



## TECHNICAL DATA

## FRAME STYLE SPRAY NOZZLES

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. DESCRIPTION

Viking Frame Style Spray Nozzles are small, directional spray nozzles for use on water spray systems. They are thermosensitive glass bulb style nozzles, however they may be ordered OPEN (glass bulb and pip cap assembly removed) for use on deluge systems.

These Frame Style Spray Nozzles are available in various finishes, temperature ratings, orifice sizes, and spray pattern discharge angles to meet design requirements. When spraying, the nozzles discharge a cone-shaped spray pattern. The deflector determines the included angle of spray pattern discharge. A special ring provides uniform distribution throughout the spray pattern.

Other features include the small frame, which allows proper nozzle positioning even in congested areas, and the nominal 3 mm glass bulb contained entirely inside the frame for protection from most mechanical damage. The glass bulb operating elements are resistant to more corrosive atmospheres than metal elements. The special Teflon® coating has been investigated for installation in corrosive atmospheres and is cULus listed as corrosion resistant as indicated in the Approval Chart.

### 2. LISTINGS AND APPROVALS

**cULus Listed:** Category VGYZ

**NYC Approved:** MEA 89-92-E, Volume 29

**NOTE:** International approval certificates are available upon request. Refer to the Approval Chart on page 31d and Design Criteria on page 31e for cULus listing requirements that must be followed.

### 3. TECHNICAL DATA

#### Specifications:

Minimum Operating Pressure: 7 PSI (0.5 bar)

Rated to 175 PSI (12 bar) water working pressure.

Factory tested hydrostatically to 500 PSI (34.5 bar)

Refer to page 31e-i for spray patterns.

Frame Style Spray Nozzles are available in various orifice sizes. The smallest nozzle passage is 1/4" (6 mm) for Part Nos.

16964-16967; 5/16 (8 mm) for Part Nos. 16960-16963; 3/8" (10 mm) for Part Nos. 16956-16959; 7/16" (11 mm) for Part

Nos. 16952-16955; 1/2" (13 mm) for Part Nos. 16948-16951.

The spray nozzle deflector is identified with the U.S. K-Factor, spray angle, and temperature rating.

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

Nominal K-Factors: Refer to the Approval Chart

Glass-bulb fluid temperature rated to -65 °F (-55 °C)

Overall Length: Refer to the Approval Chart

#### Spray Nozzle Material Standards:

Frame Casting: Brass UNS-C84400

Deflector: Copper UNS-C19500

Ring: Copper UNS-C19500

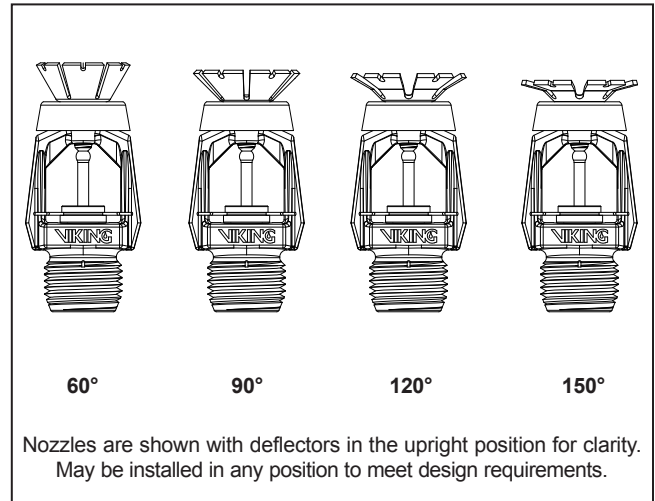
Bulb: Glass, nominal 3 mm diameter

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

Screw: Brass UNS-C36000

Bushing (Small Orifice Nozzles): Brass UNS-C36000

Pip Cap: Brass UNS-C31600



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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For Teflon® Coated Nozzles: Belleville Spring-Exposed, Screw-Nickel Plated (painted black for appearance only), Pip Cap-Teflon® Coated

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

Order Frame Style Spray Nozzles by selecting the appropriate part number from the Approval Chart. Add the appropriate suffix for the nozzle finish and then the appropriate suffix for the temperature rating to the spray nozzle base part number.

Finish Suffix: Brass = A, Black Teflon® = N

Temperature Suffix (°F/°C): 135°/57° = A, 155°/68° = B, 175°/79° = D, 200°/93° = E, 286°/141° = G, OPEN = Z.

For example, a 60° Spray Nozzle, 5.6 K-Factor with a Brass finish and a 155 °F/68 °C temperature rating = Part No. 16948AB

### Available Finishes And Temperature Ratings:

Refer to Table 1.

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

### Spray Nozzles Wrenches:

A. Standard Wrench: Part No. 10896W/B (available since 2000).

B. Wrench for coated spray nozzles: Part No. 13577W/B\*\* (available since 2006)

\*\*A ½" ratchet is required (not available from Viking).

### Sprinkler Cabinets:

A. Six-head capacity: Part No. 01724A (available since 1971)

B. Twelve-head capacity: Part No. 01725A (available since 1971)

## 4. INSTALLATION

**WARNING:** Viking Frame Style Spray Nozzles are manufactured and tested to meet the rigid requirements of the approving agency. The nozzles are designed to be installed in accordance with recognized installation standards. Deviation from the standards or any alteration to the nozzle after it leaves the factory including, but not limited to: painting, plating, coating, or modification, may render the unit inoperative and will automatically nullify the approval and any guarantee made by The Viking Corporation.

**TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES**

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating <sup>1</sup>	Maximum Ambient Ceiling Temperature <sup>2</sup>	Bulb Color
Ordinary	135 °F (57 °C)	100 °F (38 °C)	Orange
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	Green
High	286 °F (141 °C)	225 °F (107 °C)	Blue

**Sprinkler Finishes:** Brass and Black Teflon®


**Corrosion-Resistant Coatings<sup>3</sup>:** Black Teflon®

### Footnotes

<sup>1</sup> The sprinkler temperature rating is stamped on the deflector.

<sup>2</sup> 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.

<sup>3</sup> The corrosion-resistant coating has passed the standard corrosion test required by the approving agencies indicated in the Approval Chart. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coating is compatible with or suitable for the proposed environment. For automatic spray nozzles, the coating is applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Teflon® coatings. For Teflon® coated open spray nozzles only, the waterway is coated.

	<b>TECHNICAL DATA</b>	<b>FRAME STYLE SPRAY NOZZLES</b>
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<b>Approval Chart</b> Frame Style Spray Nozzles <sup>2</sup> Open or Automatic	<b>KEY</b> Temperature Finish A1X ← Escutcheon (if applicable)
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Base Part Number <sup>1</sup> (Specify Open or Automatic)	Pattern	Thread Size		Nominal Orifice		Nominal K-Factor		Overall Length		Listings and Approvals <sup>4</sup> (Refer also to Design Criteria on page 31d.)	
		NPT	BSP	Inches	mm	U.S.	metric <sup>3</sup>	Inches	mm	cULus <sup>5</sup>	NYC <sup>6</sup>
<b>1/2" (13 mm) Orifice</b>											
16948	60°	1/2"	15 mm	1/2"	13 mm	5.6	80.6	2-11/16	68.3	A1, B1	A1, B1
16949	90°	1/2"	15 mm	1/2"	13 mm	5.6	80.6	2-9/16	65.1	A1, B1	A1, B1
16950	120°	1/2"	15 mm	1/2"	13 mm	5.6	80.6	2-17/32	64.3	A1, B1	A1, B1
16951	150°	1/2"	15 mm	1/2"	13 mm	5.6	80.6	2-1/2	63.5	A1, B1	A1, B1
<b>7/16" Orifice<sup>7</sup></b>											
16952	60°	1/2"	15 mm	7/16"	--	4.2	57	2-11/16	68.3	A1, B1	A1, B1
16953	90°	1/2"	15 mm	7/16"	--	4.2	57	2-9/16	65.1	A1, B1	A1, B1
16954	120°	1/2"	15 mm	7/16"	--	4.2	57	2-17/32	64.3	A1, B1	A1, B1
16955	150°	1/2"	15 mm	7/16"	--	4.2	57	2-1/2	63.5	A1, B1	A1, B1
<b>3/8" (10 mm) Orifice<sup>7</sup></b>											
16956	60°	1/2"	15 mm	3/8"	10 mm	2.8	40.3	2-11/16	68.3	A1, B1	A1, B1
16957	90°	1/2"	15 mm	3/8"	10 mm	2.8	40.3	2-9/16	65.1	A1, B1	A1, B1
16958	120°	1/2"	15 mm	3/8"	10 mm	2.8	40.3	2-17/32	64.3	A1, B1	A1, B1
16959	150°	1/2"	15 mm	3/8"	10 mm	2.8	40.3	2-1/2	63.5	A1, B1	A1, B1
<b>5/16" Orifice<sup>7</sup></b>											
16960	60°	1/2"	15 mm	5/16"	--	1.9	27.4	2-11/16	68.3	A1, B1	A1, B1
16961	90°	1/2"	15 mm	5/16"	--	1.9	27.4	2-9/16	65.1	A1, B1	A1, B1
16962	120°	1/2"	15 mm	5/16"	--	1.9	27.4	2-17/32	64.3	A1, B1	A1, B1
16963	150°	1/2"	15 mm	5/16"	--	1.9	27.4	2-1/2	63.5	A1, B1	A1, B1
<b>1/4" Orifice</b>											
16964	60°	1/2"	15 mm	1/4"	--	1.4	20.2	2-11/16	68.3	A1, B1	A1, B1
16965	90°	1/2"	15 mm	1/4"	--	1.4	20.2	2-9/16	65.1	A1, B1	A1, B1
16966	120°	1/2"	15 mm	1/4"	--	1.4	20.2	2-17/32	64.3	A1, B1	A1, B1
16967	150°	1/2"	15 mm	1/4"	--	1.4	20.2	2-1/2	63.5	A1, B1	A1, B1

<b>Approved Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C) B - Open (glass bulb and pip cap removed)	<b>Approved Finishes</b> 1 - Brass and Black Teflon® for use on water-based deluge and water spray systems.
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**Footnotes**

<sup>1</sup> Base part number is shown. When ordering, specify either open or automatic. For complete part number, see current Viking price schedule.

<sup>2</sup> The spray nozzle deflector is identified with the U.S. K-Factor, spray angle, and temperature rating.

<sup>3</sup> Metric K-factor shown is for use when pressure is measured in bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

<sup>4</sup> This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.

<sup>5</sup> Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada.

<sup>6</sup> Accepted for use, City of New York Department of Buildings, MEA 89-92-E, Vol. 29.

<sup>7</sup> The orifice is bushed.



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### DESIGN CRITERIA

(Also refer to the Approval Chart on page 31c.)

#### cULus Listing Requirements:

Frame Style Spray Nozzles are small, directional spray nozzles for use on water spray systems. Refer to the installation standards, such as NFPA 13, for minimum water supply requirements, nozzle pressure, and installation guidelines.

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Viking frame style spray nozzles 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.**

The Approval Chart on page 31c shows listings and approvals of Frame Style Spray Nozzles for use on water spray systems and water based deluge systems. The chart shows listings and approvals available at the time of printing. Other approvals are in process. Check with the manufacturer for any additional approvals.

- A. **Spray nozzles are to be installed in accordance with the latest edition of Viking technical data, the latest published 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. The use of Frame Style Spray Nozzles may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.**
- B. Frame Style Spray Nozzles are installed on fixed fire protection systems, such as deluge systems, where total flooding is required.
- C. Handle sprinklers and spray nozzles with care. They must be stored in a cool, dry place in their original shipping container. Never install a sprinkler or spray nozzle that has been dropped, damaged, or exposed to temperatures exceeding the maximum ambient temperature allowed (refer to Table 1 below).
- D. Never install any glass-bulb sprinkler if the bulb is cracked or if there is a loss of liquid from the bulb. A small air bubble should be present in the glass bulb. Any sprinkler with a loss of liquid from the glass bulb or damage to the fusible element should be destroyed immediately.
- E. Corrosion-resistant sprinklers and spray nozzles must be installed when subject to corrosive atmospheres. When installing corrosion resistant nozzles, take care not to damage the corrosion resistant coating.
- F. Spray nozzles must be installed after the piping is in place to prevent mechanical damage.
- G. Sprinklers and spray nozzles must be protected from mechanical damage. Where open sprinklers are used, care must be taken to prevent foreign materials from entering the orifice. Foreign materials may accumulate and restrict or plug the waterway and may prevent proper operation of the spray nozzle.
- H. Before installing, be sure to have the appropriate sprinkler model and style, with the correct K-Factor, temperature rating, and response characteristics. When installing automatic (closed) Frame Style Spray Nozzles, proceed to paragraphs I, J, and K below.
  1. **When installing open Frame Style Spray Nozzles:** Hydrostatic testing must be completed prior to spray nozzle installation. Install plugs in place of spray nozzles for test purposes only. In areas where leakage during testing must be prevented, system piping may be air tested prior to testing with water. Refer to the appropriate installation standard and the Authority Having Jurisdiction. When hydrostatic testing is complete, verify that all test plugs have been removed. Proceed to paragraphs I and K below. Omit paragraph J.
- I. **For Automatic (closed) and Open Frame Style Spray Nozzles:** Before installing, be sure to have the appropriate model and style, with the correct orifice size, temperature rating, and response characteristics. Frame Style Spray Nozzle deflectors are identified with the U.S. K-Factor, spray angle, and temperature rating.
  1. Apply a small amount of pipe-joint compound or tape to the external threads of the spray nozzle only, taking care not to allow a build-up of compound inside the inlet.
  2. Install the nozzle on the fixed piping, using the special sprinkler/spray nozzle wrench only. Take care not to over-tighten or damage the spray nozzle operating parts. DO NOT use the deflector to start or thread the unit into a fitting.
- J. **For automatic (closed) spray nozzle installations:** After installation, the entire fixed pipe system must be tested. The test must be conducted to comply with the installation standards. Make sure the spray nozzle has been properly tightened. If a thread leak occurs, normally the unit 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. In areas where leakage during testing must be prevented, system piping may be air tested prior to testing with water. Refer to the appropriate installation standard and the Authority Having Jurisdiction.



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K. **For Automatic (closed) and Open Frame Style Spray Nozzles:** Spray nozzles must be protected from mechanical damage. Where open spray nozzles are used, care must be taken to prevent foreign materials from entering the orifice. Foreign materials may accumulate and restrict or plug the waterway and may prevent proper operation of the spray nozzle. Wet pipe systems must be provided with adequate heat. When installing Frame Style Spray Nozzles on dry systems, refer to the Installation Guides and the Authority Having Jurisdiction.

### 5. OPERATION

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the bulb to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the orifice strikes the special deflector to direct a specific spray pattern toward the surface covered.

### 6. INSPECTIONS, TESTS AND MAINTENANCE

**NOTICE:** Refer to NFPA 25 for Inspection, Testing and Maintenance requirements. **NOTICE:** The owner is responsible for having the fire-protection system and devices inspected, tested, and maintained in proper operating condition in accordance with this guide, and applicable NFPA standards. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

- A. Sprinklers and spray nozzles must be inspected on a regular basis for corrosion, mechanical damage, obstructions, paint, etc. Where open spray nozzles are installed, verify that foreign materials (such as dust, dirt, etc.) do not restrict or plug the waterway. Frequency of inspections may vary due to corrosive atmospheres, water supplies, and activity around the device.
- B. Sprinklers or spray nozzles that have been filed painted, caulked, 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 NFPA 25 and the Authority Having Jurisdiction for the specified period of time after which testing and/or replacement is required. Never attempt to repair or reassemble a sprinkler. Sprinklers that have operated cannot be reassembled or re-used, but must be replaced. When replacement is necessary, use only new sprinklers with identical performance characteristics.
- C. The sprinkler discharge pattern is critical for proper fire protection. Therefore, nothing should be hung from, attached to, 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.
  1. Remove the system from service, drain all water, and relieve all pressure on the piping.
  2. Use the special sprinkler wrench to remove the old sprinkler by turning it counterclockwise to unthread it from the piping.
  3. Install the new sprinkler unit by following the instructions in section 4. INSTALLATION. Care must be taken to ensure that the replacement sprinkler is the proper model and style, with the correct K-Factor, temperature rating, and response characteristics. A fully stocked spare sprinkler cabinet should be provided for this purpose.
- E. Place the system back in service and secure all valves. Check for and repair all leaks. Sprinkler systems that have been subjected 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.

### 7. AVAILABILITY

The Viking Frame Style Spray Nozzles are 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.

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