

RECHARGE MANUAL

**FIKE CLEAN AGENT SUPPRESSION SYSTEMS W/
DOT & EN CONTAINERS
IMPULSE VALVES & GCA VALVES
FK-5-1-12 AGENTS**

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Fike®



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1.0 GENERAL	1
1.1 SCOPE	1
1.2 PURPOSE	1
1.3 SAFETY PRECAUTIONS	1
2.0 EQUIPMENT	2
2.1 EQUIPMENT CALIBRATION	3
3.0 CONTAINER PREPARATION	4
3.1 TEST AND INSPECTION	4
3.2 VALVE RECONDITIONING	4
3.2.1 1" (25MM) & 3" (80MM) IMPULSE VALVE RECONDITIONING PROCEDURE	5
4.0 CONTAINER RECHARGING	9
4.1 CONTAINER CAPACITY	9
4.2 CONTAINER FILL DENSITY	9
4.3 AGENT TRANSFER	9
4.4 RECHARGE (FILL) PROCEDURE	10
4.4.1 AGENT FILL PROCEDURE – IMPULSE VALVE CONTAINERS	10
4.4.2 NITROGEN SUPER-PRESSURIZATION PROCEDURE – IMPULSE VALVE CONTAINERS	12
5.0 LEAK DETECTION	13
5.1 LEAK TESTING PROCEDURE	13
6.0 CONTAINER IDENTIFICATION	14
APPENDIX A – SUPPORT INFORMATION	15
A.1 FK-5-1-12 INFORMATION	15
A.1.1 CYLINDER FILL RANGE TABLE	15
A.1.2 PRESSURE / TEMPERATURE CHART	16
A.1.3 APPROXIMATE NITROGEN WEIGHT CHART	16
A.2 SAMPLE LOG BOOK	17
APPENDIX B – REFERENCED AND CONTRIBUTING PUBLICATIONS	18
B.1 NFPA PUBLICATION	18
B.2 U.S. GOVERNMENT PUBLICATION	18
B.3 CGA PUBLICATION	18
B.4 FIKE PUBLICATION	18
B.5 MISCELLANEOUS PUBLICATION	18
B.6 SAFETY DATA SHEETS (SDS)	18

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1.0 GENERAL**1.1 SCOPE**

This manual contains the minimum requirements and procedures for recharging clean agent suppression containers (FK-5-1-12) in the field. The information contained herein is prepared for the use and guidance of Fike authorized Sales Outlets and shall be strictly adhered to so that the clean agent suppression container will function properly throughout its life.

1.2 PURPOSE

After a system discharge, it is imperative that the clean agent suppression containers be recharged and returned to service as soon as possible (24 hours maximum) to ensure continued protection. By participating in Fike's Field Recharge Program, the sales outlet can eliminate the time associated with shipping the containers to Fike for recharge. The sales outlet can remove the container from service, perform the recharge at their shop and return the container to service in a relatively short period of time.

1.3 SAFETY PRECAUTIONS

An understanding of the physical properties of the clean agent (FK-5-1-12), and the safe and proper use of techniques for handling liquefied compressed gasses, will allow the agent to be safely transferred from bulk containers to clean agent system containers. Prior to handling the agent (FK-5-1-12), the Safety Data Sheet (SDS) specified in this manual and the safety precautions listed below shall be read and understood by all individuals handling the product.

- WARNING:** Containers associated with this procedure will be filled with a liquefied gas under pressure. Safe handling procedures associated with pressurized containers **must** be observed at all times.
- CAUTION:** Suitable pressure relief devices **shall** be incorporated into the charging system to prevent accidental over pressurization of the system. In pipe sections where agent could become trapped, suitable pressure relief devices **shall** be provided.
- CAUTION:** Container filling areas **must** be well ventilated at all times.
- CAUTION:** FK-5-1-12 has a relative low toxicity level in its natural state. However, agent products of decomposition can be toxic. Therefore, smoking **shall** be prohibited at all times in container filling areas.
- CAUTION:** Safety glasses, a full-face shield and gloves **shall** be worn at all times when handling FK-5-1-12.
- CAUTION:** Before filling, all containers **shall** be inspected for evidence of weak or corroded areas and the date of the last hydrotest or inspection. See Section 3.1 for testing details.
- CAUTION:** The quantity of agent transferred to a receiving container **must** not allow the container to become liquid-full below the following:
- FK-5-1-12 – 130°F (54°C)

Refer to Appendix A for the minimum/maximum fill ranges of Fike clean agent containers.

2.0 EQUIPMENT

This section defines the minimum recommended equipment required for the proper filling of Fike Clean Agent containers from bulk storage cylinders.

Item 1: Bulk supply of extinguishing agent:

- a) **FK-5-1-12** – UL component recognized clean agent for extinguishing system units also known as Dodecafluoro-2-methylpentan-3-one. Chemical formula: $\text{CF}_3\text{CF}_2\text{C}(\text{O})\text{CF}(\text{CF}_3)_2$.

NOTE: The Clean Agents are to be UL Component Recognized Clean Agents for Extinguishing System Units (GAR22) and are to bear the UL Component Recognized Marking, along with a marking designating the agent as FK-5-1-12. All records and markings of such shall be maintained by the sales outlet, and shall be readily available for review by the UL representative.

Item 2: **Pump** – Any pump system compatible with FK-5-1-12 that meets the operating criteria for each pump station setup or configuration. Suggest Getz, Haskel, Goulds, Corken, Dravco pump systems, or equal.

Item 3: **Recharge Adapter/Core Removal Tool** – Impulse Valve (P/N 70-282)

Required to facilitate reconditioning of the container by removing/adding the valve core from the brass fill valve.

Item 4: **Core Depressor Tool** – Impulse Valve (P/N 70-281)

Required to super-pressurize the containers by depressing the valve core in the brass fill valve and allowing the nitrogen to flow through.

Item 5: **Fittings, Valves and Hoses**, as required – Each **shall** be suitable for refrigeration service and have a minimum working pressure of 600 psi (4137 kPa).

NOTE: Connection of the supply container to the receiving vessel/container is made through the use of 3/4" (20 mm) refrigerant drum adapters, on drum valves, and one or more lengths of refrigeration charging hoses. The charging hose is a flexible, fiber-reinforced, rubber hose fitted with female tubing connectors at each end and is rated at 2250 psi (15513 kPa). The drum adapters, charging hoses, and misc. valves, fittings, etc. can be purchased at local refrigeration supply houses.

Item 6: **High Quality Thermometer** – Thermometer shall be accurate to $\pm 2^\circ\text{F}$ (1.0°C) and **shall** be located in the container filling area.

Item 7: **Scale** – A scale capable of accurately weighing to within ± 0.5 lb. (0.23 kg), with a total range greater than the maximum charged container weight, approximately 2000 lbs / 907.2 kg.

Item 8: **Nitrogen Supply** – Adequate supply of dry nitrogen shall be provided with a pressure regulator and filling adapter.

NOTE: Nitrogen supplies must be Grade H, I, J, K, L, M, N, O, or P, as described in Table 1 of the Compressed Gas Assoc. Pamphlet G10.1, having a dew point of -70°F (-56.7°C), or less.

Item 9: **Leak Detector** – A leak detector capable of detecting a minimum leak rate of 0.18 oz (5.1 g) per year. Suggest Yokogawa Series H-10, D-TEK Refrigeration Leak Detector, or equivalent.

Item 10: **Leak Standard** – A Model LS-20 leak standard for calibrating the leak detector and capable of being set to the minimum required leak rate.

NOTE: To properly set a leak detector to check FK-5-1-12, a leak standard is required. To obtain LS-20B Leak Standards, calibrated for FK-5-1-12, contact Bacharach Inc.

Item 11: **Pressure Gauges** – Two pressure gauges, as follows:

- 0-600 psi (0-4137 kPa) calibrated in 20 psig (138 kPa) increments, or less, for the output/discharge side of the pump.
- 0-600 psi (0-4137 kPa) calibrated in 20 psig (138 kPa) increments, or less, for the output/discharge side of the nitrogen regulator.

Item 12: **Spanner Wrench** (Impulse Valve / P/N 70-2153-100) – Required to remove and tighten Hold-down Nut.

Item 13: **Body Wrench** (P/N 02-12682) – Required to hold Impulse valve in place when removing Hold-down Nut.

Item 14: **Pressure vs. Temperature Chart** – A pressure vs. temperature chart detailing the relationship of super-pressurized agent vs. temperature shall be kept in the container filling area. See Appendix A.

Item 15: **Log Book** – A permanent log book shall be kept containing the following information:

- | | |
|----------------------------|--|
| ▪ Date Pumped | ▪ Container final pressure |
| ▪ Customer | ▪ Leak test results |
| ▪ Container Serial Number | ▪ Name/initials of person performing the initial fill/recharge procedure |
| ▪ Initial fill or recharge | |
| ▪ Quantity of agent pumped | ▪ Comments column |

(See Appendix A.3)

2.1 EQUIPMENT CALIBRATION

A program shall be established by the Sales Outlet to assure that testing and measuring equipment used in the production and/or inspection process is kept clean, is maintained in good working order, and in calibration. The following calibration frequencies shall be adhered to at minimum:

- Scales shall be calibrated at a minimum of once every twelve months.
- Leak Standard shall be calibrated at a minimum of once every twelve months.
- Pressure gauges shall be calibrated at a minimum of once every twelve months.
- Thermometer shall be calibrated at a minimum of once every twelve months.
- Equipment shall be calibrated when it has been subjected to abuse, such as being dropped or struck with an object or its accuracy is questionable.

The sales outlet or an outside laboratory may perform calibration. In either case, it shall be by comparison with a standard that is traceable to the applicable U.S. or foreign National Standard. Certification of calibration shall be maintained by the sales outlet until the next succeeding calibration and shall be readily available.

3.0 CONTAINER PREPARATION

3.1 TEST AND INSPECTION

Fike clean agent containers shall not be recharged without retest if more than 5 years have elapsed since the date of the last test and inspection. For halocarbon agent containers, the retest shall be permitted to consist of a complete visual inspection as described in the Code of Federal regulations (CFR), Title 49, Section 173.34 (e) (10). The CFR requirements also refer to the Compressed Gas Association (CGA) pamphlet C-6, Section 3. A certified CGA inspector shall perform inspections. Containers that fail to pass the visual inspection shall be subjected to additional strength tests before recharging.

NOTE: Transporting charged containers that have not been tested within 5 years could be illegal. Federal and local regulations should be consulted (reference *NFPA 2001*, Section 4-2.1).

3.2 VALVE RECONDITIONING

After a system discharge, the container valve must be reconditioned using the appropriate reload kit before it can be recharged with agent. If the valve is leaking and needs to be reconditioned, the contents of the container **must** be transferred to another container before reconditioning the valve.

WARNING: Container contents are under high pressure. Never attempt to rebuild the container valve until the contents have been transferred and the pressure gauge reads 0 psig (0 kPa).

CAUTION: Care should be taken, when handling valve components, to avoid damage of any kind. Do not bend, poke or otherwise distort the valve's rupture disc as its service may be adversely affected.

3.2.1 1" (25mm) & 3" (80mm) IMPULSE VALVE RECONDITIONING PROCEDURE

The 1" (25mm) valve is provided on the 5, 10, 20, 35, 60 and 100 lb (2, 4, 8, 15, 27 and 44 L) containers and requires Reload Kit P/N 85-049 (500 psi reload kit) to rebuild the valve.

The 3" (80mm) valve is provided on the 150, 215, 375, 650 and 1000 lb (61, 88, 153, 267 and 423 L) containers and require Reload Kit P/N 85-050 (500 psi reload kit) to rebuild the valve.

Item No.	Description	1" (25mm) Reload Kit, 500 psi (P/N 85-049) includes the following:	3" (80mm) Reload Kit, 500 psi (P/N 85-050) includes the following:
		Part Number	Part Number
1	Friction Ring	70-2060	70-2063
2	Disc Assembly	70-352	70-353
3	O-Ring	02-11987	02-11989
4	Valve Core-Fill Port	02-4161	02-4161

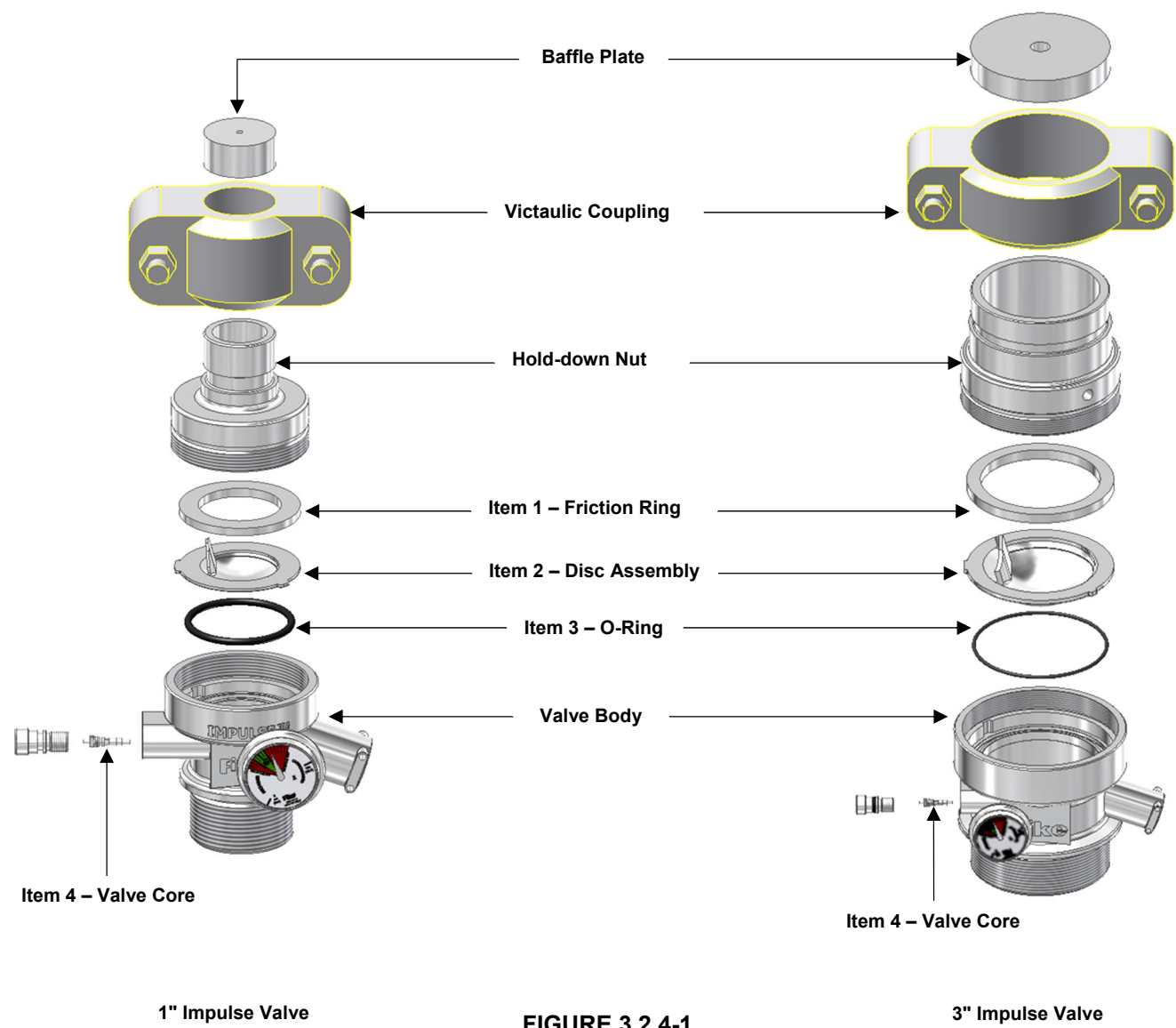


FIGURE 3.2.4-1

To recondition the 1" or 3" valve, refer to Figure 3.2.4-1 for pictorial clarification and identification of valve parts while performing the following steps:

Step 1: Remove Victaulic coupling and baffle plate from the valve outlet (if installed).

Step 2: Remove Hold-down nut (Item 3) using spanner wrench (P/N 70-2153-100).

IMPORTANT NOTE: When removing Hold-down Nut, use Body Wrench (P/N 02-12682) to stop valve from turning (see Figure 3.2.4-2).

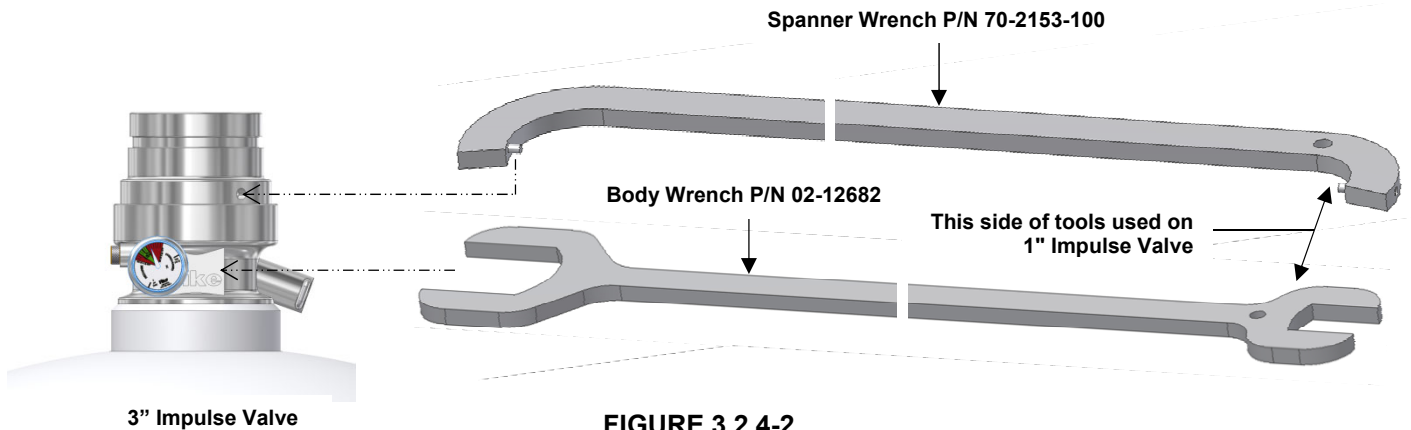


FIGURE 3.2.4-2

Step 3: Remove Friction Ring (Item 1), Disc assembly (Item 2), and O-ring (Item 3). Discard all 3 items.

Step 4: Reset the Actuator Pin to the set position (see Figure 3.2.4-3).

WARNING: Disc can be damaged and rendered inoperable if the actuator pin is **NOT** pushed in to the set position before installing the disc assembly.

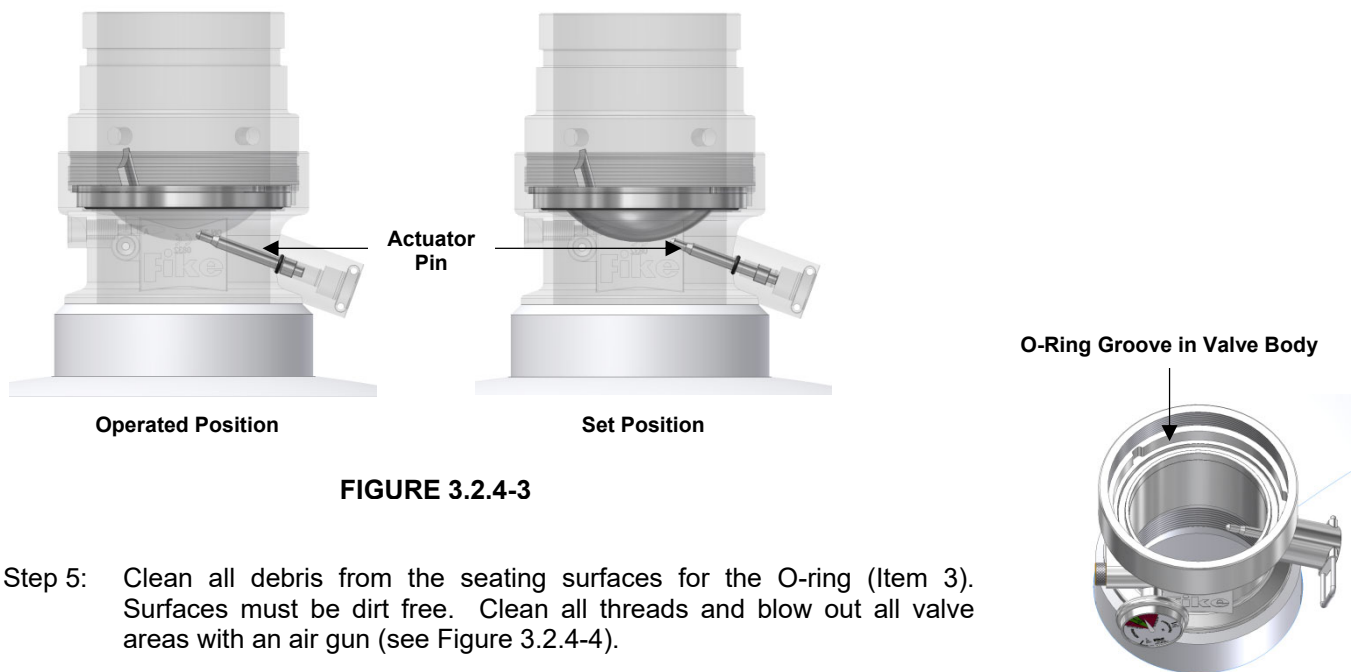


FIGURE 3.2.4-3

Step 5: Clean all debris from the seating surfaces for the O-ring (Item 3). Surfaces must be dirt free. Clean all threads and blow out all valve areas with an air gun (see Figure 3.2.4-4).

Step 6: Apply a light film of clear silicone vacuum grease (Molykote 55 or equivalent) to O-ring (Item 3), groove, and flat seating surface in valve body.

FIGURE 3.2.4-4

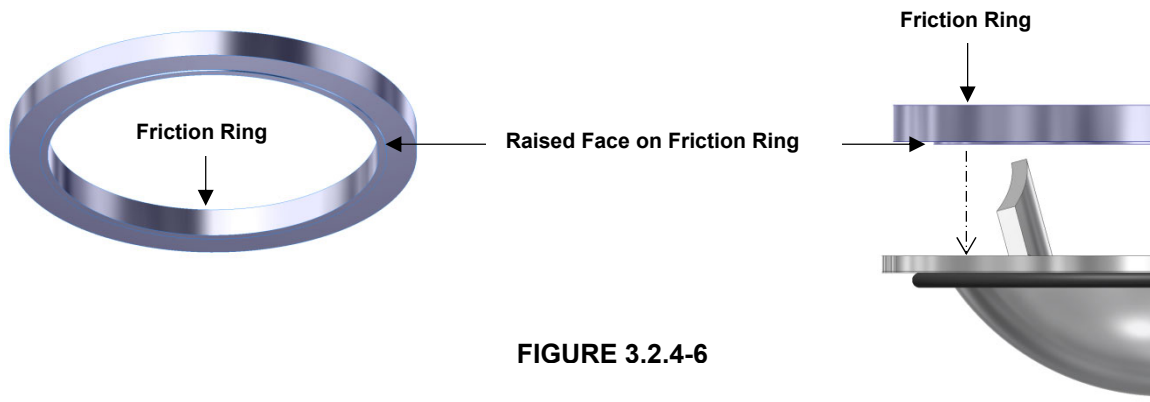
- Step 7: Install new O-ring (Item 3) into bottom groove in valve body.
- Step 8: Install new Disc assembly (Item 2) with concave (domed) rupture disc facing down. Use the alignment tap to ensure disc assembly is installed correctly (see Figure 3.2.4-5).


FIGURE 3.2.4-5

- Step 9: Install new Friction ring (Item 1) over top of rupture disc on valve assembly (see Figure 3.2.4-6).

IMPORTANT: Friction ring **MUST** be installed with raised face pointing down on top side of disc assembly.

Valve may leak or burst at a lower temperature if friction ring is installed with raised face pointing up.


FIGURE 3.2.4-6

- Step 10: Spin Hold-down Nut on hand-tight. Further tighten with spanner wrench 1/3 turn minimum, or until it will no longer turn. (Wrench, P/N 70-2153-100, available from Fike)
- Step 11 Remove and replace the valve core (Item 4) in the fill port located on the side of the discharge valve.
- Step 12: Reinstall the baffle plate and grooved coupling.

THE CONTAINER IS NOW READY FOR RECHARGING

4.0 CONTAINER RECHARGING**4.1 CONTAINER CAPACITY**

The amount of agent that a vessel or container can safely contain depends upon the volume of the vessel/container, and upon the maximum temperature to which the vessel/container is exposed. For small pressure vessels/containers, DOT (Department of Transportation) regulations require that the vessel/container shall not become liquid-full below 130°F (54.4°C). Since the density of FK-5-1-12 is approximately 99.9 lb/ft³ (1600 kg/m³), a **maximum** quantity of 99.9 lbs (1600 kg) of FK-5-1-12 can be placed in each cubic foot (cubic meter) of container volume.

4.2 CONTAINER FILL DENSITY

The fill density of a container is defined as the total weight of product, per unit of internal volume of the container. Fike containers for a fill density between:

- FK-5-1-12 – 30 lbs/ft³ to 70 lbs/ft³ (481 kg/m³ to 1121 kg/m³) of container volume.

4.3 AGENT TRANSFER

The transfer of liquid agent from the bulk storage container to a container is accomplished by using a suitable pump approved for use with FK-5-1-12 (see Section 2.0). The receiving container should be evacuated to eliminate contamination by air and to facilitate transfer of liquid agent. However, evacuation is only practical if evacuation equipment is available within the recharge area.

4.4 RECHARGE (FILL) PROCEDURE

The following is the Fike recommended step-by-step procedure for the filling of clean agent containers. Refer to Appendix A.1 for the minimum/maximum fill ranges of Fike FK-5-1-12 clean agent containers.

NOTE: Containers to be recharged **must** be rebuilt in accordance with the methods and procedures outlined in Section 3.0 of this manual.

CAUTION: Suitable precautions **must** be taken to prevent contamination of the agent supply when it is transferred from the bulk storage cylinder to the container. Suitable precautions may include any combination of the following:

- Purging the fill line with nitrogen before it is connected to each container.
- Using a fill line fitted at the end with a quick-disconnect type fitting connected to the container. If the fill line is kept pressurized up to the quick disconnect fitting, it only need to be purged with nitrogen prior to being connected to the bulk agent storage container.
- Installing a moisture meter or indicator in the fill line between the bulk agent storage container and the container to monitor the agent. The moisture content of the agent shall not exceed 10 ppm.
- Wearing of protective equipment such as safety glasses and gloves.

4.4.1 AGENT FILL PROCEDURE – IMPULSE VALVE CONTAINERS

The steps for filling a Fike Impulse Valve container with FK-5-1-12 are as follows (see Figure 4.4 for item numbers):

- Step 1: Inspect container (Item 2) per CGA pamphlet C6 for damage and verify that all container components are in good condition. Leak check container before filling (see Section 5.1).
- Step 2: Place container (Item 2) on scale (Item 12) and verify tare weight by subtracting baffle plate, Victaulic coupling, and any other material used (e.g. dolly, cart, etc.) from the value indicated on the scale. Enter tare weight in log book (see Appendix A.3).
- Step 3: Attach the core removal tool (P/N 70-282) (Item 3) with extractor rod to the brass fill valve on the container. With the core removal tool (Item 3) valve open completely, push extractor rod in and engage the core. Turn the extractor rod counter clockwise to unscrew the core. Pull the extractor rod back as far as possible. Close core removal tool (Item 3) valve completely. Remove the extractor rod and save core for reinsertion.
- Step 4: Ensure that the 1/4 turn ball valve (Item 14), used for pressure bleed off, is closed.
- Step 5: Attach fill hose to the core removal tool (Item 3) and open the valve on the core removal tool.
- Step 6: Note weight of container with core removal tool (Item 3) and fill hose attached.
- Step 7: Calculate final gross weight by adding the weight determined in Step 6, to the amount of agent required, or zero out scale if feature is available.
- Step 8: Open shutoff valve(s) (Item 4) on bulk storage tank (Item 10) to allow flow to pump (Item 5).
- Step 9: Open main valve (Item 1) on fill line.
- Step 10: Turn on pump (Item 5) to begin filling.
- Step 11: Turn off pump (Item 5) when scale (Item 12) indicates the calculated weight in Step 7, or when zeroed out scale reaches agent weight.

CAUTION: Small containers will fill very rapidly. **DO NOT** fill containers beyond their rated capacities. See Appendix A.1, for container minimum/maximum fill ranges.

Step 12: Turn off main valve in fill line (Item 1) and close core removal tool valve (Item 3).

Step 13: Open 1/4 turn ball valve (Item 14) to remove pressure from core removal tool.

Step 14: Disconnect fill hose from core removal tool (Item 3).

Step 15: Place valve core on end of extractor rod.

Step 16: Attach extractor rod to core removal tool (Item 3).

Step 17: Slowly open valve on core removal tool (Item 3).

Step 18: Push in extractor rod and screw valve core into valve body clockwise. **DO NOT OVERTIGHTEN.**

Step 19: Remove extractor rod from core removal tool (Item 3). A small amount of pressure will be released.

Step 20: Remove core removal tool (Item 3) from brass fill valve.

Step 21: Replace brass fill valve cap.

Step 22: Etch or stamp final information onto container label, if applicable. See Section 6.0.

Step 23: Enter information in log book.

NOTE: It is recommended that a running total log be maintained documenting the quantity of agent removed from the bulk supply container. See Appendix A.2 for Log Sheet example.

4.4.2 NITROGEN SUPER-PRESSURIZATION PROCEDURE – IMPULSE VALVE CONTAINERS

The following is the Fike recommended step-by-step procedure for super-pressurizing Fike clean agent containers with an Impulse Valve.

Containers must be super-pressurized with nitrogen, which is the propellant for the agent. In order to do this properly, the nitrogen must be thoroughly mixed with the agent. Differences in the containers cause nitrogen to be introduced differently.

All containers can be pressurized in the upright position, then agitated or shaken to adequately mix the agent and the nitrogen gas. They contain a fixed siphon / pickup tube and a fill port. The fill valve located on the side of the container valve assembly, discharges directly into the pickup tube and directs the flow of nitrogen down the tube and up through the liquid agent. This action allows the nitrogen gas to be absorbed into the agent, completing the super-pressurization process.

Care must be taken to observe the nitrogen pressure gauge during this process, as the agitation will cause the absorption of the nitrogen gas thereby reducing the container pressure. Continue to supply nitrogen into the container and agitating until the container pressure stabilizes at 500 psi at 70°F (2482 kPa at 21°C).

CAUTION: Appropriate safeguards **MUST** be taken to avoid over-pressurization of the containers, as well as avoiding nitrogen contact with skin. Only dry nitrogen as described in Section 2.0 may be used.

Super-pressurize containers using the following steps (see Figure 4.4 for item numbers):

Step 1: Stand container upright; all containers must be filled with the valve outlet upright.

NOTE: Placing a large piece of cardboard, carpet, or rubber matting on the floor before inverting the container(s) this will help avoid damage to the container's surface.

Step 2: Remove brass plug on the container fill port.

Step 3: Close bleed valve (Item 15) in nitrogen line.

Step 4: Attach core depressor tool (P/N 70-281) (Item 16) with ball valve closed, to fill valve port on Impulse Valve of container.

Step 5: Thread in until core depressor tool (Item 16) bottoms out.

Step 6: Attach nitrogen line to core depressor tool (Item 16).

Step 7: Open pressure regulator valve (Item 9), bleed valve (Item 15) and core depressor tool (Item 16).

CAUTION: Do not leave container unattended while pressurizing.

Step 8: Periodically check pressure on gauge (Item 8) while pressurizing.

NOTE: The gauge installed on the clean agent container, or the gauge on the nitrogen regulator, should not be used to determine the clean agent container charging pressure. The 0-600 psi (0-4137 kPa) test gauge, installed between the nitrogen pressure regulator and the container being charged, shall be used to determine the container charging pressure.

Step 9: Pressurize container to appropriate level. See Appendix A.

NOTE: Nitrogen is soluble in clean agent. Therefore, nitrogen will “settle” or mix with the agent over a short period of time. This time frame can be reduced by agitating the container, whenever possible, or “bubbling” the nitrogen gas upward through the liquid agent.

Step 10: Close pressure regulator valve (Item 9).

Step 11: Close core depressor tool (Item 16) by turning handle counter clockwise.

Step 12: Open bleed valve (Item 15) in nitrogen line.

- Step 13: Remove core depressor tool (Item 16) from fill port. There will be a popping sound when removing from fill port.
- Step 14: Replace brass plug into fill port.
- Step 15: If container is inverted, carefully turn container upright.

5.0 LEAK DETECTION

After the container has been filled with the required quantity of agent and super-pressurized with nitrogen, it must be carefully checked for leaks. All potential leak points must be carefully inspected with a leak detector (see Section 2.0). The leak detector **MUST** be checked against a leak standard (see Section 2.0) prior to each use and after every five units tested or every half-hour, whichever comes first. For calibration purposes, the leak standard shall be set to the minimum leakage rate for the specific container being filled. Refer to Section 5.1 for details on calibrating and using the leak detector and maximum leak rates per container.

5.1 LEAK TESTING PROCEDURE

The following is the Fike recommended step-by-step procedure for leak testing all recharged clean agent containers. This procedure is based on the use of the D-TEK Refrigerant Leak Detector and the LS-20 Leak Standard for the specific clean agent. Although the procedure should be virtually the same for any other brand of leak detector, the manufacturer's manual should be consulted for operating details.

NOTE: See Table 5.1 for the maximum allowable leakage rates for clean agent containers.

To perform a leak test on a clean agent container, proceed as follows:

- Step 1: Turn on the leak detector unit and allow it to stabilize for a minimum of 5 minutes prior to conducting any leak testing.
- Step 2: Allow the leak standard to condition at a temperature of 70°F ± 10°F (21°C ± 12°C), while set at the maximum leak rate, for a minimum of 5 minutes prior to calibrating the leak detector.
- Step 3: After the initial warm-up period, set the leak standard to the maximum allowable leak rate for the size container being checked. Table 5.1 details the maximum leakage rate allowed for each container size. If the maximum leak rate for the container exceeds the maximum leak rate for the leak standard, use the maximum rate of the leak standard.
- Step 4: Use the leak standard to calibrate the leak detector to the required leak rate for the clean agent container being tested. This is done by **slowly** passing the leak detector probe past the leak capillary and adjusting the leak detector balance knob until the leak detector responds to the appropriate setting. Refer to the manufacturer's manual for detector calibration directions.
- Step 5: Slowly check all openings, seams, weld joints and container components (i.e. pressure gauge, fill valve, low pressure switch, liquid level device, etc.). The inspection area should be well ventilated and separate from the fill station area, preferably in a positive pressure room.
- Step 6: If a leak is detected, it is recommended that the container be blown off with an air gun or dry nitrogen to remove any possible "pockets" of agent that may have accumulated during the fill process. Then retest the container for leakage.
- Step 7: Containers that have **NO** indication of leakage are acceptable for shipment and system use.
- Step 8: Record container acceptance date, any comments or remarks, and the inspector's initials in the fill station logbook.
- Step 9: Containers that have an unacceptable leakage rate shall be emptied, inspected, and repaired or rebuilt in accordance with the procedures outlined in Section 3.0 of this manual and in the appropriate Fike Design, Installation and Maintenance Manual.

TABLE 5.1 – MAXIMUM LEAK RATES, FK-5-1-12

DOT Container Size	Maximum Leak Rate oz/year (g/year)
5 – 20 lb (2 – 8.5 L)	0.06 (1.8)
35 lb (15 L)	0.37 (10.7)
60 – 1000 lb (27 – 423 L)	0.66 (18.9)
EN Container Size	Maximum Leak Rate oz/year (g/year)
5 – 9 L	0.13 (3.6)
16 L	0.37 (10.4)
26 – 150 L	0.62 (17.5)

6.0 CONTAINER IDENTIFICATION

Upon completion of the previous procedures and if applicable, stamp or etch using a permanent marker the following information onto the container identification label in the appropriate spaces (see Figure 6.0):

- Fill station code number assigned by Fike
- Container gross weight (agent weight + tare weight + nitrogen weight)
- Agent (FK-5-1-12) weight added to container

The following information shall be stamped or etched on the container identification label by Fike personnel before the container is shipped from the factory:

- Container assembly number (e.g. 70-357)
- Container serial number (assigned by Fike)
- Container tare weight (weight of container when empty)
- Manufactured date (date container was filled)
- An X in the “Container Shipment Vertical Only” box only if the container cannot be shipped in the horizontal (lying down) position.

Fill Station Code Number
 →

FK-5-1-12 EXTINGUISHING SYSTEM	 WWW.FIKE.COM	704 SW 10TH ST BLUE SPRINGS, MO 64015	COVERED BY PATENTS AND PATENTS PENDING. MADE IN THE U.S.A.	FPS-XXXX 5M49 		02-16778 REV N/C
INSTALLATION: SEE FIKE SYSTEM INSTALLATION, OPERATION AND MAINTENANCE MANUAL 06-832 FOR COMPLETE DETAILS. CONTACT FIKE FOR COPIES OF THIS MANUAL. CONTAINER STORAGE TEMPERATURE 32° F TO 130° F [0° C TO 54° C]. CONTAINER TESTED TO 1000 PSIG [69 BAR]. OPERATION: IN CASE OF FIRE OPERATE MANUAL RELEASE AND CONTACT YOUR LOCAL FIRE DEPARTMENT. MAINTENANCE: FOLLOW THE STANDARD ON CLEAN AGENT FIRE EXTINGUISHING SYSTEMS, NFPA 2001 AND SYSTEM INSTALLATION, OPERATION, AND MAINTENANCE MANUAL FOR COMPLETE DETAILS. SYSTEM MUST BE MAINTAINED BY TRAINED AND AUTHORIZED PERSONNEL ONLY. EVERY 6 MONTHS: CHECK ALL ELECTRICAL CONNECTIONS FOR CORROSION, CHECK PIPING AND NOZZLES FOR OBSTRUCTIONS. REMOVE AND WEIGH EACH CONTAINER. UNIT SHALL BE RECHARGED IF AGENT WEIGHT LOSS EXCEEDS 5%. EVERY MONTH: OR AT MORE FREQUENT INTERVALS WHEN CIRCUMSTANCES REQUIRE, CHECK NOZZLES FOR OBSTRUCTIONS. CHECK PRESSURE GAUGE FOR PROPER PRESSURE, 500 PSIG @ 70° F [34.5 BAR @ 21° C]. UNIT SHALL BE RECHARGED IF THE LOSS IN PRESSURE, ADJUSTED FOR TEMPERATURE, EXCEEDS 10%.						
ASSEMBLY NO. SERIAL NO. MANUFACTURING DATE CONTAINER SHIPMENT VERTICAL ONLY		GROSS WT. TARE WT. AGENT WT.		UN1956 HEPTAFLUOROISOPROPYL PENTAFLUOROETHYL KETONE (FK-5-1-12)		
WARNING: CONTAINS GAS UNDER HIGH PRESSURE; MAY EXPLODE IF HEATED. STORAGE: STORE IN A WELL VENTILATED PLACE; PROTECT FROM DIRECT SUNLIGHT. SUPPLEMENTARY INFORMATION: THE DISCHARGE OF CLEAN AGENT SYSTEMS TO EXTINGUISH A FIRE CAN RESULT IN A POTENTIAL HAZARD TO PERSONNEL FROM THE NATURAL FORM OF THE CLEAN AGENT OR FROM THE PRODUCTS OF COMBUSTION THAT RESULT FROM EXPOSURE OF THE AGENT TO THE FIRE OR HOT SURFACES. UNNECESSARY EXPOSURE OF PERSONNEL EITHER TO THE NATURAL AGENT OR TO THE PRODUCTS OF DECOMPOSITION SHALL BE AVOIDED.						
DO NOT COVER, REMOVE, OR DEFACE THIS LABEL						

FIGURE 6.0 – CONTAINER IDENTIFICATION LABEL

APPENDIX A – SUPPORT INFORMATION

This appendix contains tables and charts, which were referred to throughout this manual.

A.1 FK-5-1-12 INFORMATION
A.1.1 CYLINDER FILL RANGE TABLE

IMPULSE VALVE, DOT CONTAINER DATA TABLE – FK-5-1-12						
Container			Fill Range		Valve Size	Tare Weight
Size	Part Number	DOT Specification	Minimum	Maximum		
lb (L)			lbs (kg)	lbs (kg)	in (mm)	lbs (kg)
5 (2)	70-357	3AA2015	3 (1.0)	5 (2.0)	1 (25)	6.2 (2.8)
10 (4)	70-358	3AA2015	5 (2.5)	10 (4.5)	1 (25)	12.5 (5.7)
20 (8.5)	70-359	4BW500	9 (4.0)	21 (9.5)	1 (25)	20.9 (9.5)
35 (15)	70-360	4BW500	17 (8.0)	38 (17.0)	1 (25)	31 (14.1)
60 (27)	70-361	4BW500	30 (13.5)	68 (31)	1 (25)	52 (23.6)
100 (44)	70-362	4BW500	47 (21.5)	108 (49.0)	1 (25)	74.1 (33.6)
150 (61)	70-363	4BW500	65 (32.5)	149 (75.0)	3 (80)	130.1 (59.0)
215 (88)	70-364	4BW500	93 (42.5)	216 (98.5)	3 (80)	157 (71.2)
375 (153)	70-365	4BW500	163 (74.0)	378 (171.5)	3 (80)	224 (101.6)
650 (267)	70-366	4BW500	283 (128.5)	660 (299.0)	3 (80)	384.9 (174.6)
1000 (423)	70-367	4BW500	449 (203.5)	1045 (474.0)	3 (80)	539.9 (244.9)

A.1.2 PRESSURE / TEMPERATURE TABLE – FK-5-1-12 CONTAINERS

NOTE: The pressures shown do not vary with fill density. The pressure versus temperature curve for FK-5-1-12, at fill densities between 30 lbs/ft³ to 70 lbs/ft³ (561 kg/m³ to 1121 kg/m³), is a straight line for temperatures less than 130°F (54°C).

Temperature °F / °C	Pressure psig / kPa
32 / 0	453 / 3030
40 / 4	463 / 3210
50 / 10	475 / 3290
60 / 16	488 / 3380
70 / 21	500 / 3470
80 / 27	513 / 3560
90 / 32	525 / 3650
100 / 38	538 / 3740
110 / 43	550 / 3820
120 / 49	563 / 3910
130 / 55	575 / 4000

A.1.3 APPROX. NITROGEN WEIGHT ADDED TO A CONTAINER TO REACH 500 PSIG – FK-5-1-12

Fill Density lb/ft ³ (kg/m ³)	Amount of Nitrogen per lb of FK-5-1-12 oz (g)
20.0 (320)	0.25 (7.1)
45.1 (722)	0.17 (4.8)
69.6 (1115)	0.21 (5.9)

NOTE: These nitrogen weights are approximate. The final check should always be the pressure gauge reading 500 psi at 70°F (3447 kPa at 21°C).

A.2 SAMPLE LOG BOOK – ENGLISH & METRIC ENTRIES

Cylinder Serial No	Customer	Date	Initial or Recharge	Agent Fill Wt.	Pressure (psi/kPa)	Leak Test-Pass/Fail	Comments
375-1000	Chrysler	6/20/99	Initial	370 lbs.	500	Pass	
650-1103	KAF Mfg. Co.	7/13/99	Recharge	598 lbs.	500	Pass	
60-1571	ABCO Co.	8/2/99	Recharge	57 lbs.	500	Pass	
100-1233	Sprint	1/13/00	Initial	100 lbs.	500	Pass	
1000-1234	Kolten Corp.	1/13/00	Initial	975 lbs.	500	Pass	
375-1000	Chrysler	6/20/99	Initial	168.0 kg	3447	Pass	
650-1103	KAF Mfg. Co.	7/13/99	Recharge	271.5 kg	3447	Pass	
60-1571	ABCO Co.	8/2/99	Recharge	26.0 kg	3447	Pass	
100-1233	Sprint	1/13/00	Initial	45.5 kg	3447	Pass	
1000-1234	Kolten Corp.	1/13/00	Initial	442.5 kg	3447	Pass	

APPENDIX B – REFERENCED AND CONTRIBUTING PUBLICATIONS

This appendix lists the publications, which were used for a basis for, or substantiation of, the data and procedures contained in this manual.

B.1 NFPA PUBLICATION

National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101

- NFPA No. 2001 – *Standard on Clean Agent Fire Extinguishing Systems* – Current Edition

B.2 U.S. GOVERNMENT PUBLICATION

Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20401

- Title 29, Code of Federal Regulations, Part 1910, Subpart “S”
- DOT Title 49, Code of Federal Regulations, Parts 170 – 190
- Federal Register, Volume 59, Page 13044, EPA SNAP Program

B.3 CGA PUBLICATION

Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202

- Pamphlet C-6, Standard for the Visual Inspection of Steel Compressed Gas Cylinders
- Pamphlet G10.1, Table 1 – Quality of nitrogen Supplies

B.4 FIKE PUBLICATION

Fike Corporation, 704 S. 10th Street, P.O. Box 610, Blue Springs, MO 64013

- P/N 06-832 – Equipment, Design and Service Manual for Clean Agent Fire System w/ Impulse Valve & FK-5-1-12 Agent

B.5 MISC. PUBLICATION

Several other sources of publications and information used in the preparation of this manual follow:

- Yokogawa H-10 Pro Refrigerant Leak Detector and Model LS-20 Leak Standard, Central States Consulting Company, 109 Lynn Drive, Battle Creek, MI 49017, 1-800-272-7022
- D-TEK Refrigerant Leak Detector, Leybold Inficon Inc., 2 Technology Place, East Syracuse, NY 13057

B.6 SAFETY DATA SHEETS (SDS)

- 3M™ Novec™ 1230 – SDS, 3M Company, 1-888-364-3577, www.3m.com
- Nitrogen, Compressed – SDS, Praxair Inc., 1-800-772-9247, www.praxair.com