackets by bolting or welding them to the vehicle.
2. Mounting the dry chemical cylinders using cylinder mounting brackets.
3. Installing required distributors, tees, connectors, clamps, and nozzle brackets.
4. Installing the nozzles.
5. Installing flexible hose between connections.
6. Blowing clean dry air or nitrogen through the hose(s).

4-3 CYLINDER MOUNTING BRACKET INSTALLATION ORIENTATIONS

The Sentinel DCS cylinder mounting brackets can be either bolted or welded in place, depending on which cylinder and mounting orientation is required. Cylinder mounting brackets are described in greater detail in *Chapter 2*, *"Component Descriptions"*.

Table 4-1. Cylinder Mounting Bracket Orientations

Cylinder Assembly Model	Cylinder Mounting Bracket/Flange P/N[1]	Mounting Orientation[2]		
		Vert. Deck	Horiz. Deck	Vert. Wall
DCS-25	Bkt: 83-131400-525	No	Yes	Yes
DCS-50S	Bkt: 83-131400-550 Flg: 83-131400-568	Yes[3]	No	Yes
DCS-50T	Bkt: 83-131400-555	No	No	Yes
DCS-68	Bkt: 83-130400-510 Flg: 83-131400-568	Yes[3]	No	Yes

Notes:
1. "Bkt"=Bracket. "Flg"=Flange.
2. "Vert"= vertical. "Horiz"= horizontal.
3. Uses Deck Mount Flange for vertical deck-mount.

Note: The cylinder mounting brackets cannot be used to vertically deck mount cylinders.

4-4 CYLINDER MOUNTING BRACKET/FLANGE SPECIFICATIONS

The specifications of the Sentinel DCS-25, DCS-50S, DCS-50T, and DCS-68 cylinder mounting brackets are shown in Figure 4-1 and listed in Table 4-2.

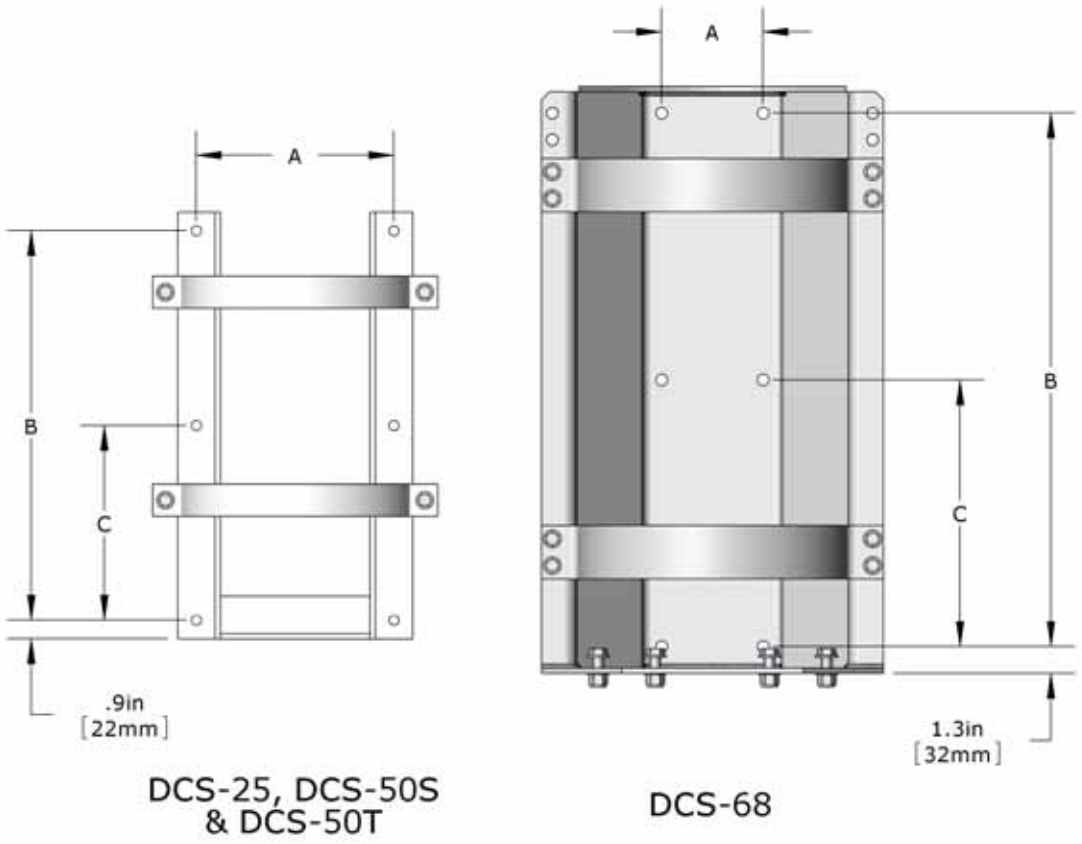

Figure 4-1. Sentinel DCS-25, DCS-50S, DCS-50T, and DCS-68 Cylinder Mounting Bracket Dimensions

Table 4-2. Sentinel DCS-25, DCS-50S, DCS-50T, and DCS-68 Cylinder Mounting Bracket Specifications

Mounting Bracket P/N	Cylinder Assembly Model	Mounting Bolt Quantity & Size (in.)	Dimensions [in./(mm)]			Total Cyl/Bkt Weight [lbs./(kg)]
			A	B	C	
83-131400-525	DCS-25	(4) 3/8	8.25 (210)	12.75 (324)	N/A	66.8 (30.2)
83-131400-550	DCS-50S	(4) 3/8	10.25 (260)	14.25 (362)	N/A	103.7 (47.0)
83-131400-555	DCS-50T	(6) 3/8	8.25 (210)	25.25 (641)	12.62 (321)	102.7 (46.5)
83-130400-510	DCS-68	(6) 3/8	6.0 (152)	20.0 (508)	10.0 (254)	162.0 (73.4)

The dimensions and specifications of the Sentinel DCS-50S and DCS-68 Deck Mount Flange are shown in Figure 4-2 and listed in Table 4-3.

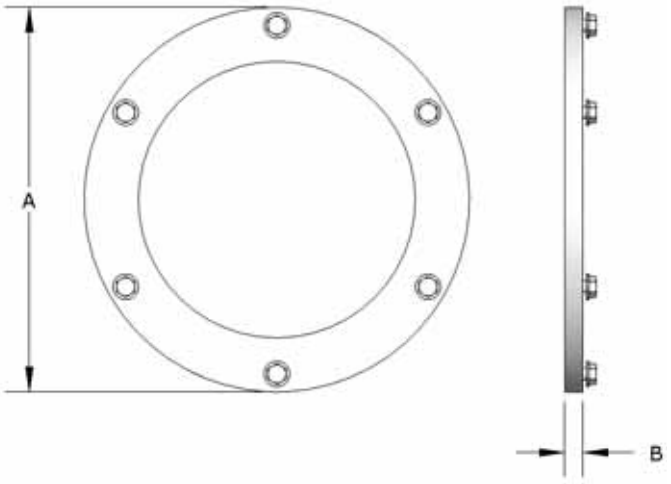

Figure 4-2. DCS-50S and DCS-68 Deck Mount Flange Dimensions

Table 4-3. Sentinel DCS-50S and DCS-68 Deck Mount Flange Specifications

Weld Flange P/N	Cylinder Assembly Model	Dimensions [in./(mm)]		Total Cyl/Flg Weight [lbs./(kg)]
		A	B	
83-131400-568	DCS-50S DCS-68	11.7 (297)	0.8 (19)	117.6 (53.3)

4-5 BRACKET/DECK MOUNT FLANGE INSTALLATION PROCEDURE

Before performing this procedure, inspect the DCS cylinder, valve assembly, and related components for any damage. Ensure that the diffuser plate, shown in Figure 4-3, is installed on the cylinder valve outlet. Ensure that the electric actuator is not installed in the valve assembly control head.

All cylinder mounting bracket assemblies are provided with cylinder mounting hardware. Refer to *Section 2-2, "Fire Extinguisher Components"*, for hardware type and size. Hardware for securing the cylinder bracket to the mounting surface is not provided.

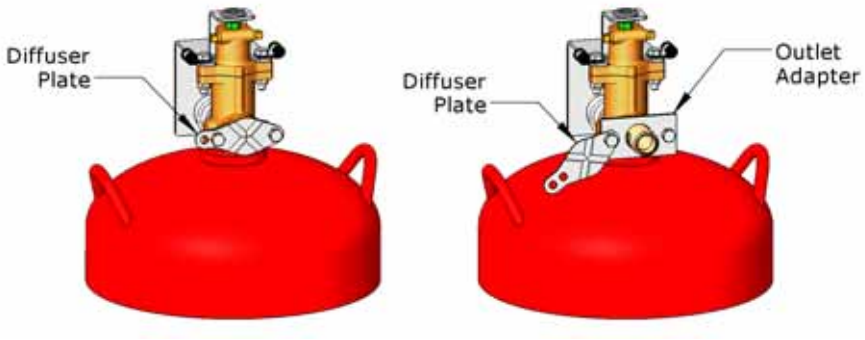

Figure 4-3. Cylinder Valve Diffuser Plate

Perform the following steps to mount the Sentinel DCS cylinder into its respective cylinder mounting bracket or weld flange.

1. Refer to the bracket hole patterns and dimensions in Figure 4-1, Table 4-2, Figure 4-2, and Table 4-3 to determine the bracket bolt locations.
2. Position the cylinder mounting bracket/flange on a rigid surface capable of supporting a minimum of 1.5 times the combined weight of the fully charged cylinder and the mounting bracket/flange under static conditions. Evaluate the mounting surface support structure strength for use during worst case operating conditions, where shock and vibration could cause the load to increase.
3. Bolt or weld the cylinder mounting bracket or weld flange in place.
4. Place the cylinder onto the mounting bracket or weld flange and secure it using the retaining straps and/or bolts provided.

Note: When installing the DCS-68 cylinder in its respective mounting bracket, position the cylinder in the bracket so that the cylinder flange mounting holes are aligned with the bracket slots. First secure the cylinder to the mounting bracket using the retaining straps, and then fasten the cylinder flange to the mounting bracket using the bolts provided.

5. Remove the diffuser plate. Attach the discharge adapter and diffuser plate (tether not shown) to the cylinder valve outlet using the supplied mounting bolts (see Figure 4-4).

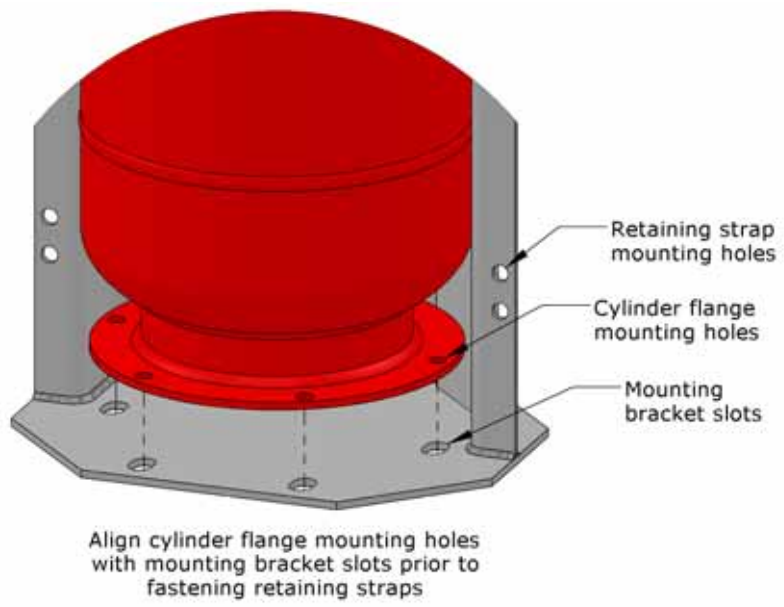

Figure 4-4. Cylinder Flange Alignment

Notes:

1. In all bracket installations, the gauge should be facing away from the mounting surface. For example, if the cylinder is installed on a wall, the gauge should be facing out for visible inspection. If the cylinder is mounted horizontally on a deck, the gauge should be facing up for visible inspection.
2. For horizontal mounting, it is recommended that the cylinder be mounted so that the long axis of the cylinder is perpendicular to the direction of travel. For example, in the mining industry where haulers drive up and down inclines, the cylinders should be positioned across the vehicle.
3. For deck mount weld flange installations, use 110 ft.-lbs. of torque when tightening the cylinder to the weld flange.

Figure 4-5 shows the DCS-25, DCS-50S, DCS-50T, and DCS-68 vertical cylinder/bracket assemblies.

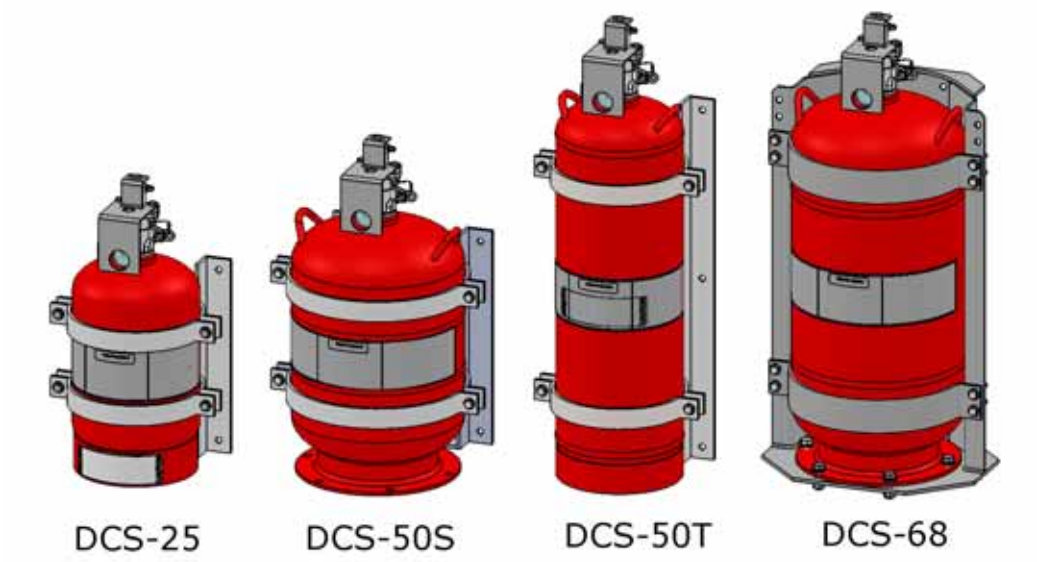

Figure 4-5. Vertical Cylinder/Bracket Assemblies

Figure 4-6 shows the DCS-25 horizontal cylinder/bracket assemblies.

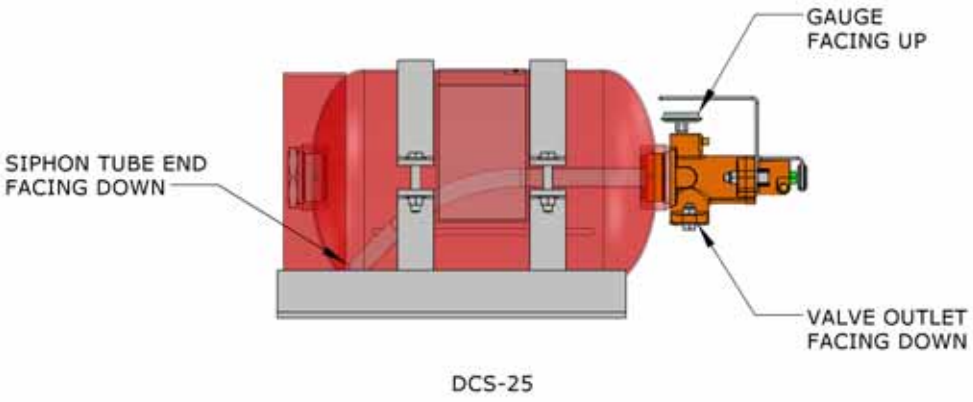

Figure 4-6. Horizontal Cylinder/Bracket Assembly

Figure 4-7 shows the DCS-50S and DCS-68 vertical cylinder/weld flange assemblies.

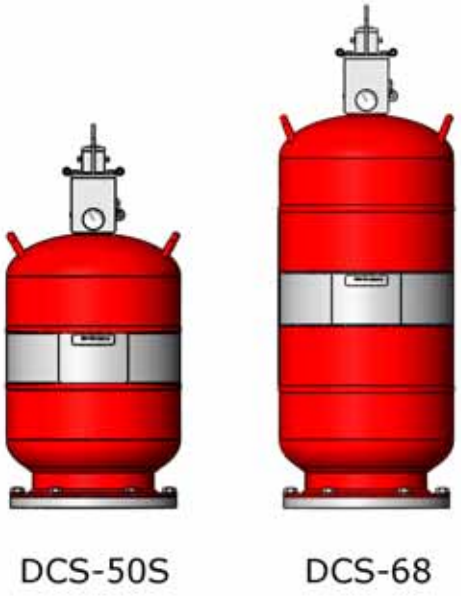

Figure 4-7. Vertical Cylinder/Deck Mount Flange Assembly

4-6 NOZZLE BRACKET AND DISTRIBUTOR INSTALLATION

Three types of nozzle brackets are used to mount the nozzles and a four-way distributor may be used to branch the hose system. These brackets may be bolted (1/4-in.) or welded to the vehicle.

4-6.1 Basic Nozzle Bracket, P/N 83-131019-001

The basic nozzle bracket (see Figure 4-8), is a 2-in. x 2-in. x 1/8-inch steel 90° angle bracket.

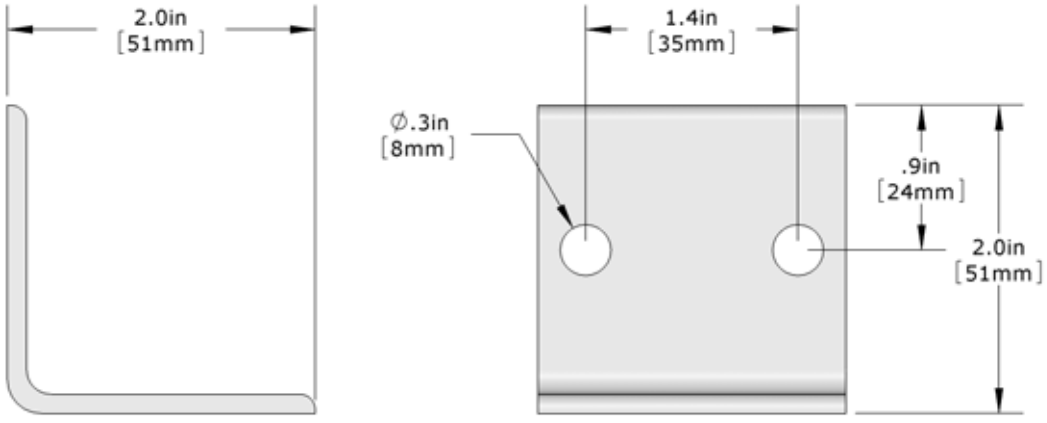

Figure 4-8. Basic Nozzle Bracket

4-6.2 Nozzle Bracket with 45° Elbow, P/N WK-263362-000

This is a basic bracket that is welded to a 1/2-inch, 45° elbow (see Figure 4-9). The 45° elbow has 1/2-inch NPT female threads.

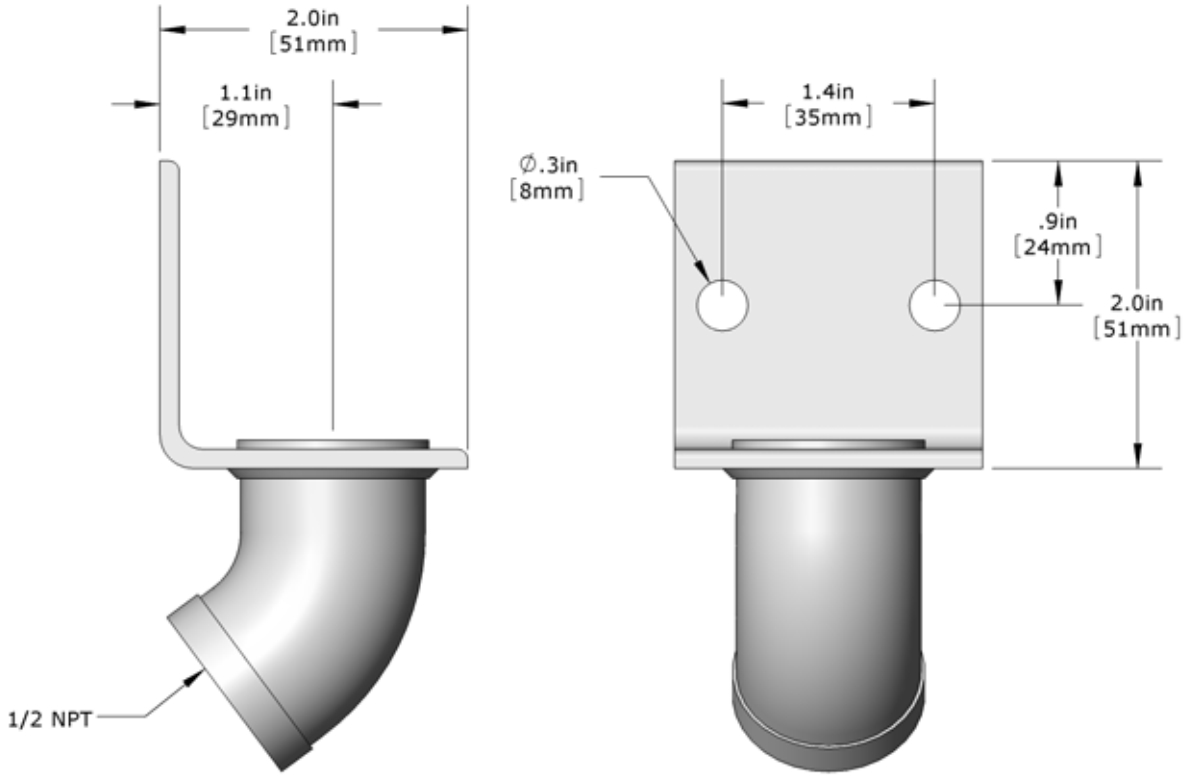

Figure 4-9. Nozzle Bracket With 45º Elbow

4-6.3 Nozzle Bracket With Iron Coupling, P/N WK-263363-000

This is a basic bracket with a straight coupling welded to it (see Figure 4-10). The coupling has 1/2-inch NPT female threads.

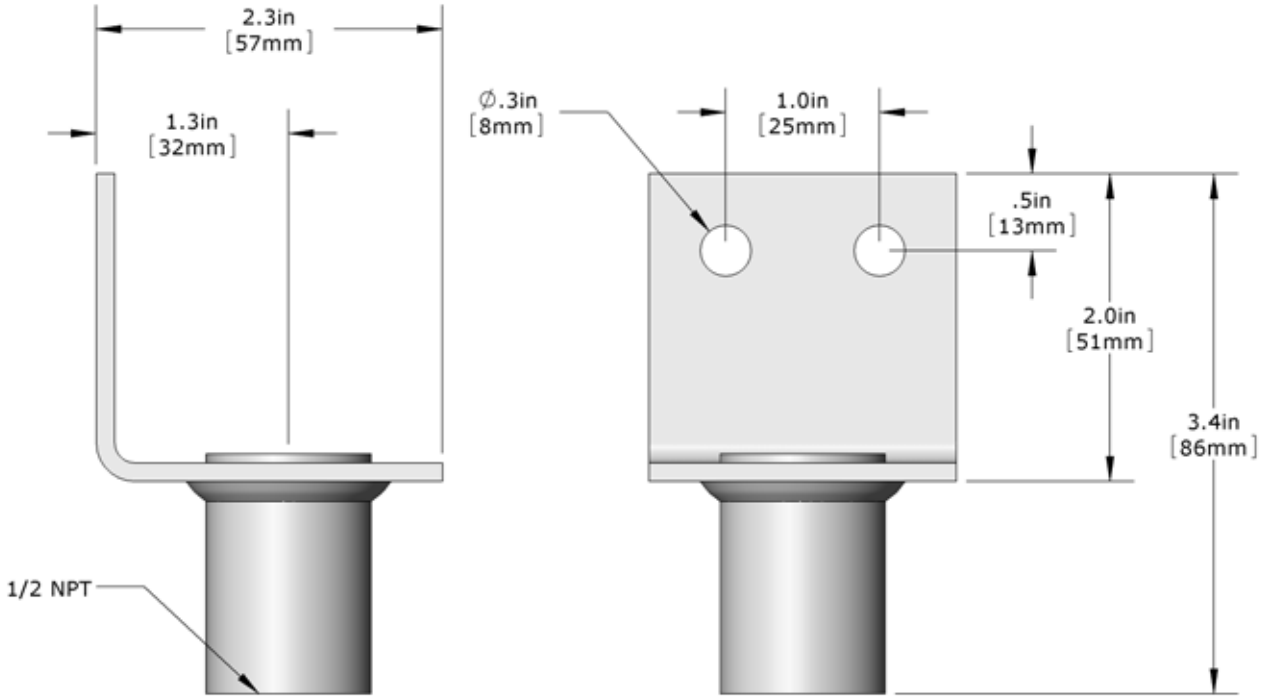

Figure 4-10. Nozzle Bracket With Iron Coupling

4-6.4 Four-Way Distributor Assembly, P/N 83-131402-000

The 4-way distributor assembly (see Figure 4-11), is provided to distribute the dry chemical agent to multiple (up to 10) nozzles. This can be done in combination with ordinary tee fittings, or by using the steel 4-way distributor. For more information, refer to *Chapter 3*, *"System Design"*. The distributor(s) can be bolted or welded in place.

The distributor has four 1/2-inch NPT female threaded outlet ports at right angles to each other, and a 3/4-inch NPT female threaded inlet port. The distributor should be prepared and painted to prevent it from rusting.

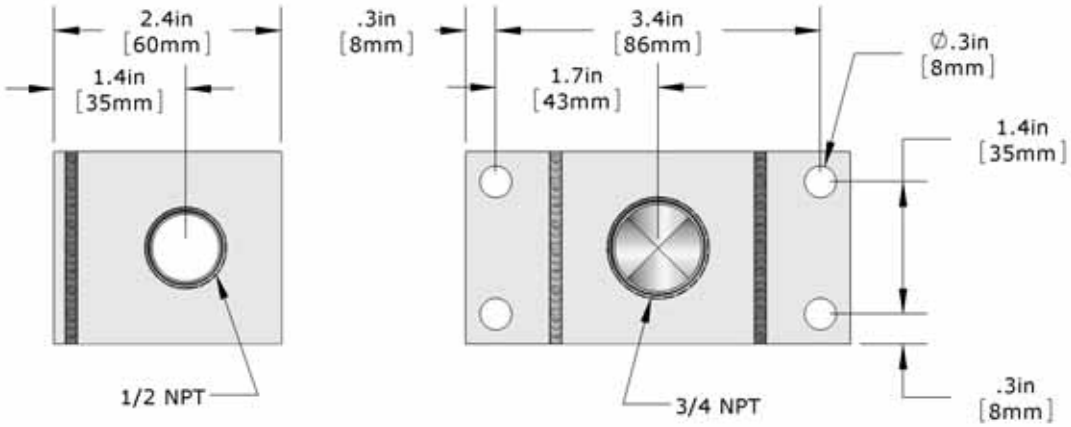

Figure 4-11. Four-Way Distributor Assembly

4-7 DRY CHEMICAL NOZZLE INSTALLATION

To install dry chemical nozzles:

1. Thread the nozzles into the nozzle bracket, as shown in Figure 4-12.
2. Check the installation to ensure that:
    a. The nozzle is accurately aimed at the area to be covered.
    b. The nozzle spray pattern is not obstructed.
    c. The nozzle brackets are securely fastened to the mounting surface.

Note: 45º or 90º fittings may be used in conjunction with the nozzle bracket

to aim the nozzle where desired.

Figure 4-12 shows the dry chemical nozzle and bracket assembly.

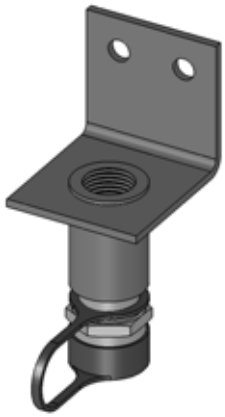

Figure 4-12. Nozzle and Bracket Assembly

CHAPTER 5
MAINTENANCE

5-1 INTRODUCTION

This chapter contains the service and maintenance instructions for the Kidde® Sentinel™ DCS Vehicle Fire Suppression System. These procedures must be performed regularly, and in accordance with all applicable regulations. If problems arise, corrective action must be taken.

For information concerning detection and actuation system operation and maintenance, refer to:

- *Sentinel NET Vehicle Fire Suppression System Design, Installation, Operation and Maintenance (DIOM) Manual* (P/N 83-132555-000)
- *Sentinel SA1 Vehicle Fire Suppression System DIOM Manual* (P/N 83-132550-000)

For further information concerning Sentinel LS vehicle fire suppression systems, refer to the *Sentinel LS Vehicle Fire Suppression System DIOM Manual* (P/N 83-130550-000).

5-2 INSPECTION PROCEDURES BY OWNER

5-2.1 Daily Inspection by Vehicle Owner

1. Inspect cylinder gauges. The Sentinel DCS pressure gauge (P/N WK-283951-000), shown in Figure 5-1, allows you to determine if the pressure in the cylinder is within the required operating limits. Cylinder gauge readings must be in the green operating range. Verify the proper operating pressure by referring to Figure 5-2.

Figure 5-1. Pressure Gauge, P/N WK-283951-000

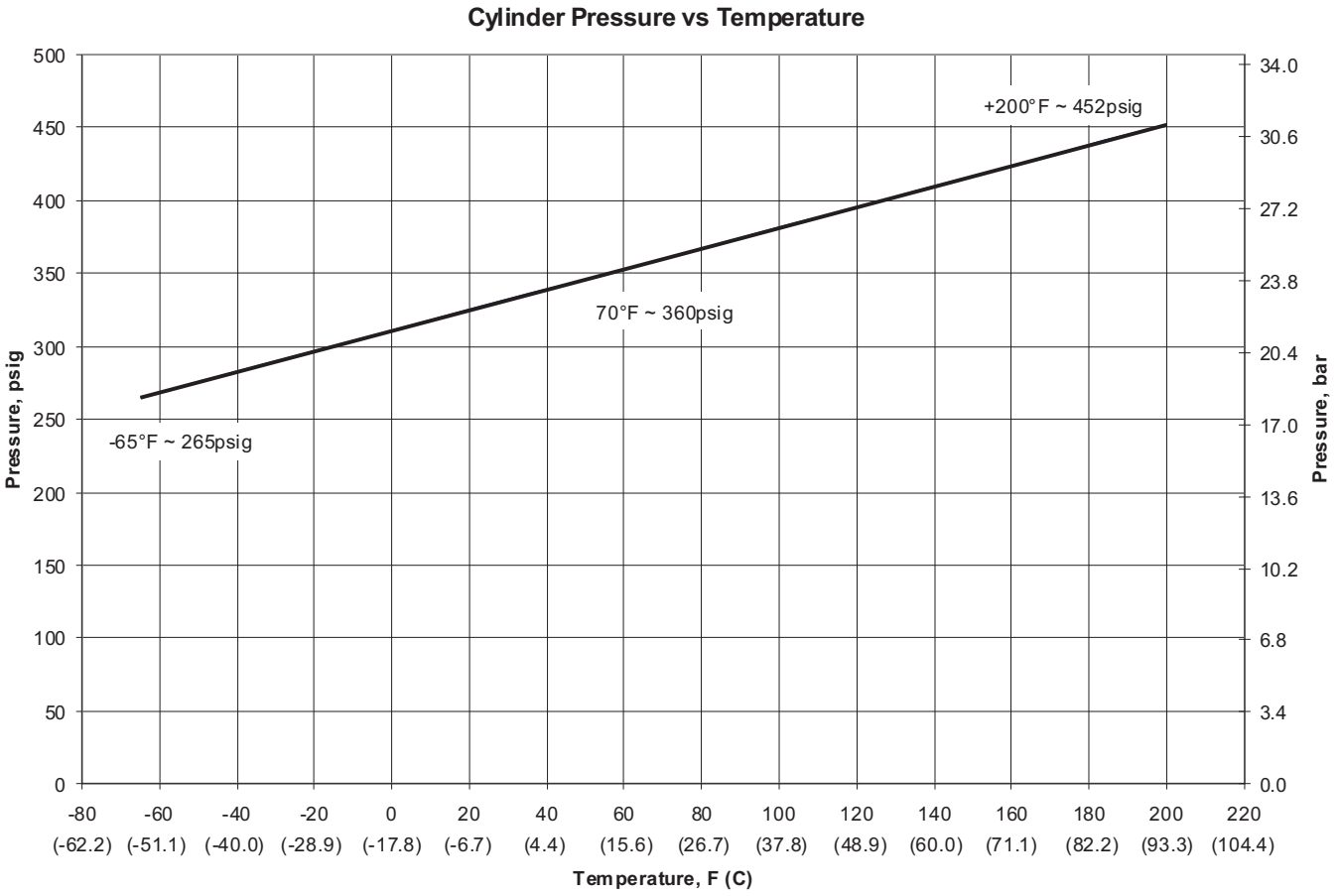

Figure 5-2. Cylinder Pressure vs. Temperature Chart, -65ºF to 200ºF

5-2.2 Weekly Inspection by Vehicle Owner

1. Perform the daily inspection procedure.
2. Check the system components for physical damage such as rust, corrosion, and wear and tear to hoses, nozzles, cylinder(s), elbows, auxiliary equipment, and related parts.
3. Ensure that the hoses are not damaged and that no fittings are loose or disconnected.
4. Check detection equipment. If it is covered with mud, grease, or dirt, wipe it with a clean dry cloth. Check for any corrosion or mechanical damage.

5-2.3 Monthly Inspection by Vehicle Owner

1. Perform the weekly inspection procedure.
2. Ensure cylinder/valve assembly is oriented correctly in mounting bracket (i.e., gauge is facing away from mounting surface).
3. Check all tamper wires/seals. If any of the wires are broken, contact your authorized dealer.

Note: Monthly inspections are conducted to ensure the system has not been tampered with, and that nothing has been placed where it could interfere with system operation.

Any servicing required as a result of monthly inspections or semi-annual inspections must be performed by an authorized Kidde Fire Systems distributor.

5-3 INSPECTION AND MAINTENANCE PROCEDURES BY KFS DISTRIBUTOR

Note: This inspection must be performed by an authorized Kidde Fire Systems distributor.

Kidde Fire Systems recommends that the fire protection system be inspected and preventive maintenance performed every 1000 hours of machine operation, or every six months, whichever occurs first.

5-3.1 Semi-Annual or 1000 Hours Inspection

WARNING

Always wear protective eyewear when working with pressurized cylinders. Never service a cylinder and valve assembly unless the diffuser plate (P/N WK-255681-000) is installed.

Never use water or oxygen to blow out hose or piping. Moisture can cause corrosion, which can create a blockage. Using oxygen is extremely dangerous. Even a minute quantity of cutting oil can cause an explosion if it comes in contact with oxygen. Failure to follow these instructions could result in death, serious personal injury, and/or property damage.

1. Perform the monthly inspection procedure.
2. Disconnect the cylinder and valve assembly from the discharge adapter and attach the diffuser plate (P/N WK-255681-000).
3. Remove the assembly from the mounting bracket and blow the hose out with clean dry air or nitrogen.
4. Check the cylinder and valve assembly for leaks. If the pressure is below normal, remove it from service, and recharge it. Figure 5-2 shows a Cylinder Temperature vs. Pressure Chart for reference.
5. Examine the cylinder for nicks, corrosion, and wear and tear, in accordance with *Compressed Gas Association Pamphlet C-6*. Replace the cylinder if it is damaged or corroded.
6. Inspect and record the cylinder date of manufacture, or the last hydrostatic test date.

5-3.2 Hydrostatic Testing

Dry chemical containers shall be hydrostatically tested at an interval not to exceed 12 years. Use the Wet/Dry Chemical Cylinder Hydrostatic Test Adapter (P/N 83-878453-000) to perform hydrostatic tests.

5-4 SERVICING THE CYLINDER/VALVE/CONTROL HEAD ASSEMBLY

Note: Anytime the system is serviced or repaired, the control head (see Figure 5-3) must be removed from the valve assembly, and a diffuser plate must be installed on top of the valve (over the valve check) as a protection plate to prevent an accidental discharge.

If the hose is removed from the cylinder, the discharge adapter must be removed from the valve outlet, and a diffuser plate must be installed.

The lubricant used in the following sections for o-ring replacement is Parker Super-O-Lube.

5-4.1 Disassembling and Rebuilding the Pneumatic/Electric Control Head

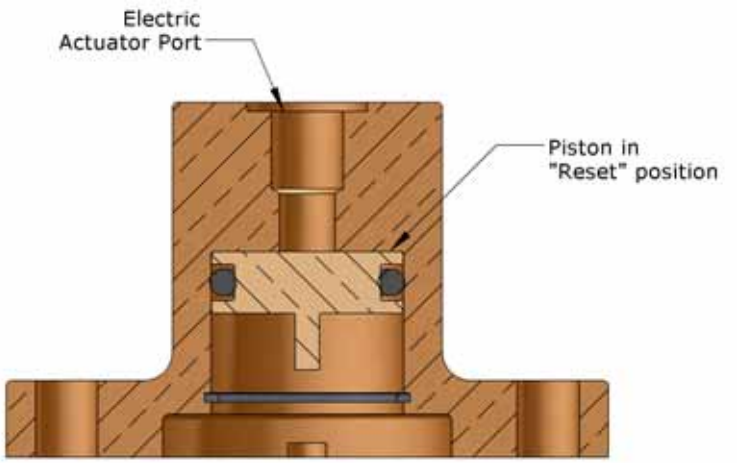

Figure 5-3. Pneumatic/Electric Control Head

To disassemble and rebuild the pneumatic/electric control head:

1. Remove the 1/4-inch actuation hose from the control head.
2. Disconnect the electric actuator from the releasing circuit.
3. Remove the two nuts and bolts securing the control head to the valve body, and remove the electric actuator cable from the cable clamp.
4. Remove the control head and gasket, and install the diffuser plate (P/N WK-255681-000) using nuts and bolts removed in Step 3 above.
5. Unscrew the electric actuator from the control head.
6. Using retaining ring pliers, remove the retaining ring from the groove.
7. Using a screwdriver, push down on the piston through the actuator port. The piston should depress easily and be able to be removed (see Figure 5-4).

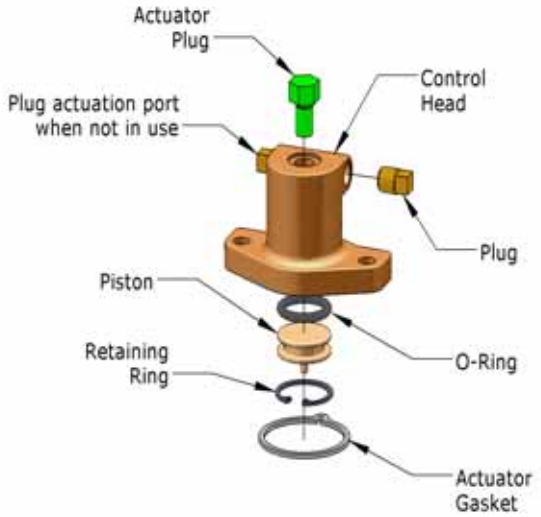

Figure 5-4. Control Head Exploded View

8. Remove the piston and check the o-ring for nicks or scrapes.
9. Replace if necessary and apply (Parker Super-O-Lube) lubricant before reassembly into the control head.
10. Reset the piston by pushing the piston back into the body of the control head until it stops.

WARNING

Failure to correctly position the piston could cause an inadvertent discharge, which may result in death, serious personal injury, and/or property damage.

11. Insert the retaining ring into the groove of the control head.
12. Insert a new actuator gasket in the control head.

5-4.2 Disassembling and Rebuilding the Cylinder and Valve Assembly

When the dry chemical cylinder and valve assembly must be rebuilt, perform the following procedure:

1. Ensure that the diffuser plate is secure on the cylinder outlet.
2. Secure the cylinder in a chain vice, strap vice, or similar device.
3. Prepare high-pressure hose with a nozzle on the end.
4. Remove the diffuser plate from the cylinder outlet and install the cylinder discharge adapter and valve.
5. Attach the high-pressure hose with nozzle to the valve.

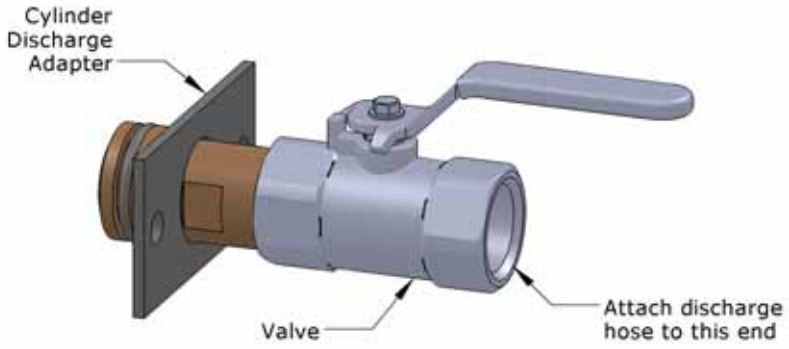

Figure 5-5. Cylinder Discharge Assembly

6. Attach the hose and discharge assembly to the cylinder valve outlet (see Figure 5-5).

WARNING

Safety is a prime concern! Never assume that the cylinder is empty: treat all cylinders as if they were fully charged. Remember that pressurized cylinders are extremely hazardous. Properly secure the cylinder, hose, and container. Failure to do so could result in serious bodily injury and possibly death, as well as property damage.

7. Insert the opposite end of the hose into the appropriate container. Ensure that the hose is secure and will not come loose or separate from the container.

WARNING **Failure to correctly secure the hose could result in death, serious personal injury, and/or property damage.**

8. Install the control head to the top of the cylinder valve.
9. Attach the pneumatic or electric means of activating the control head.
10. Ensure that the valve on the discharge assembly is in the closed position.
11. Actuate the control head to open the cylinder.
12. Carefully open the discharge valve.
13. Monitor the discharge to prevent spillage and to ensure that the hose remains secure.
14. Control the rate of discharge via the discharge valve.
15. When appropriate, stop the flow and change containers.
16. When the discharge is complete, check the gauge and carefully loosen the fusible plug. Check for any possible flow/leakage of nitrogen.
17. When certain that the cylinder has no pressure, disconnect the discharge assembly and install the diffuser plate on the valve outlet.
18. Unscrew and remove the valve and siphon tube assembly from the cylinder. (For the DCS-25, also remove the fill plug.)
19. Unscrew the siphon tube from the valve.
20. Empty the dry chemical agent remaining in the cylinder and rinse with water.
21. Visually inspect the cylinder's inner and outer surfaces as specified in *CGA Pamphlet C-6*.
22. Hydrostatically test the cylinder, if appropriate. Refer to Section 5-3.2, *Hydrostatic Testing.*
23. Re-build the valve per instructions in *Section 5-4.3, "Disassembling and Rebuilding the Valve Assembly".*

CAUTION **Do not attempt to recharge any cylinder without first determining the date of its last hydrostatic test. The U.S. Department of Transportation (DOT) has ruled that any pressurized container of the type used in dry chemical systems shall not be recharged or transported without first being inspected internally and externally, and hydrostatically tested if more than twelve (12) years have elapsed since the date of its last hydrostatic test. Regardless of previous inspection dates, it is illegal to refill any pressurized container that leaks, bulges, has defective safety devices, bears evidence of physical abuse, fire or heat damage, rusting or corrosion, until it is properly repaired and requalified as specified in the DOT regulations.**

5-4.3 Disassembling and Rebuilding the Valve Assembly

Before disassembling and rebuilding the cylinder valve, ensure that you have the Cylinder Valve Rebuild Kit (P/N 83-131411-000), and any other required tools and accessories. The kit contents are listed in Table 5-1. An exploded view of the cylinder valve is provided in Figure 5-6.

Table 5-1. Cylinder Valve Rebuild Kit

Description	Quantity Included
Cylinder O-ring	1
Retaining ring	1
Spring	2
Check valve	2
Piston O-ring, .674 ID	1
Piston O-ring, .424 ID	1
Perforated disk	1
Actuator cap O-ring	1
Parker Super-O-Lube Lubricant	1
Gasket - Actuator	1

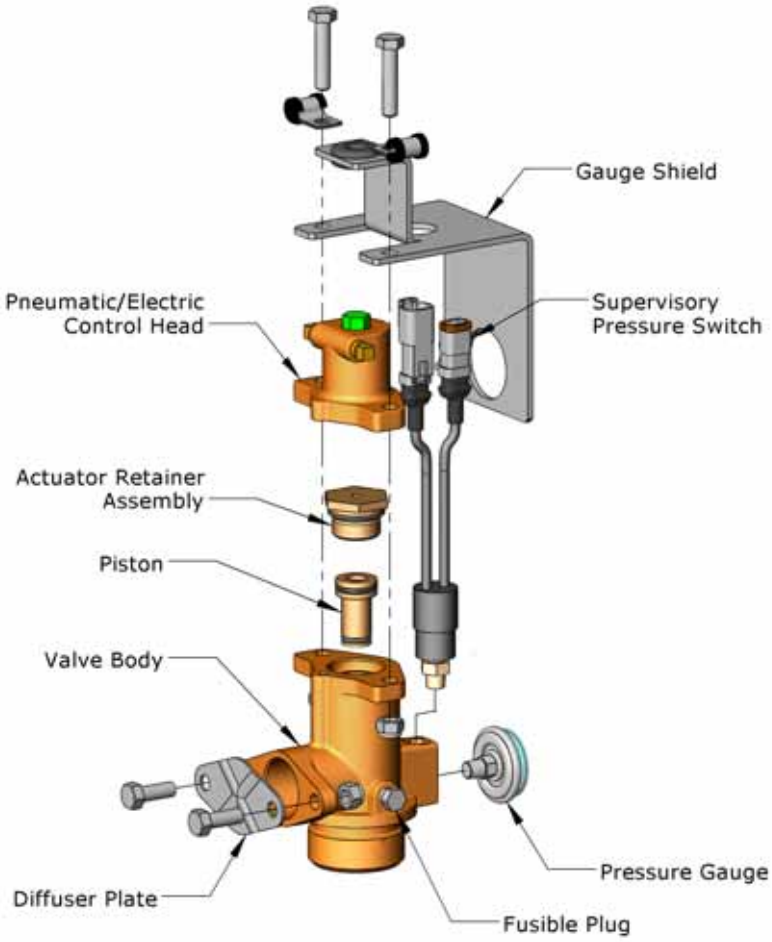

Figure 5-6. Cylinder Valve Assembly - Exploded View

5-4.3.1 REBUILDING THE ACTUATOR RETAINER ASSEMBLY

Refer to Figure 5-7 for removal and installation of the actuator retainer assembly components.

1. Using a 1-1/4-in. crescent wrench, unscrew the actuator retainer assembly from the valve body.
2. Using retaining ring pliers, remove the retaining ring from the groove.
3. Remove the perforated disk, coiled spring, and valve check.
4. Remove the old o-ring, being careful not to scratch the sealing surface. Wipe the sealing surface clean.
5. Clean the inside of the actuator retainer cap.
6. Install the valve check with cone side toward the small hole in the top of the actuator retainer cap.
7. Install the coiled spring, perforated disk, and retaining ring.

Note: Ensure that the perforated disk seats flush/level with the retaining ring and is holding the coiled spring in properly.

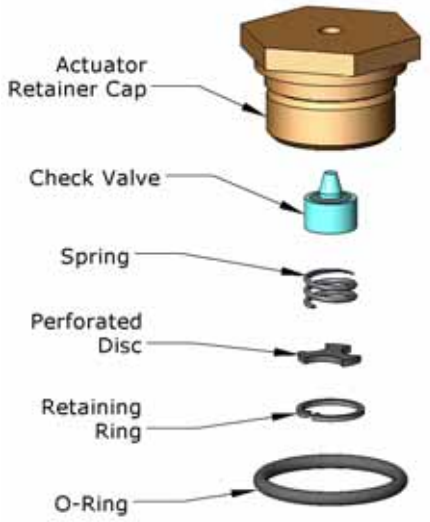

Figure 5-7. Actuator Retainer Assembly - Exploded View

5-4.3.2 REBUILDING THE PISTON

Refer to Figure 5-8 for removal and installation of the piston assembly components.

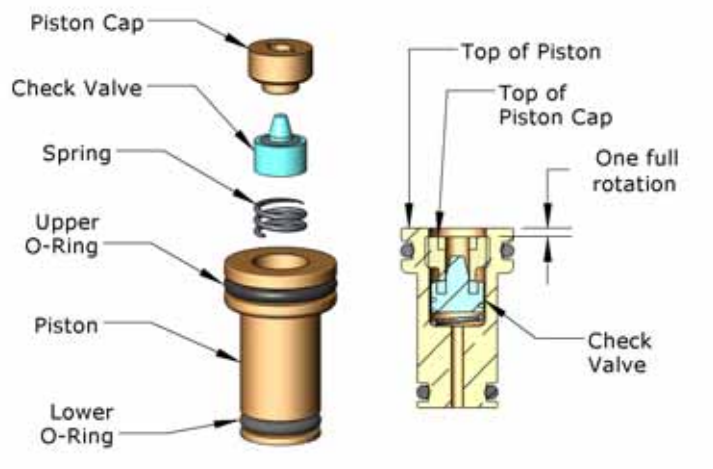

Figure 5-8. Piston Assembly - Exploded View

1. Push the piston assembly out of the valve body through the bottom siphon tube port.
2. Using a flathead screwdriver, unscrew the piston cap.
3. Remove the valve check and coiled spring.
4. Remove the old o-rings, being careful not to scratch the sealing surface. Wipe the sealing surfaces clean.
5. Clean the inside of the piston.
6. Install the coiled spring.
7. Install the valve check with cone side up toward the end of the piston with the largest diameter.
8. Screw the piston cap into the piston until the tops of both are flush. Continue turning the piston cap one full rotation from flush position. Failure to properly install the piston cap could prevent proper pressurization of cylinder assembly.
9. Lightly lubricate the new o-rings (with Parker Super-O-Lube lubricant) and install.

5-4.3.3 VALVE REASSEMBLY

Refer to Figure 5-9, and reassemble the valve by performing the following steps in the order indicated:

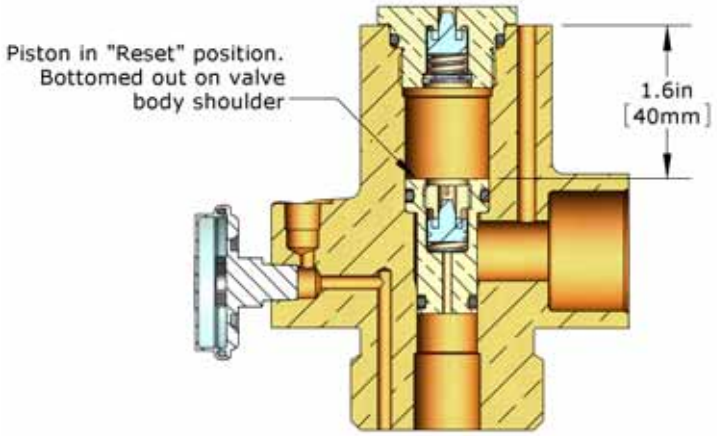

Figure 5-9. Valve Reassembly

1. Install the piston into the valve body with the piston cap facing up. Push down on the piston until it bottoms out. in the “Reset” position, the top of the piston should be approximately 1.6 inches from the top of the valve body as shown in Figure 5-9.

CAUTION

Ensure that the piston is seated completely or an accidental discharge could occur while pressurizing. Refer to Figure 5-9.

2. Install the Actuator Retainer Assembly with a new o-ring that has been lubricated (with Parker Super-O-Lube lubricant). Tighten until hand-tight.
3. Remove the old valve neck o-ring, being careful not to scratch the sealing surface. Wipe the sealing surface clean.
4. Lightly lubricate the new o-ring (with Parker Super-O-Lube lubricant), and install on the valve neck.

5-4.4 Recharging the Sentinel DCS-50S, DCS-50T, and DCS-68 Cylinder and Valve Assembly

After the control head and valve have been rebuilt and the cylinder cleaned and inspected, the following steps should be followed to recharge the assembly:

1. Fill the cylinder with the appropriate amount of ABC Dry Chemical (Kidde P/N WK-806411-000) with the quantity indicated on the cylinder nameplate.

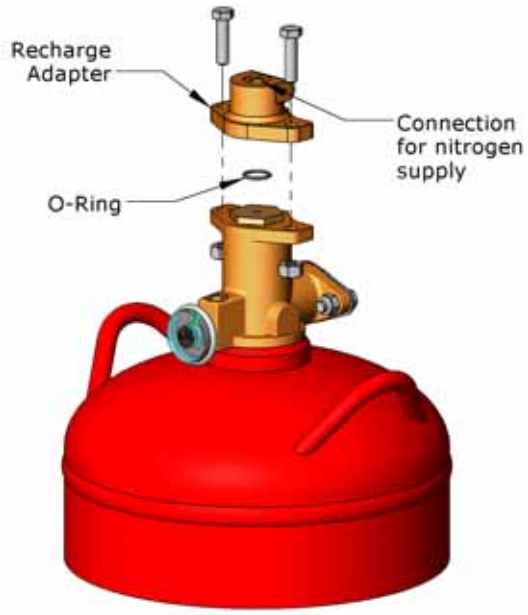

Figure 5-10. Cylinder and Valve Assembly

WARNING

Do not mix ABC Dry Chemical (P/N WK-806411-000) with any other suppressing agent. Failure to follow these instructions could result in death, serious personal injury, and/or property damage.

2. Apply blue Loctite 242 to the siphon tube threads and screw into the valve until bottomed out.
3. Screw the valve and siphon tube assembly into the cylinder hand-tight.
4. Attach the charge adapter (P/N 83-130510-000) with the bolts and nuts provided. Ensure that the o-ring stays in the charge adapter groove by applying (Parker Super-O-Lube) lubricant.

CAUTION

Ensure that the piston is seated completely or an accidental discharge could occur while pressurizing. Refer to Figure 5-9.

WARNING

Always wear protective eyewear when working with pressurized cylinders. Never service a cylinder and valve assembly unless the diffuser plate (P/N WK-255681-000) is installed.

WARNING

When you are pressurizing a cylinder, the cylinder must be securely clamped to a rigid structure capable of withstanding the full thrust that would result if the valve were to open inadvertently. Failure to follow these instructions could result in death, serious personal injury, and/or property damage.

5. Use nitrogen to pressurize the cylinder to 360 psig (24.8 bars) at 70ºF (21ºC). Use a calibrated pressure gauge to check the pressure.

Note: Do not rely on the cylinder valve's pressure gauge to determine the cylinder pressure. The suggested recharge arrangement is shown in Figure 5-11, and Pressure vs. Temperature Graphs are shown in Figure 5-12.

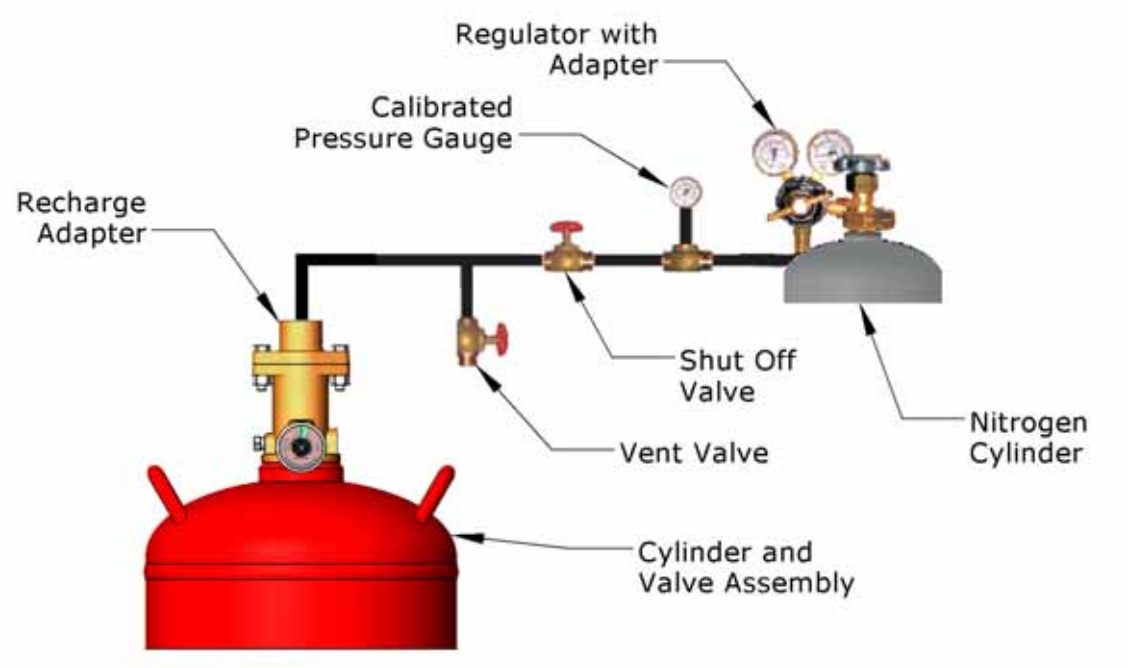

Figure 5-11. Recharge Setup

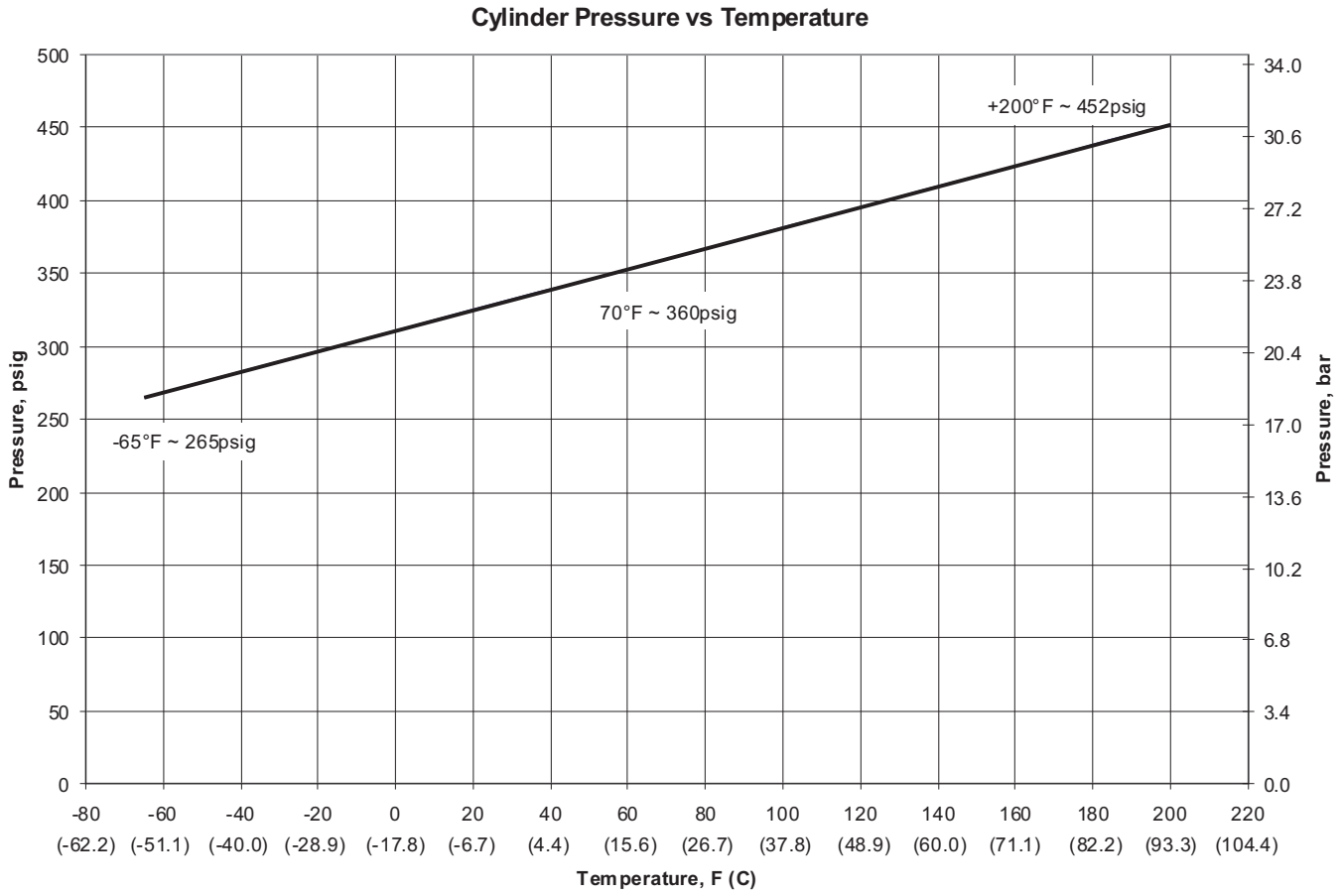

Figure 5-12. Cylinder Pressure vs. Temperature Chart, -65ºF to 200ºF

6. Release the nitrogen line pressure and remove the charge adapter.

CAUTION

Do not touch the valve check, or an accidental discharge could occur.

7. Re-attach the pneumatic/electric control head, gauge shield, and electrical actuator strain relief.

WARNING

Failure to correctly position the piston could cause an inadvertent discharge, which may result in death, serious personal injury, and/or property damage.

5-4.5 Recharging the Sentinel DCS-25 Cylinder and Valve Assembly

After the control head and valve have been rebuilt and the cylinder cleaned and inspected, the following steps should be followed to recharge the asembly:

1. Apply blue Loctite 242 to the siphon tube threads and screw into the valve until bottomed out, then unscrew the siphon tube until the inlet face is parallel to the pressure gauge face,

but 180º opposite. When the valve gauge is facing up, the siphon tube end should be facing down. Allow the Loctite to cure.

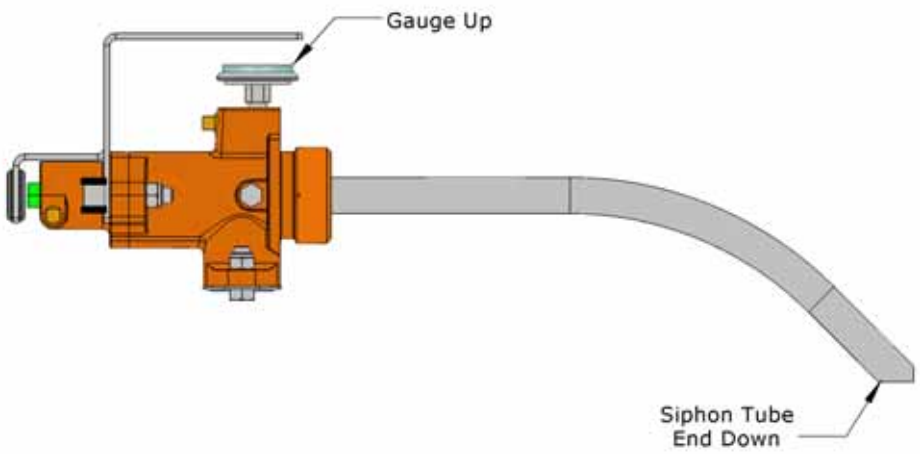

Figure 5-13. Orientation of Siphon Tube and Valve Gauge

CAUTION

Failure to install the siphon tube as described above and shown in Figure 5-13 will result in incomplete discharge of dry chemical.

2. Reinstall the valve and siphon tube assembly into the cylinder neck where the DOT stampings are present. Torque the valve to 50 +/- 1 ft-lb.
3. Invert the cylinder. Use a funnel to fill the cylinder through the bottom port. Fill the cylinder with 25 lbs. of ABC Dry Chemical.

WARNING

Under no circumstances should the valve assembly be reinstalled when the cylinder is full of dry chemical. Always install the valve first, then fill through the bottom port. Failure to follow these instructions could result in death or serious personal injury and/or property damage.

4. Replace the o-ring on the fill plug. Put a light coating of Super-O-Lube on the fill plug o-ring.
5. Reinstall the fill plug and torque to 50 +/- 1 ft-lb.
6. Invert the cylinder.
7. Continue with Step 4 from Section 5-4.4, "Recharging the Sentinel DCS-50S, DCS-50T, and DCS-68 Cylinder and Valve Assembly".

5-5 POST-DISCHARGE MAINTENANCE

Refer to the cylinder nameplate for safety, maintenance, and service-related instructions. Prior to performing post-discharge maintenance, ensure that the fire investigation is complete.

WARNING

Do not touch the equipment until the system has cooled sufficiently. Working on the equipment before it has cooled could result in death, serious personal injury, and/or property damage.

Follow these steps to perform post-discharge maintenance:

WARNING

Always wear protective eyewear when working with pressurized cylinders. Never service a cylinder and valve assembly unless the diffuser plate (P/N WK-255681-000) is installed.

Never use water or oxygen to blow out hose or piping. Moisture can cause corrosion, which can create a blockage. Using oxygen is extremely dangerous. Even a minute quantity of cutting oil can cause an explosion if it comes in contact with oxygen. Failure to follow these instructions could result in death, serious personal injury, and/or property damage.

1. Blow out the hose with clean dry air or nitrogen.
2. Inspect all hoses, and replace any hose or fitting that was exposed to direct flame or subjected to excessive heat. Excessive heat can melt the rubber hose, which could restrict the flow of the dry chemical agent.
3. Remove discharged dry chemical from external surfaces with water as soon as possible after discharge. Dry chemical can corrode some surfaces if it is not removed immediately.
4. Inspect the nozzles and protective caps, and replace any that are damaged or defective.
5. Recharge and install the cylinder.
6. Check the nitrogen actuation line and actuator:
    a. Pressurize the nitrogen line, and use a soap solution to check for leaks. The nitrogen actuator system must be pressure-tight and free of leaks.

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CHAPTER 6
PARTS LIST

The table below, and on the following pages, provides a complete list of the Kidde® Sentinel™ DCS Vehicle Fire Suppression System parts and associated system equipment. In most situations, when ordering a system component, it will be easier to order by part number.

Description	Part Number
CYLINDERS AND HARDWARE	
DRY CHEMICAL CYLINDER ASSEMBLIES	
All cylinder assemblies include control head with pressure and electric ports sealed.	
Cylinder & Valve Assy., DCS-25, 25 lbs. w/PS	83-131400-025
Cylinder & Valve Assy., DCS-50S, 50 lbs. w/PS	83-131400-050
Cylinder & Valve Assy., DCS-50T, 50 lbs. w/PS	83-131400-150
Cylinder & Valve Assy., DCS-68, 68 lbs. w/PS	83-131400-068
Cylinder & Valve Assy., DCS-25, 25 lbs. w/o PS	83-131401-025
Cylinder & Valve Assy., DCS-50S, 50 lbs. w/o PS	83-131401-050
Cylinder & Valve Assy., DCS-50T, 50 lbs. w/o PS	83-131401-015
Cylinder & Valve Assy., DCS-68, 68 lbs. w/o PS	83-131401-068
Discharge Adapter Kit (one required for each cylinder)	83-844908-000
CYLINDER MOUNTING EQUIPMENT, SENTINEL DCS	
Bracket, DCS-25, 25-pound Dry Chemical cylinder	83-131400-525
Bracket, DCS-50S, 50-pound Dry Chemical cylinder	83-131400-550
Bracket, DCS-50T, 50-pound Dry Chemical cylinder	83-131400-555
Bracket, DCS-68, 68-pound Dry Chemical cylinder	83-130400-510
Flange, Deck Mount, DCS-50S and DCS-68, 50-pound and 68-pound Dry Chemical Cylinder	83-131400-568
NOZZLES AND DISTRIBUTION ACCESSORIES	
DCS SYSTEMS (DRY CHEMICAL ABC)	
Cone Nozzle with Cap, DCS	83-844714-000
LR Fan Nozzle with Cap, DCS (mix-and-match with cone nozzle)	83-131401-000
Caps, Nozzle, Dry Chem (pkg. of 10, for Cone Nozzle, P/N 83-844714-000, and Fan Nozzle, P/N 83-131401-000)	83-131071-001
Bracket, Basic Nozzle	83-131019-001
Bracket, with 45º Elbow	WK-263362-000
Bracket, with Iron Coupling	WK-263363-000
Distributor Assembly, Four-Way	83-131402-000

Description	Part Number
MANUALS	
DIOM for Sentinel DCS System	83-131550-000
Owner's Manual for Sentinel DCS System	83-131551-000
SYSTEM SERVICE AND MAINTENANCE	
DCS VALVE SPARE PARTS	
ABC Dry Chemical, Pail, 50-pound	WK-806411-000
Valve Rebuild Kit, Dry Chemical	83-131411-000
Complete Valve, DCS System, with Pressure Switch	83-131411-900
Complete Valve, DCS System, no Pressure Switch	83-131411-950
Gauge, Dry Chemical Valve (Pressure Gauge)	WK-283951-000
Supervisory Pressure Switch	83-131411-200
COMMON VALVE SPARE PARTS	
Valve Outlet Anti-Recoil Plate	06-237021-001
O-Ring (for Discharge Adapter Kit) - minimum, 10 pieces	WK-108019-000
Fusible Plug, 212ºF (100ºC)	06-118501-001
Gauge Shield	83-131400-200
Control Head, Electric/Pressure, Wet/Dry (ships with cylinders)	83-132500-000
SERVICE TOOLS	
Nitrogen Recharge Adapter (to pressurize cylinder)	83-130510-000
O-Ring Kit, Control Head (pkg. of 10)	83-130701-000
Gasket Kit, Control Head (pkg. of 10)	83-130702-000
Hydrostatic Test Adapter	83-878453-000

INDEX

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