



TECHNICAL DATA

INSTITUTIONAL QUICK RESPONSE FLUSH HORIZONTAL SIDEWALL SPRINKLER VK412 (K5.6)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

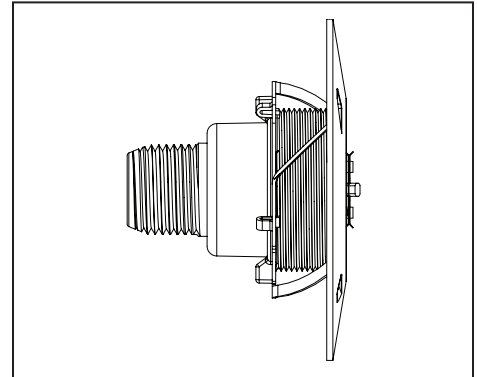
1. PRODUCT DESCRIPTION

Viking Institutional Style Quick Response Flush Horizontal Sidewall Sprinklers are small, flush, solder link and lever sprinklers made with tamper-resistant construction. Viking institutional sprinklers have been specifically designed for use with concealed piping in institutional mental health occupancies, correctional facilities, or anywhere a likelihood of tampering with fire sprinklers by the occupants may exist.

The institutional sprinkler assembly consists of the sprinkler body, lockring, and a 3-1/4" (82.6 mm) diameter thread-on escutcheon plate. The sprinkler and escutcheon plate have a polished chrome finish.

Tests simulating conditions of misuse demonstrate the fusible element assembly consistently breaks away when connected to a 40 lb. (18.1 kg) weight dropped 6" (152 mm)†.

† For a copy of the break-a-way test described, contact The Viking Corporation. The Viking Corporation disclaims any responsibility for damages or injury (including death) caused by the operation or inoperation of sprinklers arising out of the misuse of or tampering with Viking® brand sprinklers including, without limitation, any personal injury or death arising out of or caused by the manipulation of, dismantling of, or attempted use of the sprinkler or any component as an instrument unrelated to its intended use.



2. LISTINGS AND APPROVALS



cULus Listed: Category VNIV

NYC Approved: MEA 89-92-E, Volume 16

cULus Listed as Quick Response Flush Horizontal Sidewall Sprinkler for Light Hazard occupancies below smooth, flat, horizontal ceilings only. Refer to the Approval Chart on page 126m and Design Criteria on page 126n for cULus Listing requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Minimum Operating Pressure: 7 psi (0.5 bar)

Maximum Working Pressure: 175 psi (12 bar)

Spring: U.S.A. Patent No. 4,570,720

Deflector: U.S.A. Patent No. 6,520,265

Thread size: 1/2" (15 mm) NPT

Nominal K-Factor: 5.6 U.S. (80.6 metric*)

* Metric K-factor measurement is shown in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Overall Length: 2-9/32" (57.9 mm)

Material Standards:

Sprinkler Body: Brass Casting UNS-C84400

Body Cap: Stainless Steel UNS-S30400 or UNS-S30500

Deflector: Copper UNS-C19500

Deflector Pins: Stainless Steel UNS-S30300

Button: Brass UNS-C31600

Compression Screw: Brass UNS-C36000

Fusible Link Assembly: Beryllium Nickel and Eutectic Solder

Fusible Link Levers: Stainless Steel UNS-S31600

Lever Bar: Copper Alloy UNS-C72500

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape

Escutcheon Materials:

Escutcheon Plate: Brass UNS-C26000

Lockring: Stainless Steel UNS-S41000

Available Finishes And Temperature Ratings:

Refer to Table 1.

Viking Technical Data may be found on
The Viking Corporation's Web site at
<http://www.vikinggroupinc.com>.
The Web site may include a more recent
edition of this Technical Data Page.



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Ordering Instructions: (Also refer to the current Viking price list.)

Order Sprinkler VK412 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.

Finish Suffix: Polished Chrome = F

Temperature Suffix: 165 °F (74 °C) = C, 220 °F (104 °C) = F

For example, sprinkler VK412 with a 165 °F (74 °C) temperature rating = Part No. 10579FC.

Escutcheon Package: **US Patent No. 6,024,177**, Part No. 10627F (includes lockring and escutcheon plate).

Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking data book.)

Sprinkler Wrenches*:

A. Heavy Duty Part Number 08336W/B Available since 1983, or

B. Light Duty Part Number 10366W/B** Available since 1998.

*Requires a 1/2" ratchet (not available from Viking).

**Ideal for sprinkler cabinets.

Institutional Escutcheon Installation Wrench: Part No. 10551W/B (available since 1999)

Spanner Wrench: Part No. 10729*** (for removal of institutional escutcheon plate), 2-1/2" C-C (available since 1999)

***For removal of the Institutional Quick Response Flush Horizontal Sidewall Sprinklers, special tools are needed (not all the required tools are available from Viking). Refer to section 6. INSPECTIONS, TESTS, AND MAINTENANCE, paragraph D. on pages 126q-s.

Sprinkler Cabinet:

Six-head capacity: Part No. 01731A (available since 1971)

Retaining Flange Assembly: Part No. 10599, includes: Retaining Flange Casting: AISI C1045 Low Carbon Steel (available since 1999)

Thickness: 13/32" (10.3 mm)

Outside Diameter: 2-3/4" (70 mm)

Socket Set Screw††: Steel Alloy

††Requires a 1/8" hex wrench for installation and removal (not available from Viking).

4. INSTALLATION

(Refer to Figures 1-4.)

WARNING: Viking sprinklers are manufactured and tested to meet the rigid requirements of the approving agency. The sprinklers are designed to be installed in accordance with recognized installation standards. Deviation from the standards or any alteration to the sprinkler after it leaves the factory including, but not limited to: painting, plating, coating, or modification, may render the sprinkler inoperative and will automatically nullify the approval and any guarantee made by The Viking Corporation. Flush sprinklers are decorative sprinklers and may be considered special purpose. As such, some Authorities may limit the use depending on the occupancy classification. Refer to the Authority Having Jurisdiction prior to installation.

A. Sprinklers must be handled with care. They must be stored in a cool, dry place in their original shipping container. Never install sprinklers that have been dropped, damaged in any way, or exposed to temperatures in excess of maximum ambient temperature allowed. Such sprinklers should be destroyed immediately.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating ¹	Maximum Ambient Ceiling Temperature ²
Ordinary	165 °F (74 °C)	100 °F (38 °C)
Intermediate	220 °F (104 °C)	150 °F (65 °C)

Sprinkler Finish: Polished Chrome

Footnotes

¹ The sprinkler temperature rating is stamped on the sprinkler.

² Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.



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Approval Chart

Institutional Style Quick Response Flush Horizontal Sidewall Sprinkler VK412
Maximum 175 PSI (12 Bar) WWP
For Light Hazard Occupancies Only

KEY
Temperature
Finish
A1X ← Escutcheon (if applicable)

Sprinkler Base Part Number ¹	NPT Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals ^{3,5,6} (Refer also to Design Criteria on pg 126n.)							
	Inches	mm	U.S.	metric ²	Inches	mm	cULus ⁴	FM	NYC ⁷	VdS	LPCB	CE		
10579	1/2	15	5.6	80.6	2-9/32	57.9	A1	--	A1	--	--	--	--	
Approved Temperature Ratings A - 165 °F (74 °C) B - 220 °F (104 °C) ⁸							Approved Finish 1 - Polished Chrome							

Footnotes

¹ Base part number shown. For complete part number, refer to Viking's current price schedule.

² Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

³ This chart shows the listings and approvals available at the time of printing. Other approvals may be in process.

⁴ Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada.

⁵ The Viking Institutional Style Quick Response Flush Horizontal Sidewall Sprinkler is cULus Listed as a Quick Response Flush Horizontal Sidewall Sprinkler for Light Hazard Occupancies, below smooth, flat, horizontal ceilings only.

⁶ Must be located with deflector 4" to 12" (102 mm to 304 mm) below smooth, flat, horizontal ceilings, and flush with the wall in which they are installed.

⁷ Accepted for use, City of New York Department of Buildings, MEA 89-92-E, Vol 16.

⁸ Available temperature ratings are 165 °F (74 °C) and 220 °F (104 °C), however, only the 165 °F (74 °C) temperature rated sprinkler is listed at the time of this writing.

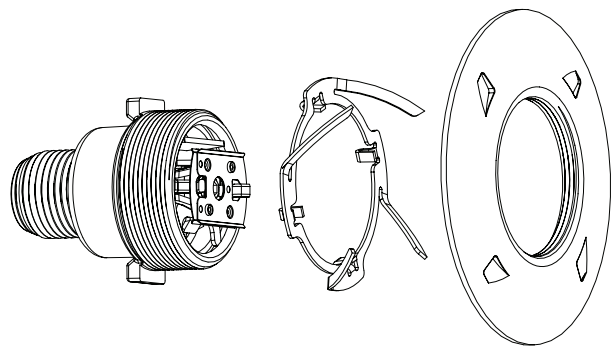


Figure 1: Sprinkler Body, Lockring, and Escutcheon Plate

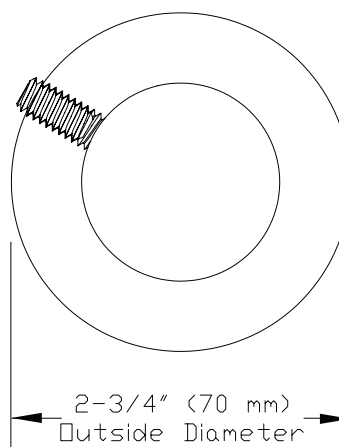


Figure 2: Retaining Flange



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DESIGN CRITERIA

(Also refer to the Approval Chart on page 126m)

cULus Listing Requirements:

Sprinkler VK412 is cULus Listed as a Quick Response Flush Horizontal Sidewall Sprinkler as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13.

- Designed for use in Light Hazard occupancies only below smooth, flat, horizontal ceilings.
- The sprinkler must be installed in the horizontal sidewall position in fixed fire protection systems (wet, dry, deluge, or preaction systems).
- Orient the top of the deflector parallel with the ceiling. The wrench ear on the top of the Viking Institutional Style Quick Response Flush Horizontal Sidewall Sprinkler is marked with the word "top".
- Must be located with deflector 4" to 12" (102 mm to 304 mm) below the ceiling, and flush with the wall in which they are installed.
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13.
- Minimum spacing allowed is 6 ft. (1.8 m).
- Minimum distance from end walls is 4 in. (102 mm).
- Maximum distance from end walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for standard coverage spray horizontal sidewall sprinklers must be followed.

IMPORTANT: Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to page QR1-2 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

- B. Viking Institutional Quick Response Flush Horizontal Sidewall Sprinklers are not intended for use in corrosive environments. Use only sprinklers listed for corrosive environments when subject to corrosive atmospheres.
- C. Use care when locating sprinklers near fixtures that can generate heat. DO NOT install sprinklers where they will be exposed to temperatures that exceed the maximum recommended ambient temperature for the temperature rating used.
- D. Adequate heat must be provided when the Institutional Quick Response Flush Pendent Sprinkler is installed on wet pipe systems.
- E. The sprinklers must be installed after the piping is in place to prevent mechanical damage. Before installing, be sure to have the appropriate sprinkler model and style, with the correct orifice size, temperature rating, and response characteristics. Install the sprinklers according to the following sequence:
 1. Install all piping and cut the sprinkler nipple so that the ½" (15 mm) NPT outlet of the reducing coupling is at the desired elevation and centered in a 2-1/4" (57.2 mm) diameter opening in the wall (due to locking).
Note: If the retaining flange assembly is to be used, slide the flange over the sprinkler nipple prior to threading the nipple into the branch line tee as shown in Figure 4-A.
 2. The internal diameter of the special Flush/Concealed Sprinkler Wrench is designed for use with the sprinkler contained in the protective plastic shell. With the sprinkler in the shell, apply a small amount of pipe-joint compound or tape to the external threads of the sprinkler only, taking care not to allow a build-up of compound in the sprinkler inlet.
 3. Refer to Figure 4-B and use only Sprinkler Wrench 08336W/B or 10366W/B, which is designed for installing Viking Institutional Quick Response Flush Horizontal Sidewall Sprinklers. With the sprinkler in the plastic protective shell, place the unit into the wrench. DO NOT use the fusible link to start or thread the sprinkler into a fitting. Turn the unit clockwise to thread the sprinkler into the coupling, taking care not to over-tighten or damage the sprinkler operating parts.
- F. After installation, the entire sprinkler system must be tested. The test must be conducted to comply with the installation standards. Make sure the sprinkler is properly tightened. If a thread leak occurs, normally the sprinkler must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal is damaged, the sealing compound or tape is washed out of the joint.
- G. After testing, repairing all leaks, and installing and painting the wall, remove the plastic protective shell from the sprinkler.



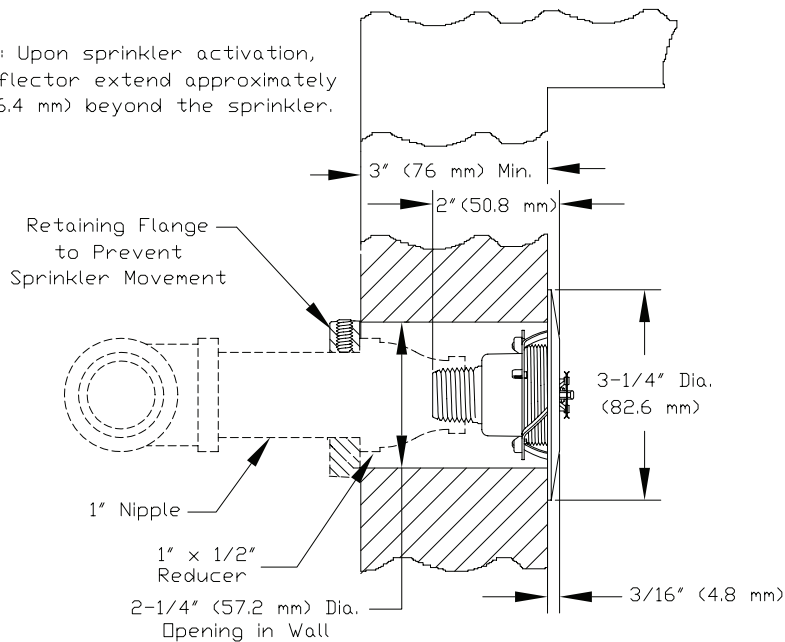
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NOTE: Upon sprinkler activation, the deflector extend approximately 1/4" (6.4 mm) beyond the sprinkler.



WARNING: There is no adjustability.
DO NOT install beyond flush.

Figure 3: Sprinkler Dimensions and Installation Adjustment

INSTALLATION TIP: Prior to installing the locking, temporarily install the escutcheon (without locking) onto the sprinkler to verify that the sprinkler supply nipple is of the proper length and the desired sprinkler and escutcheon position has been achieved. If necessary, re-cut the sprinkler supply nipple and repeat the process. When satisfied with the length of the sprinkler supply nipple and final position of the sprinkler and escutcheon, remove the escutcheon, install the locking, and use the escutcheon installation wrench to re-install the escutcheon.

DO NOT install the locking onto the sprinkler until after the sprinkler nipple has been cut back to ensure desired placement of the sprinkler in relation to the outer surface of the wall. The locking will prove difficult to remove from the sprinkler once it has been installed behind the face of the wall. Check finished product by temporarily installing the escutcheon plate onto the sprinkler without the locking, using the Institutional Escutcheon Installation Wrench. If necessary, re-cut the sprinkler nipple as required. Once satisfied with sprinkler location compared to the front of the wall, install the locking and the escutcheon plate following steps H through J on this page. The escutcheon plate cannot be removed after it has been installed with the locking, so do not install the escutcheon plate with the locking until after the system has been tested.

- H. As shown in Figures 4C and 4D, fit the locking over the open end of the protective sprinkler shell and use the shell to gently press the locking over the threads of the sprinkler. The ring must rest against the two wrench ears of the sprinkler body with the four arms of the locking pointing outward.
- I. REMOVE THE PLASTIC PROTECTIVE SHELL from the sprinkler. (Recommendation: retain a protective shell in the spare sprinkler cabinet.)
- J. As depicted in Figure 4E, use the Institutional Escutcheon Installation Wrench to screw on the escutcheon plate clockwise. The face of the escutcheon plate is equipped with four indentations to complement the design of the Institutional Escutcheon Installation Wrench and facilitate installation of the escutcheon plate. As the escutcheon plate is threaded onto the sprinkler body, the four arms of the locking must fully engage with the radial grooves on the inside of the escutcheon plate. Continue to thread the escutcheon plate onto the sprinkler body until the plate's flange fits tightly against the surface of the wall. Then, proceed to turn the escutcheon plate another 1/2 turn clockwise to ensure that it is secured to the wall. The arms of the locking are angled and designed to wedge into the coined radial grooves on the inside face of the escutcheon plate to keep the escutcheon plate from being unscrewed. Thus, an attempt to remove the escutcheon plate is prevented after it is installed with the locking. DO NOT MODIFY THE UNIT.

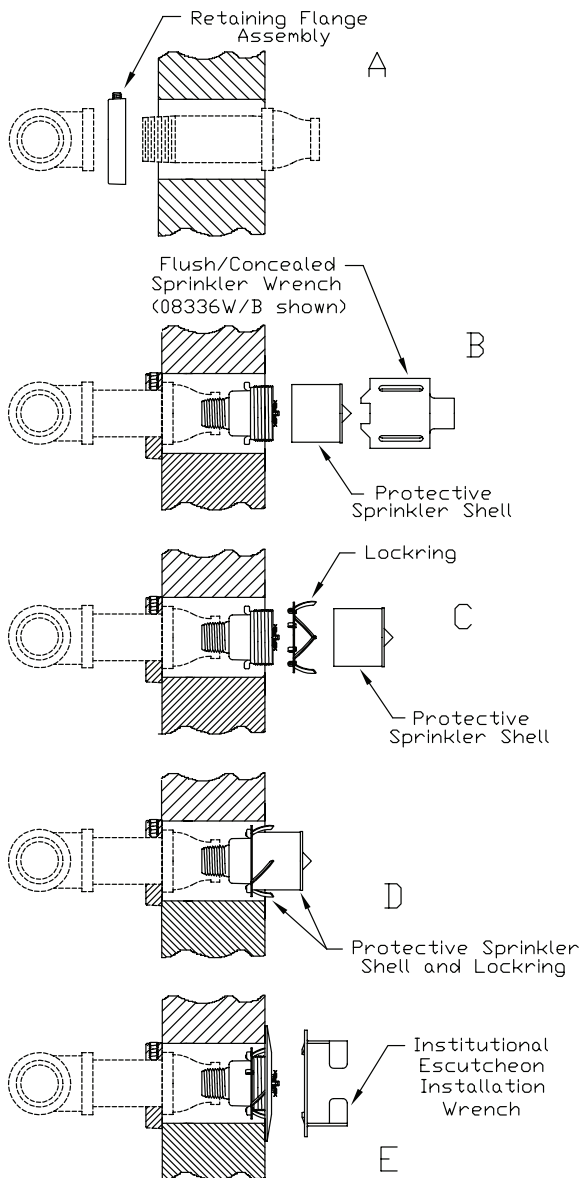


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Do not install the locking onto the sprinkler until after the sprinkler nipple has been cut back to ensure desired placement of the sprinkler in relation to the outer surface of the wall. The locking will prove difficult to remove from the sprinkler once it has been installed behind the face of the wall. Check finished product by temporarily installing the escutcheon plate onto the sprinkler without the locking. If necessary, re-cut the sprinkler nipple as required.

Once satisfied with the sprinkler location compared to the front of the wall, install the locking and the escutcheon plate following steps H through J on page 126o. The escutcheon plate cannot be removed after it has been installed with the locking, so do not install the escutcheon plate with the locking until after the system has been tested.

Figure 4: Sequence of Installation

K. The retaining flange, located behind the wall, must fit snug against the inner surface of the wall to prevent vertical movement of the assembly. Use a 1/8" hex wrench to tighten the retaining flange screw and secure the assembly into place to prevent it from being pulled through the wall.

L. **DISASSEMBLY:** Refer to section 6. **INSPECTIONS, TESTS AND MAINTENANCE**, paragraph D. and follow all warnings and instructions.

5. OPERATION

The sprinkler is recessed into the mounting surface, flush to the wall, with only a portion of the fusible link assembly exposed beyond the wall. The concealed deflector is held inside the sprinkler body until the eutectic metal solder link is fused. When the sprinkler fuses, the deflector extends to discharge and distribute water.

The special escutcheon plate on the Institutional Quick Response Flush Horizontal Sidewall Sprinkler assembly is the only escutcheon ring that may be used with these institutional sprinklers, and all of these sprinklers must be installed with this escutcheon plate. Removal of the thread-on escutcheon plate is prevented by the locking.

The sprinkler piping behind the wall leading to the sprinkler must be secured to prevent any movement of the sprinkler. One method of anchoring the pipe behind the wall is to use the retaining flange and screw assembly that are available from Viking. The flange slides over the sprinkler nipple prior to threading the nipple into the tee (see Figure 4A).

6. INSPECTIONS, TESTS AND MAINTENANCE

(Refer to Figures 1-4.)

NOTICE: The owner is responsible for maintaining the fire protection system and devices in proper operating condition. For minimum maintenance and inspection requirements, refer to NFPA 25 for Inspection, Testing and Maintenance requirements. In addition, the Authority Having Jurisdiction may have additional maintenance requirements that must be followed.

- A. The sprinklers must be inspected on a regular basis for corrosion, mechanical damage, obstructions, paint, etc. The frequency of inspections may vary due to corrosive atmospheres, water supplies, and activity around the device.
- B. Sprinklers that have been painted or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced after a specified term of service. Refer to the installation standards and the Authority Having Jurisdiction for the specified period of time after which testing and/or replacement is required. Sprinklers that have operated cannot be reassembled or reused, but must be replaced. When replacing sprinklers, use only new sprinklers.



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C. The sprinkler discharge pattern is critical for proper fire protection. Nothing should be hung from the sprinkler, attached to it, or otherwise obstruct the discharge pattern. All obstructions must be immediately removed or, if necessary, additional sprinklers installed.

D. When replacing existing sprinklers, the system must be removed from service. Refer to the appropriate system description and/or valve instructions. Prior to removing the system from service, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected area.

DISASSEMBLY: There are two methods of sprinkler disassembly. In Method 1, the escutcheon plate and lockring are removed first, and then the remaining sprinkler components can be removed without being destroyed. The second method of disassembly results in complete destruction of the unit.

Disassembly Method 1:

1. Remove the system from service, drain all water, and relieve all pressure on the piping.
2. Use a drill (not available from Viking) sized appropriately for use with a spanner wrench (see step 3) to make two holes through two opposite indentations on the face of the escutcheon plate.
3. Use a 2-1/2" C-C spanner wrench (Viking Part No. 10729) to unthread the escutcheon plate by turning it counterclockwise. Make sure that the sprinkler body does not turn or loosen. The top surface of the horizontal sidewall deflector should remain parallel to the ceiling.
4. Remove the lockring from the sprinkler body.
5. Place a protective sprinkler shell (from the spare sprinkler cabinet) over the sprinkler to be removed.
6. With the protective shell over the sprinkler, place Sprinkler Wrench 08336W/B or 10366W/B over the unit and turn it counterclockwise to carefully unthread the sprinkler body from the reducing coupling.
7. Install the new unit using the sprinkler wrench. Care must be taken to ensure that the replacement sprinkler is the proper model and style, with the appropriate orifice size, temperature rating, and response characteristics. A fully stocked spare sprinkler cabinet should be provided for this purpose. (Stock of spare lockrings and escutcheon plates should be available in the spare sprinkler cabinet in addition to the spare sprinkler heads.)
8. Place the system back in service and secure all valves. Check for and repair all leaks.

NOTE: Disassembly Method 1 results in damage to the escutcheon plate and lockring, and they cannot be reused.

Disassembly Method 2:

1. Remove the system from service, drain all water, and relieve all pressure on the piping.
 2. Disassemble and remove the fusible element, and bend the deflector and sealing assembly to expose the waterway of the sprinkler.
 3. Insert an easy-out screw extractor (Trade No. 6) into the waterway. Turn the easy-out counterclockwise with a wrench to remove the sprinkler assembly from the reducing coupling.
 4. Install the new unit using Sprinkler Wrench 08336W/B or 10366W/B. Care must be taken to ensure that the replacement sprinkler is the proper model and style, with the appropriate orifice size, temperature rating, and response characteristics. A fully stocked spare sprinkler cabinet should be provided for this purpose. (Stock of spare lockrings and escutcheon plates should be available in the spare sprinkler cabinet in addition to the spare sprinkler heads.)
 5. Place the system back in service and secure all valves. Check for and repair all leaks.
- E. Sprinkler systems that have been subject to a fire must be returned to service as soon as possible. The entire system must be inspected for damage and repaired or replaced as necessary. Sprinklers that have been exposed to corrosive products of combustion or high ambient temperatures, but have not operated, should be replaced. Refer to the Authority Having Jurisdiction for minimum replacement requirements.

NOTE: Disassembly Method 2 results in complete destruction of the unit. None of the sprinkler components may be reused.

7. AVAILABILITY

Viking Sprinkler VK412 is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

9. DISCLAIMER

THE VIKING CORPORATION DISCLAIMS ANY RESPONSIBILITY FOR DAMAGES OR INJURY (INCLUDING DEATH) CAUSED BY THE OPERATION OR INOPERATION OF SPRINKLERS ARISING OUT OF THE MISUSE OF OR TAMPERING WITH VIKING® BRAND SPRINKLERS INCLUDING, WITHOUT LIMITATION, ANY PERSONAL INJURY OR DEATH ARISING OUT OF OR CAUSED BY THE MANIPULATION OF, DISMANTLING OF, OR ATTEMPTED USE OF THE SPRINKLER OR ANY COMPONENT AS AN INSTRUMENT UNRELATED TO ITS INTENDED USE.

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