



*Brothers*

**Fire Protection Inc.**  
Design - Installation – Inspections

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## **Material Submittal**

**Miami Lakes Garage  
16200 NW 57 Ave  
Miami LAkes Fl 33014**

PIPE

# Schedule-10/Schedule-40

## Fully Listed and FM Approved Sprinkler Pipe

When you specify Allied Schedule-10/Schedule-40 sprinkler pipe you get a UL listed and FM approved product. Although these products do not require separate approvals, Schedule-10/Schedule-40 gives you the extra quality assurance you demand. Our Sch-10 (1¼" – 8") pipe and Sch-40 (1" – 2½") pipe have passed the same thorough lab testing as our other listed pipe products, and receive periodic mill inspections from both UL and FM agents to ensure consistent quality.

### ➤ Galvanized Pipe

Schedule-10/Schedule-40 product can be "hot-dip" galvanized to meet FM requirements for dry systems in accordance with the zinc coating specifications of ASTM A-123.

### ➤ Superior Coating

Our advanced formula mill coating offers a clean, durable surface. It is also paint-ready for custom color applications without special preparation.

### ➤ American Made

Able to meet "Buy American" requirement and is available through distributors in the USA, Canada, Mexico and Latin America.

### ➤ Specifications & Approvals

Schedule-10/Schedule-40 pipe are in compliance with the following: ASTM A-135, Type E Grade A, and NFPA 13. All pipe products have a rated working pressure of 300 psi maximum and also meet the stringent requirements for the following applications and tests:

- Welded Outlets
- Hydrostatic Pressure
- Side Wall Rupture

Sch-40 Specifications

| NPS    | Nominal I.D. | Wt.          | Wt. (H2O Filled) | CRR |
|--------|--------------|--------------|------------------|-----|
| In; mm | In; mm       | Lbs/Ft; kg/m | Lbs/Ft; kg/m     | –   |
| 1"     | 1.049        | 1.680        | 2.05             | 1   |
| 25     | 26.6         | 2.5          | 3.05             | –   |
| 1¼"    | 1.380        | 2.270        | 2.93             | 1   |
| 32     | 35.1         | 4.36         | 4.36             | –   |
| 1½"    | 1.610        | 2.720        | 3.61             | 1   |
| 40     | 40.9         | 4.0          | 5.37             | –   |
| 2"     | 2.067        | 3.650        | 5.13             | 1   |
| 50     | 52.5         | 5.4          | 7.63             | –   |
| 2½"    | 2.469        | 5.790        | 7.86             | 1   |
| 65     | 62.7         | 8.6          | 11.73            | –   |

Sch-10 Specifications

| NPS    | Nominal I.D. | Wt.          | Wt. (H2O Filled) | CRR    |
|--------|--------------|--------------|------------------|--------|
| In; mm | In; mm       | Lbs/Ft; kg/m | Lbs/Ft; kg/m     | –      |
| 1¼"    | 1.442        | 1.810        | 2.525            | 7.0955 |
| 32     | 36.6         | 2.7          | 3.75             | –      |
| 1½"    | 1.682        | 2.080        | 3.04             | 5.6570 |
| 40     | 42.7         | 3.1          | 4.52             | –      |
| 2"     | 2.157        | 2.640        | 4.22             | 4.5827 |
| 50     | 54.8         | 3.9          | 6.28             | –      |
| 2½"    | 2.635        | 3.530        | 5.89             | 3.5196 |
| 65     | 66.9         | 5.3          | 8.77             | –      |
| 3"     | 3.260        | 4.330        | 7.94             | 2.5550 |
| 75     | 82.8         | 6.4          | 11.82            | –      |
| 4"     | 4.260        | 5.610        | 11.78            | 1.6020 |
| 100    | 108.2        | 8.3          | 17.53            | –      |
| 5"     | 5.295        | 7.77         | 17.33            | 1.4874 |
| 125    | 134.5        | 11.56        | 25.80            | –      |
| 6"     | 6.357        | 9.290        | 23.03            | 1.0251 |
| 150    | 161.5        | 13.8         | 34.27            | –      |
| 8"     | 8.249        | 16.490       | 40.15            | 1.8365 |
| 200    | 209.5        | 24.5         | 59.75            | –      |



Customer Service (800) 882-5543 Fax: (800) 659-7730

• 16100 S Lathrop Ave.  
Harvey, IL 60426

• 11350 Norcom Rd.  
Philadelphia, PA 19154

• 2525 N 27th Ave.  
Phoenix, AZ 85009

[www.alliedtube-sprinkler.com](http://www.alliedtube-sprinkler.com)

• 600 Dean Sievers Place  
Morrisville, PA 19067

# Dyna-Flow®

## High Strength Steel Pipe

- **Exceptional hydraulics**
- **Lightweight and easy to install**
- **Available factory roll grooved**
- **UL and cUL listed**
- **FM approved**

### ➤ The original high-strength light wall sprinkler pipe with superior hydraulics.

Dyna-Flow® is the "original" high-strength light wall sprinkler pipe. With outstanding hydraulic capabilities, Dyna-Flow is recognized as the most popular alternative to Schedule-10 pipe. Lightweight and easy to cut, Dyna-Flow is a valuable addition to any fire protection system.

With an inside diameter (ID) up to 11% larger than Schedule-40 and up to 7% larger than Schedule -10, Dyna-Flow pipe hydraulics are exceptional. Larger ID's enable Dyna-Flow and related components to be down-sized within the system, increasing the potential for job cost savings. For complete Hazen Williams charts, refer to "Dyna-Flow Hydraulic Data Tables".

Dyna-Flow pipe has metallurgical properties that provide excellent fabrication characteristics for end prep finishes, welding and roll grooving. There are no special processes or equipment needed for fabrication and installation.

| Dyna-Flow Specifications |              |              |                  |            |
|--------------------------|--------------|--------------|------------------|------------|
| NPS                      | Nominal I.D. | Wt.          | Wt. (H2O Filled) | CRR        |
| In; mm                   | In; mm       | Lbs/Ft; kg/m | Lbs/Ft; kg/m     | Unthreaded |
| 1"                       | 1.191        | 0.830        | 1.31             | 2.41       |
| 25                       | 30.3         | 1.2          | 1.95             | —          |
| 1¼"                      | 1.536        | 1.059        | 1.87             | 1.55       |
| 32                       | 39.0         | 1.6          | 2.78             | —          |
| 1½"                      | 1.728        | 1.667        | 2.71             | 3.44       |
| 40                       | 43.9         | 2.5          | 4.03             | —          |
| 2"                       | 2.203        | 2.104        | 3.79             | 2.78       |
| 50                       | 56.0         | 3.1          | 5.64             | —          |
| 2½"                      | 2.703        | 2.564        | 5.10             | 1.60       |
| 65                       | 68.7         | 3.8          | 7.59             | —          |
| 3"                       | 3.314        | 3.387        | 7.18             | 1.48       |
| 75                       | 84.2         | 5.0          | 10.69            | —          |
| 4"                       | 4.310        | 4.473        | 10.86            | 1.00       |
| 100                      | 109.5        | 6.7          | 16.16            | —          |



### ➤ Superior Coating

Dyna-Flow products are coated with an environmentally approved and specially formulated modified-acrylic or water-based coating. This durable coating is paintable and acts as an excellent primer while resisting weather and UV degradation from outdoor storage.

### ➤ American Made

Able to meet "Buy American" requirements, and is available through distributors in the USA, Canada, Mexico and Latin America.

### ➤ Specifications & Approvals

Dyna-Flow pipe is manufactured to meet ASTM A-795 Type E, Grade A and is in compliance with NFPA-13 and NFPA-14. All sizes of Dyna-Flow are UL and cUL listed and FM approved.

Dyna-Flow is UL and cUL listed for use with roll grooved, plain-end and welded joints for wet, dry, pre-action and deluge systems. It is FM approved for roll grooved, plain end and welded joints for wet systems. Dyna-Flow is available "hot-dip" galvanized\*\* and has been specifically approved by FM for dry system uses. Dyna-Flow complies with NFPA 13 and is rated at 300 psi working pressure.

\*\* must be ordered in 10 bundle increments



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# Reliable®

## Model RFB RASCOFLEX® Sprinkler Connections

cULus Listed, FM Approved

### Product Description

RASCOFLEX® Sprinkler Connections are intended to connect a branch line to a sprinkler using a flexible stainless steel hose assembly. RASCOFLEX® Sprinkler Connections are suitable for use in suspended and hard ceiling applications such as T-Bar ceiling grids, wood, metal stud, or hat furring channel hard lid ceilings. Every package contains one (1) fully assembled stainless steel flexible sprinkler system complete with hose, branch line connection, and sprinkler connection, as well as the pre-assembled bracket assembly to attach to the ceiling.

RASCOFLEX® Sprinkler Connections are designed for use in hydraulically calculated wet, preaction, or dry sprinkler systems per NFPA 13, 13R, 13D, and FM Global Loss Prevention Data Sheets.

### Technical Data

Table A

|                                         |                   |                                                  |
|-----------------------------------------|-------------------|--------------------------------------------------|
| <b>Maximum Working Pressure</b>         |                   | FM: 200 psi (13.8 bar)<br>UL: 175 psi (12.1 bar) |
| <b>Maximum Working Temperature</b>      |                   | 300°F (149°C)                                    |
| <b>Connections</b>                      | Inlet/Branch Line | 1" NPT                                           |
|                                         | Outlet/Reducer    | 1/2" or 3/4" NPT                                 |
| <b>Minimum Allowable Bending Radius</b> |                   | UL: 3" (76 mm)<br>FM: 7" (178 mm)                |
| <b>Maximum Number of Bends</b>          |                   | See Friction Loss Chart                          |
| <b>Maximum K-Factor</b>                 | 1/2" Outlet       | 5.6 (80 metric)                                  |
|                                         | 3/4" Outlet       | 14.0 (200 metric)                                |

### Maintenance

RASCOFLEX® Sprinkler Connections should be inspected and the sprinkler system maintained in accordance with NFPA 25, as well as the requirements of any Authorities Having Jurisdiction.

### Patents

RASCOFLEX® Sprinkler Connections may be covered by one or more of the following US Patent Nos. 10,173,088 and 10,328,296.

### Listings and Approvals

FM Approved Class No. 1637 (FM)  
UL Listed and UL Certified for Canada to ANSI/UL 2443 (cULus)



RASCOFLEX® Sprinkler Connections

### Ordering Information

#### Specify:

Model Name

- Model RFB

Nominal Hose Length

- 24" (610 mm)
- 31" (790 mm)
- 40" (1015 mm)
- 48" (1220 mm)
- 60" (1525 mm)
- 72" (1830 mm)

Reducer Outlet: 1/2" NPT or 3/4" NPT

Reducer Type

Standard:

- 6-1/8" (155 mm) straight

Optional:

- 4-5/16" (110 mm) straight
- 5-5/16" (135 mm) straight
- 11-3/4" (300 mm) straight
- 5-5/8" (143 mm) elbow
- 7-3/8" (187 mm) elbow

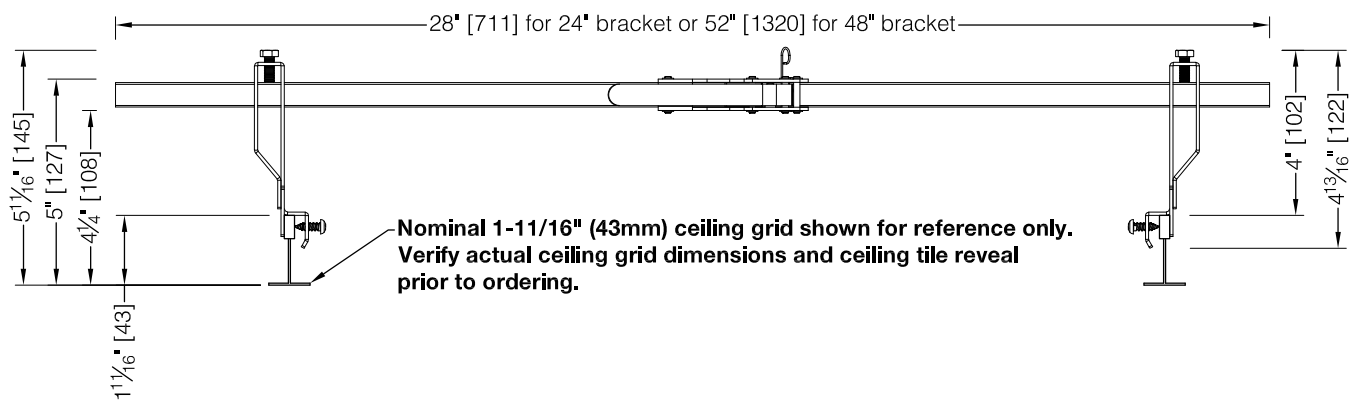
Bracket Assembly Length

- 24" (610 mm) standard
- 48" (1220 mm) optional

Accessories

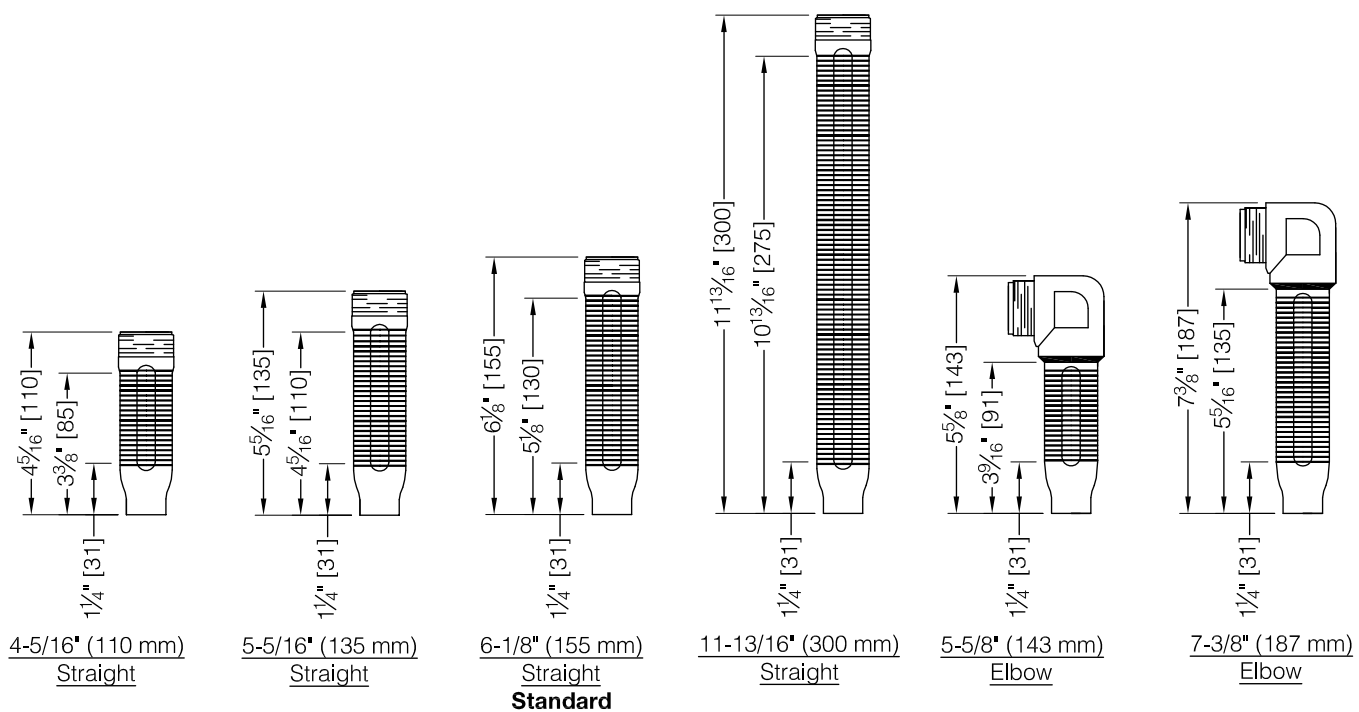
- See Table F

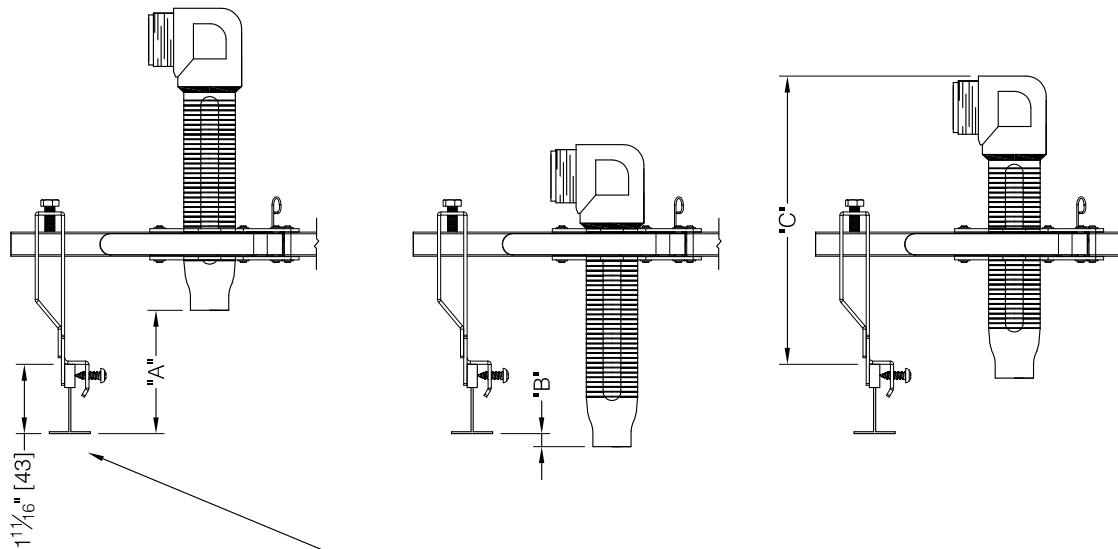
Figure 1



Reducer Dimensions

Figure 2





Nominal 1-11/16" (43mm) ceiling grid shown for reference only.  
Verify actual ceiling grid dimensions and ceiling tile reveal prior to ordering.

Minimum and Maximum Face of Fitting to Bottom of Ceiling Grid for Each Reducer

Table B

| Fitting Distance                                           | 6-1/8"<br>(155mm)<br>Straight<br>Standard | 4-5/16"<br>(110mm)<br>Straight | 5-5/16"<br>(135mm)<br>Straight | 11-13/16"<br>(300mm)<br>Straight | 5-5/8"<br>(143mm)<br>Elbow | 7-3/8"<br>(187mm)<br>Elbow |
|------------------------------------------------------------|-------------------------------------------|--------------------------------|--------------------------------|----------------------------------|----------------------------|----------------------------|
| Max. Face of Fitting Distance Above Bottom of Ceiling Grid | 3" (77mm)                                 | 3" (7mm)                       | 3" (7mm)                       | 3" (7mm)                         | 3" (7mm)                   | 3" (7mm)                   |
| Max. Face of Fitting Distance from Bottom of Ceiling Grid  | 1/8" (3mm) below                          | 1-5/8" (42mm) above            | 11/16" (17mm) above            | 6-3/8" (148mm) below             | 1-7/16" (36mm) above       | 5/16" (60mm) below         |

**Note:** Based on 1-11/16" (43mm) tall ceiling grid.

Fig. 3 Dimension C - Clearance Above Ceiling Required at Max. Sprinkler Recess

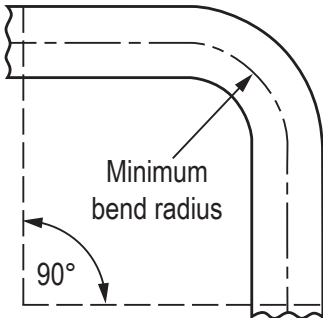
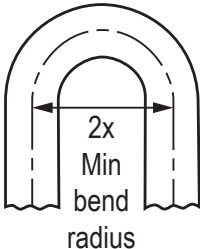
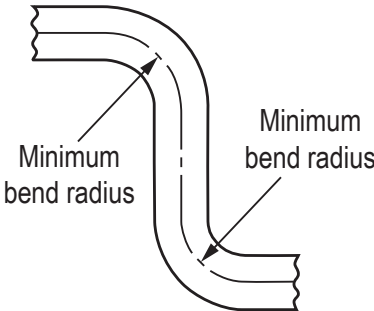
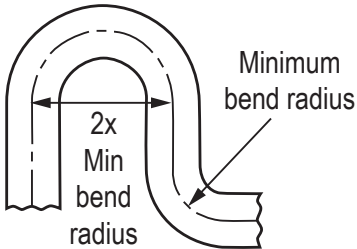
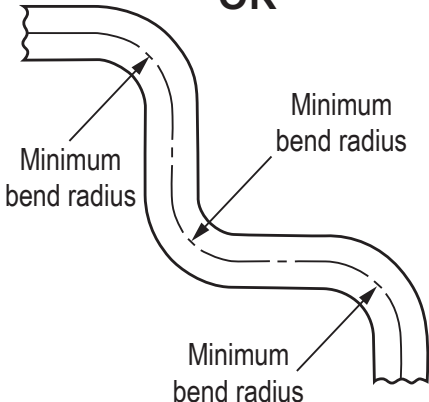
Table C

| Recessed Escutcheon or Concealed/Flush Sprinkler      | Reducer              |                      |
|-------------------------------------------------------|----------------------|----------------------|
|                                                       | 5-5/8" (143mm) Elbow | 7-3/8" (187mm) Elbow |
| F1 recessed escutcheon                                | NC                   | 5-5/8" (144mm)       |
| F2 or FV recessed escutcheon                          | NC                   | 5-3/8" (138mm)       |
| FP recessed escutcheon                                | NC                   | 6-1/4" (160mm)       |
| CCP conical concealed cover plate                     | NC                   | 6-1/4" (160mm)       |
| G4 series concealed sprinklers                        | 5-5/8" (144mm)       | 7-3/8" (188mm)       |
| G5 series concealed sprinklers                        | 5-1/4" (134mm)       | 7" (179mm)           |
| RFC series concealed sprinklers                       | 5-1/4" (134mm)       | 7" (179mm)           |
| XL commercial flush sprinkler with flat escutcheon    | 4-7/8" (125mm)       | 6-5/8" (169mm)       |
| XL commercial flush sprinkler with conical escutcheon | 4-3/8" (112mm)       | 6-1/8" (157mm)       |

**Note:** NC - Reducer not compatible with sprinkler adjustment range.

Based on 1-11/16" (43mm) tall ceiling grid and flush ceiling tile.

| Materials |                           |                               | Figure 4 |
|-----------|---------------------------|-------------------------------|----------|
| Number    | Item Description          | Material                      |          |
| 1         | Flexible Hose/Bellow      | AISI Type 304 Stainless Steel |          |
| 2         | Isolation Ring            | Nylon 66                      |          |
| 3         | Gasket                    | EPDM                          |          |
| 4         | Nut                       | Zinc Plated Carbon Steel      |          |
| 5         | Branch Line Nipple (1")   | Zinc Plated Carbon Steel      |          |
| 6         | Reducer                   | Zinc Plated Carbon Steel      |          |
| 7         | Braid                     | AISI Type 304 Stainless Steel |          |
| 8         | Welded Collar Fitting     | AISI Type 304 Stainless Steel |          |
| -         | Bar Stock                 | Zinc Plated SGCC Steel        |          |
| -         | Brackets: Center and Side | Zinc Plated SPCC Steel        |          |

| Flexible Hose Number of Bends                                                       |                                                                                                                                                                                                                     |                                                                                                                                                                                                                         | Figure 5 |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| One Bend                                                                            | Two Bends                                                                                                                                                                                                           | Three Bends                                                                                                                                                                                                             |          |
|  |  <p style="text-align: center;"><b>OR</b></p>  |  <p style="text-align: center;"><b>OR</b></p>  |          |

Do NOT install the RASCOFLEX™ straight. Some flexibility in the form of an allowable bend (or bends) must be provided.





cULus Friction Loss Data

Table D

| Nominal Length of Flexible Hose in (mm) | Reducer     |          | Maximum Sprinkler K-Factor<br>gpm/psi <sup>1/2</sup><br>(lpm/bar <sup>1/2</sup> ) | Maximum Number of 90° Bends at 3" (76mm) Bend Radius | Equivalent Length of 1" (33.7mm) Sch. 40 Pipe (C=120), ft (m) |
|-----------------------------------------|-------------|----------|-----------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------|
|                                         | NPT Threads | Type     |                                                                                   |                                                      |                                                               |
| 24<br>(610)                             | 1/2         | Straight | 5.6 (80)                                                                          | 2                                                    | 10 (3)                                                        |
|                                         | 3/4         | Straight | 14.0 (200)                                                                        | 2                                                    | 13 (4)                                                        |
| 31<br>(790)                             | 1/2         | Straight | 5.6 (80)                                                                          | 3                                                    | 14 (4.3)                                                      |
|                                         | 3/4         | Straight | 14.0 (200)                                                                        | 3                                                    | 16 (4.9)                                                      |
| 40<br>(1015)                            | 1/2         | Straight | 5.6 (80)                                                                          | 4                                                    | 21 (6.4)                                                      |
|                                         | 3/4         | Straight | 14.0 (200)                                                                        | 4                                                    | 23 (7)                                                        |
| 48<br>(1220)                            | 1/2         | Straight | 5.6 (80)                                                                          | 4                                                    | 24 (7.3)                                                      |
|                                         | 3/4         | Straight | 14.0 (200)                                                                        | 4                                                    | 26 (7.9)                                                      |
| 60<br>(1525)                            | 1/2         | Straight | 5.6 (80)                                                                          | 4                                                    | 25 (7.6)                                                      |
|                                         | 3/4         | Straight | 14.0 (200)                                                                        | 4                                                    | 30 (9.1)                                                      |
| 72<br>(1830)                            | 1/2         | Straight | 5.6 (80)                                                                          | 5                                                    | 36 (11)                                                       |
|                                         | 3/4         | Straight | 14.0 (200)                                                                        | 5                                                    | 33 (10.1)                                                     |

**UL Notes:**

1. Available data for use with 6.1" straight reducers.
2. Sprinkler K-Factor: 5.6 (80 metric) for 1/2-inch reducer and 14.0 (200 metric) for 3/4-inch reducer.
3. RASCOFLEX® Sprinkler Connections have been tested and approved by Underwriter's Laboratories, Inc. for use in wet, preaction, and dry sprinkler systems per NFPA 13, 13D, 13R and UL2443.

**Note:**

All Reliable RASCOFlex products may be painted provided the paint is compatible with the following materials of construction:

- Stainless steel
- Zinc-plated carbon steel
- Ductile iron

Care should be taken to ensure that the sprinkler and associated escutcheon or cover plate are not painted. Additionally, care should be taken to avoid painting over any manufacturer or product identifying markings or tags on the flexible drop. No paint of any kind should be applied to threads or components / surfaces that comprise a pressure-containing seal.



# FM Friction Loss Data

Table E

| Nominal Length of Flexible Hose in (mm) | Reducer     |           | Maximum Sprinkler K-Factor gpm/psi <sup>1/2</sup> (lpm/bar <sup>1/2</sup> ) | Maximum Number of 90° Bends at 7" 178mm) Bend Radius | Equivalent Length of 1" (33.7mm) Sch. 40 Pipe (C=120), ft (m) |
|-----------------------------------------|-------------|-----------|-----------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------|
|                                         | NPT Threads | Type      |                                                                             |                                                      |                                                               |
| 24 (610)                                | 1/2         | Straight  | 5.6 (80)                                                                    | 1                                                    | 9.7 (2.9)                                                     |
|                                         | 1/2         | 90° Elbow | 5.6 (80)                                                                    | 0                                                    | 11.5 (3.5)                                                    |
|                                         | 3/4         | Straight  | 8.0 (115)                                                                   | 1                                                    | 9.9 (3)                                                       |
|                                         |             |           | 11.2 (160)                                                                  | 1                                                    | 9.8 (2.9)                                                     |
|                                         |             |           | 14.0 (200)                                                                  | 1                                                    | 9.6 (2.9)                                                     |
|                                         | 3/4         | 90° Elbow | 8.0 (115)                                                                   | 0                                                    | 10.2 (3.1)                                                    |
|                                         |             |           | 11.2 (160)                                                                  | 0                                                    | 10 (3)                                                        |
|                                         |             |           | 14.0 (200)                                                                  | 0                                                    | 9.8 (2.9)                                                     |
|                                         |             |           |                                                                             |                                                      |                                                               |
| 31 (790)                                | 1/2         | Straight  | 5.6 (80)                                                                    | 2                                                    | 12.4 (3.8)                                                    |
|                                         | 1/2         | 90° Elbow | 5.6 (80)                                                                    | 2                                                    | 15.8 (4.8)                                                    |
|                                         | 3/4         | Straight  | 8.0 (115)                                                                   | 2                                                    | 13.7 (4.1)                                                    |
|                                         |             |           | 11.2 (160)                                                                  | 2                                                    | 12.9 (3.9)                                                    |
|                                         |             |           | 14.0 (200)                                                                  | 2                                                    | 12.2 (3.7)                                                    |
|                                         | 3/4         | 90° Elbow | 8.0 (115)                                                                   | 2                                                    | 14.5 (4.4)                                                    |
|                                         |             |           | 11.2 (160)                                                                  | 2                                                    | 13.7 (4.1)                                                    |
|                                         |             |           | 14.0 (200)                                                                  | 2                                                    | 13 (3.9)                                                      |
|                                         |             |           |                                                                             |                                                      |                                                               |
| 40 (1015)                               | 1/2         | Straight  | 5.6 (80)                                                                    | 2                                                    | 15.9 (4.8)                                                    |
|                                         | 1/2         | 90° Elbow | 5.6 (80)                                                                    | 2                                                    | 21.6 (6.6)                                                    |
|                                         | 3/4         | Straight  | 8.0 (115)                                                                   | 2                                                    | 18.5 (5.6)                                                    |
|                                         |             |           | 11.2 (160)                                                                  | 2                                                    | 17.4 (5.3)                                                    |
|                                         |             |           | 14.0 (200)                                                                  | 2                                                    | 16.3 (4.9)                                                    |
|                                         | 3/4         | 90° Elbow | 8.0 (115)                                                                   | 2                                                    | 20 (6)                                                        |
|                                         |             |           | 11.2 (160)                                                                  | 2                                                    | 18.9 (5.7)                                                    |
|                                         |             |           | 14.0 (200)                                                                  | 2                                                    | 20 (6)                                                        |
|                                         |             |           |                                                                             |                                                      |                                                               |
| 48 (1220)                               | 1/2         | Straight  | 5.6 (80)                                                                    | 3                                                    | 19.0 (5.8)                                                    |
|                                         | 1/2         | 90° Elbow | 5.6 (80)                                                                    | 3                                                    | 25.9 (7.9)                                                    |
|                                         | 3/4         | Straight  | 8.0 (115)                                                                   | 3                                                    | 22.7 (6.9)                                                    |
|                                         |             |           | 11.2 (160)                                                                  | 3                                                    | 21.5 (6.5)                                                    |
|                                         |             |           | 14.0 (200)                                                                  | 3                                                    | 20.5 (6.2)                                                    |
|                                         | 3/4         | 90° Elbow | 8.0 (115)                                                                   | 3                                                    | 24.8 (7.5)                                                    |
|                                         |             |           | 11.2 (160)                                                                  | 3                                                    | 23.6 (7.2)                                                    |
|                                         |             |           | 14.0 (200)                                                                  | 3                                                    | 22.6 (6.8)                                                    |
|                                         |             |           |                                                                             |                                                      |                                                               |

**FM Friction Loss Data (cont.)**
**Table E**

| Nominal Length of Flexible Hose in (mm) | Reducer     |           | Maximum Sprinkler K-Factor<br>gpm/psi <sup>1/2</sup><br>(lpm/bar <sup>1/2</sup> ) | Maximum Number of 90° Bends at 7" (178mm) Bend Radius | Equivalent Length of 1" (33.7mm) Sch. 40 Pipe (C=120), ft (m) |
|-----------------------------------------|-------------|-----------|-----------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------|
|                                         | NPT Threads | Type      |                                                                                   |                                                       |                                                               |
| 60<br>(1525)                            | 1/2         | Straight  | 5.6 (80)                                                                          | 4                                                     | 23.7 (7.2)                                                    |
|                                         | 1/2         | 90° Elbow | 5.6 (80)                                                                          | 4                                                     | 33.1 (10)                                                     |
|                                         | 3/4         | Straight  | 8.0 (115)                                                                         | 4                                                     | 29.1 (8.8)                                                    |
|                                         |             |           | 11.2 (160)                                                                        | 4                                                     | 28 (8.5)                                                      |
|                                         |             |           | 14.0 (200)                                                                        | 4                                                     | 27 (8.2)                                                      |
|                                         | 3/4         | 90° Elbow | 8.0 (115)                                                                         | 4                                                     | 32.2 (9.8)                                                    |
|                                         |             |           | 11.2 (160)                                                                        | 4                                                     | 31.1 (9.5)                                                    |
|                                         |             |           | 14.0 (200)                                                                        | 4                                                     | 30 (9.1)                                                      |
| 72<br>(1830)                            | 1/2         | Straight  | 5.6 (80)                                                                          | 4                                                     | 28.4 (8.6)                                                    |
|                                         | 1/2         | 90° Elbow | 5.6 (80)                                                                          | 4                                                     | 40.4 (12.3)                                                   |
|                                         | 3/4         | Straight  | 8.0 (115)                                                                         | 4                                                     | 35.5 (10.8)                                                   |
|                                         |             |           | 11.2 (160)                                                                        | 4                                                     | 34.3 (10.4)                                                   |
|                                         |             |           | 14.0 (200)                                                                        | 4                                                     | 33.2 (10.1)                                                   |
|                                         | 3/4         | 90° Elbow | 8.0 (115)                                                                         | 4                                                     | 39.5 (12)                                                     |
|                                         |             |           | 11.2 (160)                                                                        | 4                                                     | 38.3 (11.6)                                                   |
|                                         |             |           | 14.0 (200)                                                                        | 4                                                     | 37.2 (11.3)                                                   |

**FM Notes:**

1. RASCOFLEX® Sprinkler Connections have been tested and approved by FM Approvals for use in wet, preaction, and dry sprinkler systems per FM data sheets 2-0, 2-5, and 2-8 per FM1637.
2. Maximum sprinkler K-Factor: 5.6 (80 metric) for 1/2-inch reducer and 14.0 (200 metric) for 3/4-inch reducer.
3. Differences in equivalent lengths are due to varying test methods, per FM 1637 standards.
4. Above data of friction loss for use with 6.1" straight reducers.

# Accessories List

Table F

|                                                                                                                                                                                |                                                                                                                                                                                                          |                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>5-5/8" (143mm)<br/>Elbow Reducer-Short<br/><br/>1/2": 7M99003303<br/>3/4": 7M99003305</p> |  <p>7-3/8" (187mm)<br/>Elbow Reducer-Long<br/><br/>1/2": 7M99003302<br/>3/4": 7M99003304</p>                            |  <p>4-5/16" (110mm)<br/>Straight Reducer<br/><br/>1/2": 7M99003306<br/>3/4": 7M99003325</p>   |
|  <p>5-5/16" (135mm)<br/>Straight Reducer<br/><br/>1/2": 7M99003307<br/>3/4": 7M99003326</p>   |  <p>Replacement<br/>6-1/8" (155mm)<br/>Standard Straight<br/>Reducer<br/><br/>1/2": 7M99003308<br/>3/4": 7M99003327</p> |  <p>11-13/16" (300mm)<br/>Straight Reducer<br/><br/>1/2": 7M99003309<br/>3/4": 7M99003328</p> |
|  <p>Hat Channel End<br/>Bracket- Short<br/>3" (76mm)<br/>7M99003310</p>                       |  <p>Hat Channel End<br/>Bracket- Long<br/>3-3/4" (95mm)<br/>7M99003311</p>                                              |  <p>Metal Stud End<br/>Bracket-Short 1-1/2"<br/>(38mm)<br/>7M99003312</p>                     |
|  <p>Metal Stud End<br/>Bracket- Long<br/>2-1/16" (53mm)<br/>7M99003313</p>                   |  <p>T-Bar End Bracket-<br/>Short 2-5/8" (68mm)<br/>7M99003314</p>                                                      |  <p>T-Bar End Bracket-<br/>Long 4-1/8" (105mm)<br/>7M99003316</p>                            |
|  <p>Wood Beam Stud<br/>End Bracket<br/>7M99003317</p>                                       |  <p>Replacement<br/>Center Bracket<br/>7M99003321</p>                                                                 |  <p>3" (76 mm)<br/>Bend Radius<br/>Indicator<br/>7M99004179</p>                             |
|  <p>Replacement<br/>1" NPT Inlet Adapter<br/>7M99003322</p>                                 |  <p>#2 Square Drive Bit<br/>7M99004539</p>                                                                            |  <p>Replacement Gasket<br/>7M99004319</p>                                                   |
|  <p>48" (1220mm)<br/>Bracket Assembly<br/>7M99003301</p>                                   |                                                                                                                                                                                                          |                                                                                                                                                                                  |

# SPRINKLERS



## TECHNICAL DATA

### STANDARD AND QUICK RESPONSE CONCEALED PENDENT SPRINKLER VK4621 (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

Visit the Viking website for the latest edition of this technical data page [www.vikinggroupinc.com](http://www.vikinggroupinc.com)

## 1. DESCRIPTION

Viking Standard and Quick Response Concealed Pendent Sprinkler VK4621 is a small thermosensitive, glass-bulb sprinkler designed for installation on concealed pipe systems where the appearance of a smooth ceiling is desired. The low-profile cover assemblies provide up to 1/2" (13 mm) of vertical adjustment.

### Features:

- K5.6 (80.6 metric).
- Quick response glass bulb operating element.
- Integral threaded adapter cup accepts push-on or thread-on cover plates.
- Low-profile, small diameter, removeable cover plates offer almost flush appearance upon installation and allow ease of maintenance.
- Protective cap prevents damage during installation and finishing and keeps errant overspray from coating internal parts.
- Various finishes available to meet design requirements.
- Optional Electroless Nickel PTFE (ENT) coating provides corrosion resistance (see Approval Chart).

## 2. LISTINGS AND APPROVALS



**cULus Listed:** Category VNIV



**FM Approved:** Class 2015

Also approved for use in FM Approved vacuum dry sprinkler systems with a maximum supervisory vacuum pressure of -3 psi (-207mbar)



**VdS Approved:** Standard EN 12259-1:199 + A3:2006; Certificate Number G 422002



**LPCB Approved:** Standard EN 12259-1:199 + A3:2006; Certificate Number 096e



**CE:** Standard EN 12259-1:1999 + A3:2006, Sprinkler, DOP\_VK4621, 2831, 2023



**MED Approved:** Standard EN 12259-1:1999 + A3:2006, DOC\_MED\_VK4621, 2831.



**UKCA Approved:** Standard EN 12259-1:1999 + A3:2006, DOC\_UKCA\_VK4621, 0832, 2023.

**China Approval:** Approved according to China GB standard.



**WARNING:** Cancer and Reproductive Harm-  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Refer to the Approval Charts and Design Criteria on for cULus Listing requirements that must be followed.

## 3. TECHNICAL DATA

### Specifications:

Minimum Operating Pressure: 7 psi (0.5 bar)

Maximum Working Pressure: FM - 175 psi (12 bar). UL - 250 psi (17.2 bar)

Factory tested hydrostatically to 500 psi (34.5 bar).

Thread size: 1/2" NPT or 15 mm BSPT

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

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

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



## TECHNICAL DATA

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#### Material Standards:

Sprinkler body: QM Brass or DZR Brass

Deflector: Phosphor Bronze UNS-C51000

Deflector pins: Stainless steel UNS-S43000

Pip cap: Copper UNS-C11000

Pip cap insert: stainless steel UNS-S30400

Pip cap T-hinge ring: Stainless steel UNS-S31600

Compression screw: UNS-C36000

Belleville spring sealing assembly: Nickel alloy, coated on both sides with PTFE tape

Cover adapter: Cold rolled steel JIS G3141 and carbon steel UNS-G10100 (per JIS G3141)

Shipping cap: High density polyethylene

#### Cover Plate Materials:

Cover plate assembly: Copper UNS-C11000 and brass UNS-C26800 or stainless steel UNS-S30400

Spring: Beryllium nickel

Solder: Eutectic

**Ordering Information:** Refer to Tables 1 and 2.

#### 4. INSTALLATION

Refer to appropriate NFPA Installation Standards and installation instructions in this document.

#### 5. OPERATION

During fire conditions, when the temperature around the sprinkler approaches its operating temperature, the cover plate detaches, releasing the deflector. Continued heating of the exposed sprinkler causes the heat-sensitive liquid in the glass bulb to expand, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the deflector, forming a uniform spray pattern over a specific area of coverage determined by the water supply pressure at the sprinkler to extinguish or control the fire.

#### 6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

#### 7. AVAILABILITY

Viking Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor contact The Viking Corporation.

#### 8. GUARANTEE

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



## TECHNICAL DATA

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### Ordering Instructions - Sprinkler Base

1. Choose a sprinkler base part number with the required thread size and listing or approval (refer to the approval chart).
2. Add the suffix for the desired finish.
3. Add the suffix for the desired temperature rating.
4. Order a cover plate (refer to Ordering Instructions - Cover Plate).

**EXAMPLE: 24682AB** = VK4621 with brass finish and 155 °F (68 °C) nominal temperature rating. This sprinkler is to be installed into an area with a maximum ambient temperature of 100 °F (38 °C).

| 1. Sprinkler Base Part Numbers |             |
|--------------------------------|-------------|
| Part Number                    | Thread Size |
| 24682                          | ½" NPT      |
| 22962                          | 15 mm BSPT  |
| 26548 <sup>7</sup>             | 15 mm BSPT  |

| 2. Available Finishes |        |
|-----------------------|--------|
| Description           | Suffix |
| Brass                 | A      |
| ENT <sup>2,3,5</sup>  | JN     |

| 3. Temperature Ratings               |                    |            |                                                  |        |
|--------------------------------------|--------------------|------------|--------------------------------------------------|--------|
| Sprinkler Temperature Classification | Temperature Rating | Bulb Color | Maximum Ambient Ceiling Temperature <sup>1</sup> | Suffix |
| Ordinary                             | 155 °F (68 °C)     | Red        | 100 °F (38 °C)                                   | B      |
| Intermediate                         | 175 °F (79 °C)     | Yellow     | 150 °F (66 °C)                                   | D      |
| Intermediate                         | 200 °F (93 °C)     | Green      | 150 °F (66 °C)                                   | E      |

| Accessories |                                                                                                           |
|-------------|-----------------------------------------------------------------------------------------------------------|
| Part Number | Description                                                                                               |
| 23143       | Installation wrench <sup>4,6</sup>                                                                        |
| 14412       | Concealed cover plate installer tool, for use with push-on cover plates only (available since 2007)       |
| 14867       | Large concealed cover plate installer tool, for use with push-on cover plates only (available since 2007) |
| 01731A      | Sprinkler cabinet; holds up to 6 sprinklers (available since 1971)                                        |

#### FOOTNOTES

1. Based on NFPA 13, NFPA 13R, and NFPA 13D. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
2. UL Listed as corrosion resistant.
3. The corrosion resistant coatings have 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 coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the ENT coating is applied to all exposed exterior surfaces, including the waterway.
4. Requires a 1/2" ratchet which is not available from Viking.
5. FM Approved as a decorative finish.
6. The installation wrench is intended to be used for a maximum of 500 sprinkler installations at a maximum torque of 14 ft-lbs (19 Nm).
7. See Approval Chart for approval information.





## TECHNICAL DATA

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### Ordering Instructions - Cover Plate

1. Choose a cover plate base part number with the desired shape and style (refer to the approval chart).
2. Add the suffix for the desired finish.
3. Add the suffix for the required temperature rating.

**Note:** for stainless steel versions, skip steps 2 and 3 (finishes and paint are not available).

#### Example:

**23190MC/W** = Thread-On style, 165 °F (74 °C) Temperature Rated, 2 3/4" (70 mm) diameter Round Cover Plate with a Painted White finish.

| 1. Cover Plate Base Part Numbers <sup>3, 6</sup> |                                         |                      |                    |
|--------------------------------------------------|-----------------------------------------|----------------------|--------------------|
| Style                                            | Base Part Number <sup>5</sup>           | Size Inches (mm)     | Shape (type)       |
| Thread-On Style                                  | 23190                                   | 2 3/4 (70) diameter  | Round              |
|                                                  | 23174                                   | 3 5/16 (84) diameter | Round              |
|                                                  | 23179                                   | 3 5/16 (84)          | Square             |
|                                                  | 23174-/CR                               | 3 5/16 (84) diameter | Round (clean room) |
|                                                  | ▼ Stainless Steel material <sup>4</sup> |                      |                    |
|                                                  | 23193                                   | 2 3/4 (70) diameter  | Round              |
|                                                  | 23183                                   | 3 5/16 (84) diameter | Round              |
| Push-On Style                                    | 23183-/CR                               | 3 5/16 (84) diameter | Round (clean room) |
|                                                  | 23447                                   | 2 3/4 (70) diameter  | Round              |
|                                                  | 23463                                   | 3 5/16 (84) diameter | Round              |
|                                                  | 23482                                   | 3 5/16 (84)          | Square             |
|                                                  | 23463-/CR                               | 3 5/16 (84) diameter | Round (clean room) |
|                                                  | ▼ Stainless Steel material <sup>4</sup> |                      |                    |
|                                                  | 23455                                   | 2 3/4 (70) diameter  | Round              |
|                                                  | 23473                                   | 3 5/16 (84) diameter | Round              |
|                                                  | 23473-/CR                               | 3 5/16 (84) diameter | Round (clean room) |

| 2. Available Finishes <sup>5</sup> |        |
|------------------------------------|--------|
| Description                        | Suffix |
| Polished Chrome                    | F      |
| Brushed Chrome                     | F_/B   |
| Bright Brass                       | B      |
| Antique Brass                      | B_/A   |
| Brushed Brass                      | B_/A   |
| Brushed Copper                     | B_/A   |
| Painted White                      | M_/W   |
| Painted Ivory                      | M_/I   |
| Painted Black                      | M_/B   |

### 3. Temperature Rating Matrix

**IMPORTANT:** The required cover plate temperature rating is determined by the sprinkler's temperature rating.

| Sprinkler Temperature Classification <sup>1</sup> | Required Cover Plate Temperature Rating | Corresponding Sprinkler Nominal Temperature Rating | Maximum Ambient Ceiling Temperature <sup>2</sup> | Suffix |
|---------------------------------------------------|-----------------------------------------|----------------------------------------------------|--------------------------------------------------|--------|
| Ordinary                                          | 139 °F (59 °C)                          | 155 °F (68 °C)                                     | 100 °F (38 °C)                                   | A      |
| Intermediate                                      | 165 °F (74 °C)                          | 200 °F (93 °C)                                     | 150 °F (66 °C)                                   | C      |

#### FOOTNOTES

1. The sprinkler temperature rating is stamped on the deflector.
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.
3. Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.
4. Stainless Steel versions are not available with any finishes or paint.
5. Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.
6. For use with gasketed cover plates has been evaluated as part of the UL Listing.



## TECHNICAL DATA

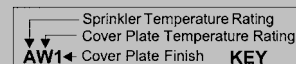
### STANDARD AND QUICK RESPONSE CONCEALED PENDENT SPRINKLER VK4621 (K5.6)

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

#### Concealed Pendent Sprinkler VK4621

1/2" NPT or 15 mm BSPT, Nominal K-factor 5.6 U.S. (80.6 metric<sup>2</sup>)



#### Listings and Approvals<sup>3</sup> (Refer also to Design Criteria)

| Sprinkler<br>Base Part No. <sup>1</sup> | cULus <sup>4,9</sup>                                    | China Approval | FM                                                    | VdS | LPCB | CE | MED | UKCA |
|-----------------------------------------|---------------------------------------------------------|----------------|-------------------------------------------------------|-----|------|----|-----|------|
|                                         | Maximum<br>Water Working Pressure<br>250 psi (17.2 bar) |                | Maximum<br>Water Working Pressure<br>175 psi (12 bar) |     |      |    |     |      |

#### Standard Response Applications

|                        |    |    |                                           |          |          |          |          |          |
|------------------------|----|----|-------------------------------------------|----------|----------|----------|----------|----------|
| 24682A                 | -- | -- | AV1, BX1, AS2, BT2, BW1,<br>CX1, CT2, CX1 | AV1, CX1 | AV1, CX1 | AV1, CX1 | AV1, CX1 | AV1, CX1 |
| 24682JN <sup>7,8</sup> | -- | -- | AV1, BX1, AS2, BT2, BW1,<br>CX1, CT2, CX1 | --       | --       | --       | --       | --       |
| 22962A                 | -- | -- | AV1, BX1, AS2, BT2, BW1,<br>CX1, CT2, CX1 | AV1, CX1 | AV1, CX1 | AV1, CX1 | AV1, CX1 | AV1, CX1 |
| 22962JN <sup>7,8</sup> | -- | -- | AV1, BX1, AS2, BT2, BW1,<br>CX1, CT2, CX1 | --       | --       | --       | --       | --       |

#### Quick Response Applications

|                        |                                 |                       |    |    |    |    |    |    |
|------------------------|---------------------------------|-----------------------|----|----|----|----|----|----|
| 24682A                 | AV1, BX1, AS2,<br>BT2, CX1, CT2 | --                    | -- | -- | -- | -- | -- | -- |
| 24682JN <sup>7,8</sup> | AV1, BX1, AS2,<br>BT2, CX1, CT2 | --                    | -- | -- | -- | -- | -- | -- |
| 22962A                 | AV1, BX1, AS2,<br>BT2, CX1, CT2 | --                    | -- | -- | -- | -- | -- | -- |
| 22962JN <sup>7,8</sup> | AV1, BX1, AS2,<br>BT2, CX1, CT2 | --                    | -- | -- | -- | -- | -- | -- |
| 26548                  | AV1, BX1, AS2,<br>BT2, CX1, CT2 | AV1, CX1, AS2,<br>CT2 | -- | -- | -- | -- | -- | -- |

#### Approved Sprinkler Temperature Rating Key

A = 155 °F (68 °C)  
 B = 175 °F (79 °C)  
 C = 200 °F (93 °C)

#### Approved Cover Plate Assembly Finishes Key<sup>5</sup>

S = 139 °F (59 °C) Stainless steel covers (23193, 23455, 23183, and 23473)  
 T = 165 °F (74 °C) Stainless steel covers (23193, 23455, 23183, and 23473)  
 V = 139 °F (59 °C) covers (23190, 23447, 23174, 23463, 23179, and 23482)  
 W = 165 °F (59 °C) square covers (23179 and 23482)  
 X = 165 °F (74 °C) covers (23190, 23447, 23174, and 23463)

#### Approved Cover Plate Finishes Key

1 = Polished Chrome,  
 Brushed Chrome,  
 Bright Brass, Antique  
 Brass, Brushed Brass,  
 Brushed Copper,  
 Painted<sup>6</sup> White,  
 Painted<sup>6</sup> Ivory, or  
 Painted<sup>6</sup> Black  
 2 = Stainless Steel

#### Footnotes

- Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.
- 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.
- 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.
- Listed by Underwriter's Laboratories for use in the U.S. and Canada.
- The 139 °F (59 °C) covers have an orange label. The 165 °F (74 °C) covers have a white label.
- Other paint colors are available on request with the same listings as the standard paint colors. Listings and approvals apply for any paint manufacturer. Contact Viking for additional information.
- cULus Listed as corrosion-resistant.
- FM Approved as a decorative finish.
- Refer to the Cleanroom Sprinkler Cover Assembly technical data sheet for Viking's UL Listed cover plates with built-in gaskets.

**NOTE: Custom colors are indicated on a label inside the cover assembly. Refer to Figure 2.**



## TECHNICAL DATA

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#### DESIGN CRITERIA - UL

(Also refer to Approval Chart)

##### cULus Listing Requirements:

Concealed Pendent Sprinkler VK4621 is cULus Listed as quick response for installation in accordance with the latest edition of NFPA 13 for standard coverage pendent spray sprinklers as indicated below.

- For hazard occupancies up to and including Ordinary Hazard, Group II.
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13. Maximum spacing allowed is 15 ft. (4.6 m).
- Minimum spacing allowed is 6 ft. (1.8 m) unless baffles are installed in accordance with NFPA 13.
- Minimum distance from walls is 4 in. (102 mm).
- Maximum distance from 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 obstruction rules contained in NFPA 13 for standard coverage pendent spray sprinklers must be followed.

**NOTE: Concealed sprinklers must be installed in neutral or negative pressure plenums only.**

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to Form No. F\_080614 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, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.**

#### DESIGN CRITERIA - FM

(Also refer to Approval Chart)

##### FM Approval Requirements:

Viking Concealed Pendent Sprinkler VK4621 is FM Approved as a standard response **Non-Storage** concealed pendent sprinkler as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

**NOTE: The FM installation guidelines may differ from cULus and/or NFPA criteria.**

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to Form No. F\_080614 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, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.**



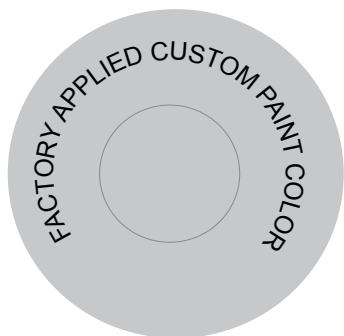
## TECHNICAL DATA

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**Figure 1: Installation Wrench**



All custom color painted cover plates will have an identifying label affixed to the inside of the cover that indicates the custom color and will have a representative sample (a paint dot) of the paint on the label.

**Figure 2: Identification of Custom Paint**



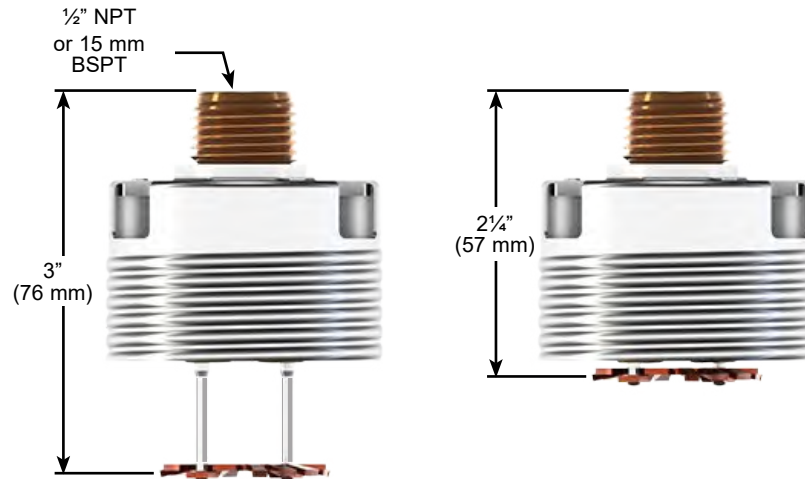
**Figure 3: Square Cover Assembly**



## TECHNICAL DATA

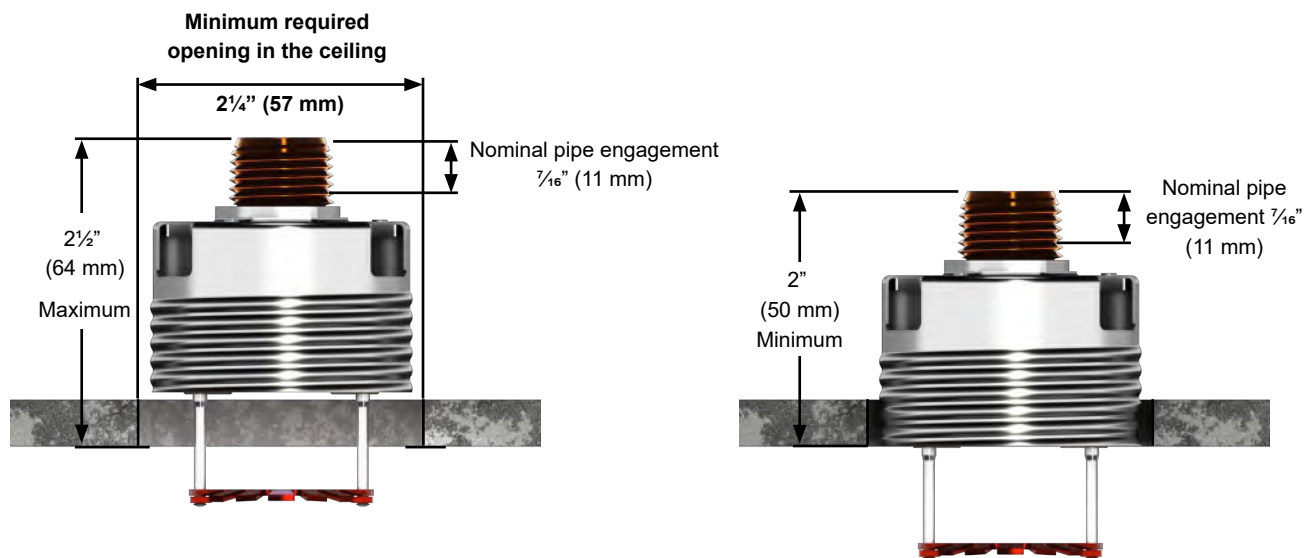
### STANDARD AND QUICK RESPONSE CONCEALED PENDENT SPRINKLER VK4621 (K5.6)

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  
 Visit the Viking website for the latest edition of this technical data page [www.vikinggroupinc.com](http://www.vikinggroupinc.com)



NOTE: Image is representative only. Actual product may vary.

**Figure 4: Sprinkler Dimensions**



NOTE: Image is representative only. Actual product may vary.

**Figure 5: Sprinkler Installation Dimensions**



## TECHNICAL DATA

### STANDARD AND QUICK RESPONSE CONCEALED PENDENT SPRINKLER VK4621 (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  
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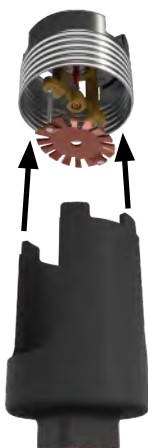


**NOTICE: USE ONLY** the designated sprinkler wrenches shown in this document. Permanent damage to the sprinkler assembly can occur if the proper wrench is not used. Other sprinkler wrenches available from Viking may fit into the sprinkler adapter cup; however, only the wrenches shown here are designed to properly install this sprinkler.

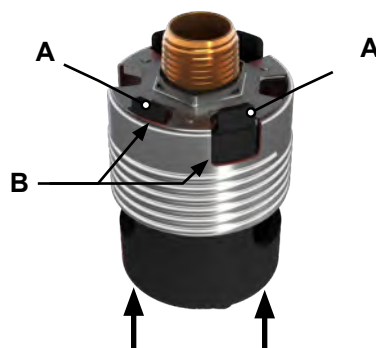
Step 1:  
Remove the protective cap.



Step 2:  
Insert the wrench into the sprinkler adapter.



Step 3:  
Rotate the wrench slightly in either direction until the tines on the wrench (A) line up with the vent openings (B) on the adapter cup and lock into place. NOTE: A leak tight seal must be achieved. Turn the sprinkler clockwise 1 to 1-½ turns past finger-tight.



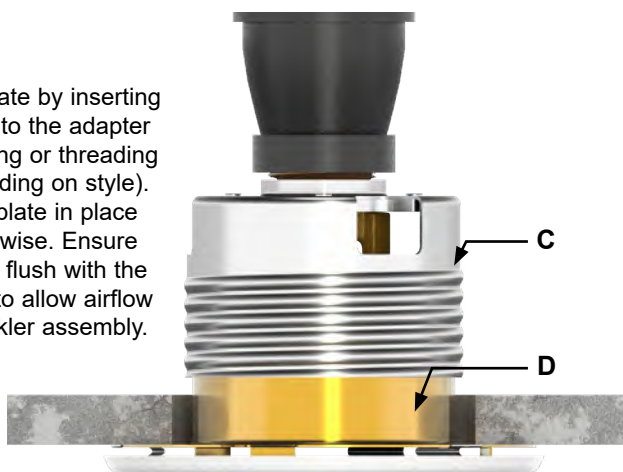
NOTE: Image is representative only. Actual product may vary.

**Figure 6: Using the Sprinkler Wrench**



Minimum

Install the cover plate by inserting the adapter (D) into the adapter cup (C) and pushing or threading into place (depending on style). Snug the cover plate in place by rotating clockwise. Ensure the cover plate is flush with the ceiling as shown to allow airflow through the sprinkler assembly.



Maximum

NOTE: Image is representative only. Actual product may vary.

**Figure 7: Installing the Cover Plate**



## TECHNICAL DATA SHEET

### VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

#### 1. PRODUCT IDENTIFICATION

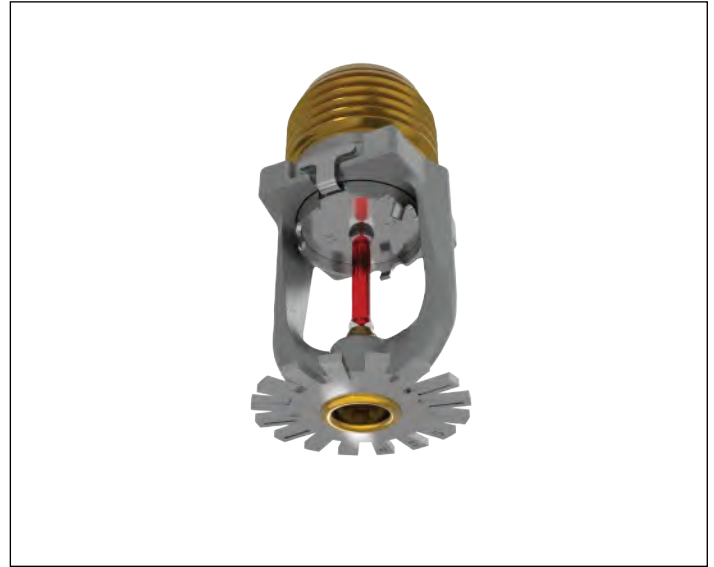
This document covers the following product, hereafter referred to as “sprinkler”:

VK3021: Quick Response, Standard Coverage, Pendent, K5.6 (80.6) Sprinkler.

#### 2. INTENDED USE

The sprinkler is intended to be used in automatic fire sprinkler systems as allowed by applicable approval authorities. The sprinkler must be used in accordance with:

1. the sprinkler's Listings, Approvals, and associated design requirements.
2. the recognized design and installations standards issued, for example NFPA, FM, EN, VdS, or LPCB.
3. the latest revisions of all applicable manufacturer's documentation.



Governmental codes, ordinances, and standards may apply and may differ from one another.

#### **WARNING**

Cancer and Reproductive Harm [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

#### 3. LISTING AND APPROVALS

Refer to section 5 for details and requirements that must be followed.



cULus Listed



VdS Approved



FM Approved



UKCA Approved



CE



MED Approved



LPCB Approved

China Approved





## TECHNICAL DATA SHEET

### VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

#### 4. TECHNICAL SPECIFICATIONS

##### 4.1 Definitions

**Standard Pendent Sprinkler:** A sprinkler intended to be oriented with the deflector below the frame so water flows downward through the orifice, striking the deflector and forming an umbrella-shaped spray pattern downward. These sprinklers are marked “SP/RP” (Standard Pendent/Recessed Pendent). When a standard pendent sprinkler is used with a recessed escutcheon, it becomes a recessed pendent sprinkler.

**Recessed Sprinkler:** A spray sprinkler assembly intended for installation with a concealed piping system. The assembly consists of a sprinkler installed in a decorative adjustable recessed escutcheon that minimizes the protrusion of the sprinkler beyond the ceiling or wall without adversely affecting the sprinkler distribution or sensitivity. Refer to the appropriate technical data page for allowable sprinkler models, temperature ratings, and occupancy classifications.

**NOTICE: Do not recess any sprinkler not listed or approved for use with the escutcheon. Refer to Section 5.**

**Corrosion-Resistant Sprinkler:** A special service sprinkler with non-corrosive protective coatings, or that is fabricated from non-corrosive material, for use in atmospheres that would normally corrode sprinklers. Sprinklers can be ordered as corrosion-resistant sprinklers and can be used with escutcheons when allowed by the approval body.

##### 4.2 Ratings and Physical Characteristics

| Parameter                               | Value                                            |
|-----------------------------------------|--------------------------------------------------|
| Minimum operating pressure              | 7 psi (0.5 bar)                                  |
| Maximum rated pressure                  | UL: 250 psi (17 bar) FM and CE: 175 psi (12 bar) |
| Factory tested pressure                 | 500 psi (35 bar)                                 |
| Thread size                             | 1/2" NPT or 15 mm BSPT                           |
| Nominal K-factor                        | 5.6 U.S. (80.6)                                  |
| Minimum temperature rating (glass bulb) | –65 °F (–55 °C)                                  |





# TECHNICAL DATA SHEET

## VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

### 4.3 Markings and Dimensions

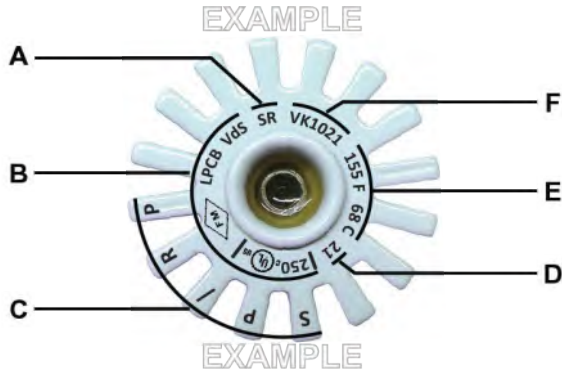


Figure – 1 Markings

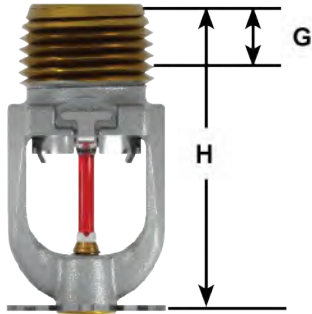


Figure – 2: Dimensions

| Ref | Description                                         | Value                                    |
|-----|-----------------------------------------------------|------------------------------------------|
| A   | Response type                                       | QR: Quick Response                       |
| B   | Listings and Approvals                              | See sections 3 and 5                     |
| C   | Sprinkler type                                      | SP/RP: Standard Pendent/Recessed Pendent |
| D   | Manufacture date (year)                             | See marking                              |
| E   | Nominal temperature rating                          | See marking                              |
| F   | Manufacturers Sprinkler Identification Number (SIN) | VK3021                                   |
| G   | Nominal pipe engagement                             | 7/16" (11 mm)                            |
| H   | Height                                              | 1-15/16" (49 mm)                         |



# TECHNICAL DATA SHEET

## VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

### 4.4 Materials of Construction

**NOTICE:** Do not disassemble the sprinkler.

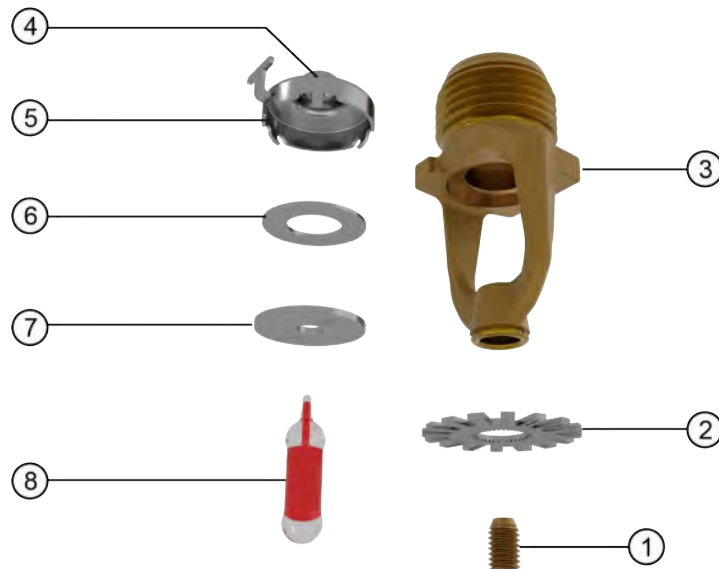


Figure – 3 Sprinkler Components

| Ref | Description       | Material                                       |
|-----|-------------------|------------------------------------------------|
| 1   | Compression screw | Brass CW612N, CW508L, UNS-C36000 or UNS-C26000 |
| 2   | Deflector         | Stainless steel UNS S30400                     |
| 3   | Sprinkler body    | CW602N, UNS-C84400 or QM brass                 |
| 4   | Pip cap seal      | Polytetrafluoroethylene (PTFE)                 |
| 5   | Pip cap shell     | Stainless steel UNS-S44400                     |
| 6   | Belleville spring | Nickel alloy                                   |
| 7   | Pip cap disc      | Stainless steel UNS-S30100                     |
| 8   | Bulb              | Glass, nominal 0.10" (3 mm) diameter           |



# TECHNICAL DATA SHEET

## VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

### 5. LISTING AND APPROVAL DESIGN REQUIREMENTS

#### 5.1 Listing and Approval Specifications

| Sprinkler<br>Base Part<br>Number <sup>1</sup>                                                                                                                                                                                                                                                                                                                 | Thread Size |       | Approval Body   |                 |                 |                 |     |                 |                 |       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|-----------------|-----------------|-----------------|-----------------|-----|-----------------|-----------------|-------|
|                                                                                                                                                                                                                                                                                                                                                               | NPT         | BSPT  | cULus           | FM              | CE              | LPCB            | VdS | UKCA            | MED             | China |
| Maximum WWP PSI (bar) →                                                                                                                                                                                                                                                                                                                                       |             |       | 250 (17)        | 175 (12)        |                 |                 |     |                 |                 |       |
| 23870                                                                                                                                                                                                                                                                                                                                                         | 1/2"        | —     | A1, A2X,<br>A3Y | A1, B2X,<br>B3Y | A1, B2X,<br>B3Y | A1, A2X,<br>A3Y | A1  | A1, A2X,<br>A3Y | A1, A2X,<br>A3Y | —     |
| 23882                                                                                                                                                                                                                                                                                                                                                         | —           | 15 mm | A1, A2X,<br>A3Y | A1, B2X,<br>B3Y | A1, B2X,<br>B3Y | A1, A2X,<br>A3Y | A1  | A1, A2X,<br>A3Y | A1, A2X,<br>A3Y | —     |
| 26756                                                                                                                                                                                                                                                                                                                                                         | —           | 15 mm | C4              | C4              | —               | —               | —   | —               | —               | C4    |
| <b>Approval Specification (Temperature Ratings) Key:</b><br><b>A</b> = 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C) and 286 °F (141 °C)<br><b>B</b> = 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)<br><b>C</b> = 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C) and 286 °F (141 °C)                                   |             |       |                 |                 |                 |                 |     |                 |                 |       |
| <b>Approval Specification (Finishes) Key:</b><br><b>1</b> = Brass, Chrome, White Polyester <sup>2,3</sup> , Black Polyester <sup>2,3</sup> , and ENT <sup>3,4</sup><br><b>2</b> = Brass, Chrome, White Polyester <sup>2,3</sup> , and Black Polyester <sup>2,3</sup><br><b>3</b> = ENT <sup>3,4</sup><br><b>4</b> = Chrome                                    |             |       |                 |                 |                 |                 |     |                 |                 |       |
| <b>Approval Specification (Escutcheons) Key:</b><br><b>X</b> = Installed with Viking Recessed Escutcheons Models E-1, E-2, E-3, NP-1, NP-2, and NP-3, or Viking Standard Surface Mounted Escutcheons<br><b>Y</b> = Installed with Viking Recessed Escutcheons Models E-1 and NP-1, or Viking Standard Surface Mounted Escutcheons                             |             |       |                 |                 |                 |                 |     |                 |                 |       |
| <sup>1</sup> For complete part number, refer to Viking's current price list.<br><sup>2</sup> For White Polyester and Black Polyester, other colors are available upon request and will carry the same Listings and Approvals as the standard colors.<br><sup>3</sup> cULus Listed as corrosion-resistant.<br><sup>4</sup> FM Approved as corrosion-resistant. |             |       |                 |                 |                 |                 |     |                 |                 |       |

#### 5.2 cULus Listing Requirements and Details

The sprinkler is cULus Listed as indicated in Table 5.1 for installation in accordance with the latest edition of NFPA 13 for standard spray sprinklers. This sprinkler is designed for use in light and ordinary hazard occupancies. Venting is not required.

#### 5.3 FM Approval Requirements and Details

The sprinkler is FM Approved as quick response Non-Storage pendent sprinkler as indicated in the FM Approval Guide. The sprinkler is also approved for use in FM Approved vacuum dry sprinkler systems with a maximum supervisory vacuum pressure of -3 psi (-207 mbar). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling. For specific application and installation requirements, refer to the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0).



## TECHNICAL DATA SHEET

### VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

#### 5.4 Additional Approval Requirements and Details

Refer to Table 5.1 for approved configurations allowed by each of the following approvals.

- CE CPR: Standard EN 12259-1:1999 +A3:2006; Declaration of Performance DOP\_VK3021.
- LPCB: Standard EN 12259-1:1999 +A3:2006; Certificate Number 096m.
- VdS: Standard EN 12259-1:1999 +A3:2006; Certificate Number G 422006.
- UKCA: Standard EN12259-1:1999 +A3:2006; Declaration of Conformity UKCA DOC\_S5048.
- MED: Standard EN 12259-1:1999 +A3:2006; Declaration of Conformity DOC\_MED\_XT1.
- China Approval: Approved according to China GB standard.

For specific application and installation requirements, refer to the latest applicable governmental codes, ordinances, and standards for the installation location.

#### 5.5 Corrosion-Resistant Coatings

The corrosion-resistant coatings have passed the standard corrosion tests required by the approving agencies and are listed and approved as indicated in Table 5.1. These tests do not represent all possible corrosive environments. The Electro-less Nickel PTFE (ENT) finish passed the UL 199 thirty-day corrosion test and is cULus listed and FM Approved as corrosion-resistant. For automatic sprinklers, the ENT coating is applied to all exposed exterior surfaces, including the waterway.

Prior to installation, verify that the coatings are compatible with, or suitable for, the proposed environment. The ENT finish has not been evaluated for environments containing chlorine, such as indoor swimming pools. It is not recommended for these applications.

#### 5.6 Sprinkler Guards and Water Shields

The sprinkler is approved for use with the Model XG Sprinkler Guard and the Model F-1 water shield. Refer to the Guards and Water Shields for XT1 Sprinklers technical data sheet for more information.

#### 5.7 Escutcheons

The sprinkler is approved for use with various styles of Viking escutcheons. Specific installation dimensions apply that must be observed. Refer to the sprinkler's Handling and Installation instructions for more information.

#### 5.8 Available Temperature Ratings

Viking sprinklers are available in several temperature ratings that relate to a specific temperature classification. Applicable installation rules mandate the use and limitations of each temperature classification. In selecting the appropriate temperature classification, the maximum expected ceiling temperature must be known. When there is doubt as to the maximum temperature at the sprinkler location, a maximum-reading thermometer should be used to determine the temperature under conditions that would show the highest readings to be expected. In addition, recognized installation rules may require a higher temperature classification, depending upon sprinkler location, occupancy classification, commodity classification, storage height, and other hazards. In all cases, the maximum expected ceiling temperature dictates the lowest allowable temperature classification. Sprinklers located immediately adjacent to a heat source may require a higher temperature rating.



# TECHNICAL DATA SHEET

## VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

### 6. ORDERING PROCEDURE

#### 6.1 Sprinkler

1. Choose a sprinkler base part number with the required thread size and listing or approval (refer to section 5):
2. Add the suffix for the desired finish.
3. Add the suffix for the desired temperature rating.

**NOTE: For Polyester, insert the desired temperature rating suffix where the dash (–) is shown.**

**EXAMPLE: 23870MB/W** = VK3021 with white polyester finish and 155 °F (68 °C) nominal temperature rating. This sprinkler is to be installed into an area with a maximum ambient temperature of 100 °F (38 °C).

**NOTE: When ordering sprinklers that will be installed into InstaSeal® CPVC fittings, refer to Form No. F\_032219 for installation instructions. Use the InstaSeal® alignment tool and NOT the sprinkler wrench for InstaSeal® sprinkler installations.**

| 1. Sprinkler Base<br>Part Number |            | 2. Finish       |        | 3. Temperature Rating            |               |                                              |        |
|----------------------------------|------------|-----------------|--------|----------------------------------|---------------|----------------------------------------------|--------|
| See Section 5                    |            | Description     | Suffix | Nominal<br>Temperature<br>Rating | Bulb<br>Color | Maximum<br>Ambient<br>Ceiling<br>Temperature | Suffix |
| 23870                            | 1/2" NPT   | Brass           | A      | 135 °F (57 °C)                   | Orange        | 100 °F (38 °C)                               | A      |
| 23882                            | 15 mm BSPT | Chrome          | F      | 155 °F (68 °C)                   | Red           | 100 °F (38 °C)                               | B      |
| 26756*                           | 15 mm BSPT | White Polyester | M–/W   | 175 °F (79 °C)                   | Yellow        | 150 °F (65 °C)                               | D      |
|                                  |            | Black Polyester | M–/B   | 200 °F (93 °C)                   | Green         | 150 °F (65 °C)                               | E      |
|                                  |            | ENT             | JN     | 286 °F (141 °C)                  | Blue          | 225 °F (107 °C)                              | G      |
|                                  |            |                 |        | OPEN                             | —             | —                                            | Z      |

\*Only for China



## TECHNICAL DATA SHEET

### VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

#### 6.2 Sprinkler Accessories



Figure – 4: Sprinkler Accessories

| Image Reference | Part Number | Description                                                       |
|-----------------|-------------|-------------------------------------------------------------------|
| 1)              | 23559MB     | Straight wrench: required for proper installation                 |
| 2)              | 23560MB     | Recessed socket wrench                                            |
| 3)              | 01724A      | Sprinkler cabinet: holds up to 6 sprinklers                       |
| 4)              | 01725A      | Sprinkler cabinet: holds up to 12 sprinklers (not shown)          |
| 5)              | 06419A      | Model E-1 Slip-on style recessed escutcheon                       |
|                 | 07902       | Model E-1 Slip-on style recessed escutcheon (stainless steel)     |
| 6)              | 11038       | Model E-2 Threaded recessed escutcheon                            |
| 7)              | 18347       | Model E-3 Threaded recessed escutcheon (large diameter outer cup) |
| 8)              | 01960A      | Large standard flat surface mount escutcheon (steel)              |
|                 | 09488       | Large standard flat surface mount escutcheon (stainless steel)    |
| 9)              | 26676       | InstaSeal® alignment tool                                         |
| 10)             | 02960A      | Small standard flat surface mount escutcheon (steel)              |
|                 | 07526       | Small standard flat surface mount escutcheon (stainless steel)    |
| 11)             | 01961B      | Large standard raised surface mount escutcheon (brass)            |



## TECHNICAL DATA SHEET

## VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)

### 7. CONTACT

The sprinkler and accessories are available through Viking distributors only. Contact your local Viking sales office which can be found on our website:

Americas and Asia: [www.vikinggroupinc.com/locations](http://www.vikinggroupinc.com/locations) OR Europe, Middle East, Africa (EMEA): [www.viking-emea.com/contact](http://www.viking-emea.com/contact)

#### Manufacturer:

The Viking Corporation  
5150 Beltway SE  
Caledonia, MI 49316  
Tel.: (800) 968-9501  
Fax: 269-818-1680  
Technical Services: 1-877-384-5464  
[techsvcs@vikingcorp.com](mailto:techsvcs@vikingcorp.com)

#### Importer EU:

Viking S.A.  
21, Z.I, Haneboesch  
L-4562 Differdange / Niederkorn  
Tel.: +352 58 37 37 – 1  
Fax: +352 58 37 36  
[vikinglux@viking-emea.com](mailto:vikinglux@viking-emea.com)

#### Asia Pacific (APAC) Main Office:

The Viking Corporation (Far East) Pte. Ltd.  
69 Tuas View Square  
Westlink Techpark, Singapore 637621  
Tel: (+65) 6 278 4061  
Fax: (+65) 6 278 4609  
[vikingAPAC@vikingcorp.com](mailto:vikingAPAC@vikingcorp.com)



## Handling and Installation Instructions

## Model XT-1 Pendent Sprinklers

|  |           |                                                                                                                            |           |                                                                                                                 |
|--|-----------|----------------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------|
|  | <b>bg</b> | Инсталирайте и пуснете продукта в експлоатация само ако следната инструкция е ясно разбрана.                               | <b>lv</b> | Produkta iemontēšanu un ekspluatācijas sākšanu veikt tikai tad, ja dotā instrukcija ir pilnībā saprasta.        |
|  | <b>cs</b> | Namontujte a spusťte do provozu produkt pouze tehdy, když jste jasně pochopili tento návod.                                | <b>lt</b> | Produktą montuokite ir pradėkite eksploatuoti tik tuomet, jei aiškiai suprantate šią instrukciją.               |
|  | <b>de</b> | Du må kun montere og idriftsætte produktet, hvis du har forstået følgende vejledning til fulde.                            | <b>mt</b> | Installa u f'ad dem il-prodott biss jekk l-istruzzjonijiet li ġejjin jinftehm u b'mod ċar.                      |
|  | <b>de</b> | Produkt nur einbauen und in Betrieb nehmen, wenn die nachfolgende Anleitung klar verstanden wird.                          | <b>nl</b> | Product alleen installeren en in gebruik nemen, als de volgende instructies begrepen zijn.                      |
|  | <b>el</b> | Η εγκατάσταση και θέση σε λειτουργία του προϊόντος επιτρέπονται μόνο εάν οι ακόλουθες οδηγίες έχουν γίνει κατανοητές.      | <b>no</b> | Ikke installer og ta i bruk produktet uten at følgende anvisninger er tydelig forstått.                         |
|  | <b>en</b> | Do not install and commission the product unless you have clearly understood the instructions below.                       | <b>pl</b> | Produkt należy montować i uruchamiać tylko wtedy, gdy poniższe instrukcje są w pełni zrozumiałe.                |
|  | <b>es</b> | Instalar el producto y ponerlo en funcionamiento solo cuando se hayan comprendido claramente las siguientes instrucciones. | <b>pt</b> | Instalar e colocar o produto em funcionamento somente se as instruções a seguir forem claramente compreendidas. |
|  | <b>et</b> | Paigaldage toode ja kasutage seda ainult siis, kui saate alljärgnevast juhendist selgelt aru.                              | <b>ro</b> | Montați produsul și puneți-l în funcțiune numai dacă instrucțiunea următoare este înțeleasă clar.               |
|  | <b>fi</b> | Tuotteen saa asentaa ja ottaa käyttöön vain, jos jäljempänä oleva ohje ymmärretään selvästi.                               | <b>ru</b> | Не устанавливайте и не принимайте оборудование в эксплуатацию, если вы четко не поняли инструкции ниже          |
|  | <b>fr</b> | N'installer et ne mettre en service le produit que si les instructions suivantes ont été clairement comprises.             | <b>sk</b> | Namontujte a spusťte do prevádzky výrobok iba vtedy, pokiaľ ste jasne pochopili tento návod.                    |
|  | <b>ga</b> | Ná déan an táirge a shuiteail agus a choimisiunu mura dtuigean tu na teoracha thíos go soileir.                            | <b>sl</b> | Izdelek vgradite in zaženite samo, če ste dobro razumeli navodila v nadaljevanju.                               |
|  | <b>hr</b> | Ne instalirajte i ne puštajte proizvod u rad ako niste jasno razumjeli donje upute.                                        | <b>sr</b> | Ne instalirajte i ne puštajte proizvod u rad ako niste jasno razumeli uputstva u nastavku.                      |
|  | <b>hu</b> | Csak akkor építse be a terméket és helyezze üzembe, ha a következő útmutatót egyértelműen megértette.                      | <b>sv</b> | Montera och driftsätt produkten endast om du förstår den efterföljande instruktionen.                           |
|  | <b>is</b> | Settu ekki upp eða taktu vöruna í notkun nema þú hafir skilið greinilega leiðbeiningarnar hér að neðan.                    | <b>tr</b> | Aşağıdaki talimatları açıkça anlamadan ürünü kurmayın ve devreye almayın.                                       |
|  | <b>it</b> | Montare il prodotto e metterlo in funzione solo se si sono comprese appieno le seguenti istruzioni.                        |           |                                                                                                                 |

## 1. PRODUCT IDENTIFICATION

This document covers the following products, hereafter referred to as “sprinkler”:

- VK1021 Standard Response Pendent Sprinkler K5.6 (80.6)
- VK2021 Standard Response Pendent Sprinkler K8.0 (115)
- VK2022 Standard Response Pendent Sprinkler K8.0 (115)
- VK3021 Quick Response Pendent Sprinkler K5.6 (80.6)
- VK3521 Quick Response Pendent Sprinkler K8.0 (115)
- VK3522 Quick Response Pendent Sprinkler K8.0 (115)

## 2. OTHER APPLICABLE DOCUMENTS

For intended use and relevant conditions for the safe use of the specific sprinkler refer to the appropriate *Technical Data Sheet*.



**FITTINGS**



## FireLock® Fittings



FireLock® products comprise a unique system specifically designed for fire protection services. FireLock full-flow elbows and tees feature CAD-developed, hydrodynamic design, affording a shorter center-to-end dimension than standard fittings. A noticeable bulge allows the water to make a smoother turn to maintain similar flow characteristics as standard full flow fittings.

FireLock fittings are designed for use exclusively with Victaulic IPS-sized couplings that have been Listed or Approved for Fire Protection Services. Use of other couplings or flange adapters may result in bolt pad interference.

Victaulic FireLock fittings pressure ratings conform to the ratings of Victaulic FireLock Style 005 couplings.



### MATERIAL SPECIFICATIONS

**Fitting:** Ductile iron conforming to ASTM A-536, grade 65-45-12.

#### Fitting Coating:

- Orange enamel.
- Red Enamel in EMEA-I.
- **Optional:** Hot dipped galvanized.

### JOB/OWNER

System No. \_\_\_\_\_

Location \_\_\_\_\_

### CONTRACTOR

Submitted By \_\_\_\_\_

Date \_\_\_\_\_

### ENGINEER

Spec Sect \_\_\_\_\_ Para \_\_\_\_\_

Approved \_\_\_\_\_

Date \_\_\_\_\_

[www.victaulic.com](http://www.victaulic.com)

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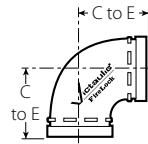
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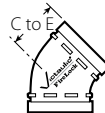
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# FireLock® Fittings

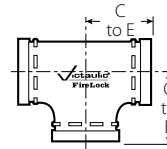
## DIMENSIONS



NO. 001



NO. 003



NO. 002



NO. 006

| Size                            |                                            | No. 001<br>90° Elbow   |                                      | No. 003<br>45° Elbow   |                                      | No. 002<br>Straight Tee |                                      | No. 006<br>Cap                |                                      |
|---------------------------------|--------------------------------------------|------------------------|--------------------------------------|------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------------|--------------------------------------|
| Nominal<br>Size<br>Inches<br>mm | Actual<br>Outside Diameter<br>Inches<br>mm | C to E<br>Inches<br>mm | Approx.<br>Weight Each<br>Lbs.<br>kg | C to E<br>Inches<br>mm | Approx.<br>Weight Each<br>Lbs.<br>kg | C to E<br>Inches<br>mm  | Approx.<br>Weight Each<br>Lbs.<br>kg | Thickness "T"<br>Inches<br>mm | Approx.<br>Weight Each<br>Lbs.<br>kg |
| 1 ¼<br>32                       | 1.660<br>42.4                              | —                      | —                                    | —                      | —                                    | —                       | —                                    | 0.8<br>21                     | 0.3<br>0.1                           |
| 1 ½<br>40                       | 1.900<br>48.3                              | —                      | —                                    | —                      | —                                    | —                       | —                                    | 0.82<br>21                    | 0.4<br>0.2                           |
| 2<br>50                         | 2.375<br>60.3                              | 2.75<br>70             | 1.7<br>0.8                           | 2.00<br>51             | 1.8<br>0.8                           | 2.75<br>70              | 2.4<br>1.1                           | 0.88<br>22                    | 0.6<br>0.3                           |
| 2 ½<br>65                       | 2.875<br>73.0                              | 3.00<br>76             | 3.1<br>1.4                           | 2.25<br>57             | 2.2<br>1.0                           | 3.00<br>76              | 3.6<br>1.6                           | 0.88<br>22                    | 1.0<br>0.5                           |
| 76.1 mm                         | 3.000<br>76.1                              | 3.00<br>76             | 3.30<br>1.5                          | 2.25<br>57             | 2.4<br>1.1                           | —                       | —                                    | —                             | —                                    |
| 3<br>80                         | 3.500<br>88.9                              | 3.38<br>86             | 4.0<br>1.8                           | 2.50<br>64             | 3.1<br>1.4                           | 3.38<br>86              | 5.3<br>2.4                           | 0.88<br>22                    | 1.2<br>0.5                           |
| 108 mm                          | 4.250<br>108.0                             | 4.00<br>102            | 5.7<br>2.6                           | 3.00<br>76             | 5.1<br>2.3                           | 4.00<br>102             | 7.5<br>3.4                           | —                             | —                                    |
| 4<br>100                        | 4.500<br>114.3                             | 4.00<br>102            | 6.7<br>3.0                           | 3.00<br>76             | 5.6<br>2.5                           | 4.00<br>102             | 8.7<br>3.9                           | 1.00<br>25                    | 2.4<br>1.1                           |
| 5<br>125                        | 5.563<br>141.3                             | 4.88<br>124            | 12.6<br>5.7                          | 3.25<br>83             | 8.3<br>3.8                           | 4.88<br>124             | 15.7<br>7.1                          | 1.00<br>25                    | 4.1<br>1.9                           |
| 159 mm                          | 6.250<br>158.8                             | 5.50<br>140            | 12.6<br>5.7                          | 3.50<br>89             | 9.2<br>4.2                           | 5.50<br>140             | 17.9<br>8.0                          | —                             | —                                    |
| 6<br>150                        | 6.625<br>168.3                             | 5.50<br>140            | 18.3<br>8.3                          | 3.50<br>89             | 11.7<br>5.3                          | 5.50<br>140             | 22.7<br>10.3                         | 1.00<br>25                    | 5.9<br>2.7                           |
| 8<br>200                        | 8.625<br>219.1                             | 6.81<br>173            | 25.5<br>11.6                         | 4.25<br>108            | 20.4<br>9.3                          | 6.94<br>176             | 38.7<br>17.6                         | 1.13<br>29                    | 12.7<br>5.8                          |

## FireLock® Fittings

### FLOW DATA

| Size                            |                                               | Frictional Resistance<br>Equivalent Feet/meters of Straight Pipe † |                      |                         |             |
|---------------------------------|-----------------------------------------------|--------------------------------------------------------------------|----------------------|-------------------------|-------------|
| Nominal<br>Size<br>Inches<br>mm | Actual<br>Outside<br>Diameter<br>Inches<br>mm | Elbows                                                             |                      | No. 002<br>Straight Tee |             |
|                                 |                                               | No. 001<br>90° Elbow                                               | No. 003<br>45° Elbow | Branch                  | Run         |
| 1 ¼<br>32                       | 1.660<br>42.4                                 | 1.5<br>0.5                                                         | 0.8<br>0.2           | 3.7<br>1.1              | 1.5<br>0.5  |
| 1 ½<br>40                       | 1.900<br>48.3                                 | 2.2<br>0.7                                                         | 1.1<br>0.3           | 5.5<br>1.7              | 2.2<br>0.7  |
| 2<br>50                         | 2.375<br>60.3                                 | 3.5<br>1.1                                                         | 1.8<br>0.5           | 8.5<br>2.6              | 3.5<br>1.1  |
| 2 ½<br>65                       | 2.875<br>73.0                                 | 4.3<br>1.3                                                         | 2.2<br>0.7           | 10.8<br>3.3             | 4.3<br>1.3  |
| 76.1 mm                         | 3.000<br>76.1                                 | 4.5<br>1.4                                                         | 2.3<br>0.7           | 11.0<br>3.4             | 4.5<br>1.4  |
| 3<br>80                         | 3.500<br>88.9                                 | 5.0<br>1.5                                                         | 2.6<br>0.8           | 13.0<br>4.0             | 5.0<br>1.5  |
| 108 mm                          | 4.250<br>108.0                                | 6.4<br>2.0                                                         | 3.2<br>0.9           | 15.3<br>4.7             | 6.4<br>2.0  |
| 4<br>100                        | 4.500<br>114.3                                | 6.8<br>2.1                                                         | 3.4<br>1.0           | 16.0<br>4.9             | 6.8<br>2.1  |
| 5<br>125                        | 5.563<br>141.3                                | 8.5<br>2.6                                                         | 4.2<br>1.3           | 21.0<br>6.4             | 8.5<br>2.6  |
| 159 mm                          | 6.250<br>158.8                                | 9.4<br>2.9                                                         | 4.9<br>1.5           | 25.0<br>7.6             | 9.6<br>2.9  |
| 6<br>150                        | 6.625<br>168.3                                | 10.0<br>3.0                                                        | 5.0<br>1.5           | 25.0<br>7.6             | 10.0<br>3.0 |
| 8<br>200                        | 8.625<br>219.1                                | 13.0<br>4.0                                                        | 5.0<br>1.5           | 33.0<br>10.1            | 13.0<br>4.0 |

† The flow data listed is based upon the pressure drop of Schedule 40 pipe.

## FireLock® Fittings

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### GENERAL NOTES

NOTE: When assembling FireLock EZ couplings onto end caps, take additional care to make certain the end cap is fully seated against the gasket end stop. For FireLock EZ Style 009/009V/009H couplings, use FireLock No. 006 end caps containing the “EZ” marking on the inside face or No. 60 end caps containing the “QV EZ” marking on the inside face. Non-Victaulic end cap products shall not be used with Style 009/009V/009H couplings.

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### WARRANTY

Refer to the Warranty section of the current Price List or contact Victaulic for details.

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### NOTE

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

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For complete contact information, visit [www.victaulic.com](http://www.victaulic.com)

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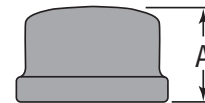
## Ductile Iron

## Submittal Sheet



### CAPS

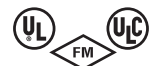
| Nominal Size    | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions A    | Approx. Wt. Each |
|-----------------|-------------------|------------------|-----------------------|-----------------|------------------|
| <i>In. (mm)</i> |                   |                  | <i>PSI (kPa)</i>      | <i>In. (mm)</i> | <i>Lbs. (kg)</i> |
| 1<br>25         | 840005615         | DCP003           | 500<br>3450           | 1.16<br>29.46   | 0.32<br>0.15     |
| 1¼<br>32        | 840005623         | DCP004           | 500<br>3450           | 1.28<br>32.51   | 0.43<br>0.20     |
| 1½<br>40        | 840005631         | DCP005           | 500<br>3450           | 1.33<br>33.78   | 0.60<br>0.27     |
| 2<br>50         | 840005649         | DCP006           | 500<br>3450           | 1.45<br>36.83   | 0.91<br>0.41     |



### MATERIAL SPECIFICATIONS

Ductile iron threaded fittings are UL & ULC Listed & Factory Mutual Approved for 500 psi service. Dimensions conform to ASME B16.3 Class 150.  
 Ductile iron per ASTM A536 Class 65-45-12. Threads are NPT per ANSI/ASME B1.20.1.

**NOTICE:** Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened three turns beyond hand tight, but no more than four turns.



**APPROVED**  
 For Listing / Approval  
 details contact your  
 AnvilStar™ Representative.

#### PROJECT INFORMATION:

#### APPROVAL STAMP:

Project:

Date:

Phone:

Architect / Engineer:

Contractor:

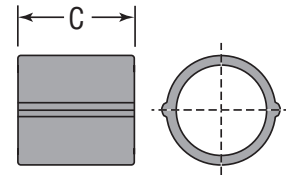
Address:

Notes 1:

Notes 2:



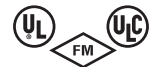
| COUPLING     |                   |                  |               |                  |
|--------------|-------------------|------------------|---------------|------------------|
| Nominal Size | Anvil Item Number | Universal Number | Dimensions A  | Approx. Wt. Each |
| In. (mm)     |                   |                  | In. (mm)      | Lbs. (kg)        |
| 1<br>25      | 840008692         | DCL033           | 1.67<br>42.42 | 0.40<br>0.18     |
| 1¼<br>32     | 840008700         | DCL044           | 1.93<br>49.02 | 0.57<br>0.26     |
| 1½<br>40     | 840008718         | DCL055           | 2.15<br>54.61 | 0.75<br>0.34     |
| 2<br>50      | 840008726         | DCL066           | 2.53<br>64.26 | 1.15<br>0.52     |



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### APPROVAL STAMP:

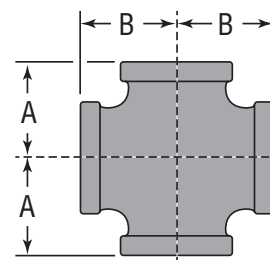
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| <b>Project:</b>              |               |
| <b>Date:</b>                 | <b>Phone:</b> |
| <b>Architect / Engineer:</b> |               |
| <b>Contractor:</b>           |               |
| <b>Address:</b>              |               |
| <b>Notes 1:</b>              |               |
| <b>Notes 2:</b>              |               |

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| CROSS             |                   |                  |                       |               |               |                  |
|-------------------|-------------------|------------------|-----------------------|---------------|---------------|------------------|
| Nominal Size      | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions    |               | Approx. Wt. Each |
|                   |                   |                  |                       | A             | B             |                  |
| In. (mm)          | In. (mm)          | PSI (kPa)        | PSI (kPa)             | In. (mm)      | In. (mm)      | Lbs. (kg)        |
| 1<br>25           | 840006647         | DX033            | 500<br>3450           | 1.50<br>38.10 | 1.50<br>38.10 | 0.98<br>0.44     |
| 1¼<br>32          | 840006654         | DX044            | 500<br>3450           | 1.75<br>44.45 | 1.75<br>44.45 | 1.50<br>0.68     |
| 1½<br>40          | 840006662         | DX055            | 500<br>3450           | 1.94<br>49.27 | 1.94<br>49.27 | 1.90<br>0.86     |
| 2<br>50           | 840006670         | DX066            | 500<br>3450           | 2.25<br>57.15 | 2.25<br>57.15 | 2.95<br>1.34     |
| 1¼ x 1<br>32 x 25 | 840007678         | DX043            | 500<br>3450           | 1.58<br>40.13 | 1.67<br>42.41 | 1.27<br>0.58     |
| 1½ x 1<br>40 x 25 | 840007686         | DX053            | 500<br>3450           | 1.65<br>41.91 | 1.80<br>45.72 | 1.48<br>0.67     |
| 2 x 1<br>50 x 25  | 840007694         | DX063            | 500<br>3450           | 1.73<br>43.94 | 2.02<br>51.30 | 2.10<br>0.95     |



### MATERIAL SPECIFICATIONS

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 Ductile iron per ASTM A536 Class 65-45-12. Threads are NPT per ANSI/ASME B1.20.1.

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 details contact your  
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#### PROJECT INFORMATION:

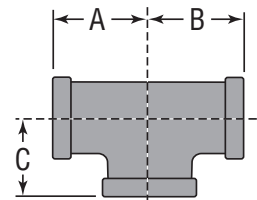
#### APPROVAL STAMP:

|                              |               |  |
|------------------------------|---------------|--|
| <b>Project:</b>              |               |  |
| <b>Date:</b>                 | <b>Phone:</b> |  |
| <b>Architect / Engineer:</b> |               |  |
| <b>Contractor:</b>           |               |  |
| <b>Address:</b>              |               |  |
| <b>Notes 1:</b>              |               |  |
| <b>Notes 2:</b>              |               |  |



### BULL HEAD TEE

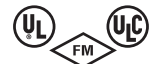
| Nominal Size                          | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions    |               |               | Approx. Wt. Each |
|---------------------------------------|-------------------|------------------|-----------------------|---------------|---------------|---------------|------------------|
|                                       |                   |                  |                       | A             | B             | C             |                  |
| In. (mm)                              |                   |                  | PSI (kPa)             | In. (mm)      | In. (mm)      | In. (mm)      | Lbs. (kg)        |
| 1 x 1 x 1 1/4<br>25 x 25 x 32         | 840004238         | DT334            | 500<br>3450           | 1.67<br>42.41 | 1.67<br>42.41 | 1.58<br>40.13 | 0.98<br>0.44     |
| 1 x 1 x 1 1/2<br>25 x 25 x 40         | 840004246         | DT335            | 500<br>3450           | 1.80<br>45.72 | 1.80<br>45.72 | 1.65<br>41.91 | 1.16<br>0.53     |
| 1 1/4 x 1 x 1 1/2<br>32 x 25 x 40     | 840004295         | DT435            | 500<br>3450           | 1.88<br>47.75 | 1.80<br>45.72 | 1.82<br>46.22 | 1.42<br>0.64     |
| 1 1/4 x 1 1/4 x 1 1/2<br>32 x 32 x 40 | 840004337         | DT445            | 500<br>3450           | 1.88<br>47.75 | 1.88<br>47.75 | 1.82<br>46.22 | 1.45<br>0.66     |
| 1 1/4 x 1 1/4 x 2<br>32 x 32 x 50     | 840004345         | DT446            | 500<br>3450           | 2.10<br>53.34 | 2.10<br>53.34 | 1.90<br>48.26 | 1.75<br>0.79     |
| 1 1/2 x 1 1/4 x 2<br>40 x 32 x 50     | 840004436         | DT546            | 500<br>3450           | 2.16<br>54.86 | 2.10<br>53.34 | 2.02<br>51.30 | 1.90<br>0.86     |
| 1 1/2 x 1 1/2 x 2<br>40 x 40 x 50     | 840004485         | DT556            | 500<br>3450           | 2.16<br>54.86 | 2.16<br>54.86 | 2.02<br>51.30 | 1.98<br>0.90     |



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#### APPROVAL STAMP:

|                              |               |
|------------------------------|---------------|
| <b>Project:</b>              |               |
| <b>Date:</b>                 | <b>Phone:</b> |
| <b>Architect / Engineer:</b> |               |
| <b>Contractor:</b>           |               |
| <b>Address:</b>              |               |
| <b>Notes 1:</b>              |               |
| <b>Notes 2:</b>              |               |

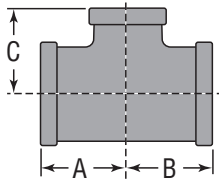
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| <b>APPROVAL STAMP:</b> |
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# REDUCING TEE



## Ductile Iron

## Submittal Sheet



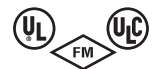
| REDUCING TEE          |                   |                  |                       |            |          |          |                  |
|-----------------------|-------------------|------------------|-----------------------|------------|----------|----------|------------------|
| Nominal Size          | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions |          |          | Approx. Wt. Each |
|                       |                   |                  |                       | A          | B        | C        |                  |
| In. (mm)              |                   |                  | PSI (kPa)             | In. (mm)   | In. (mm) | In. (mm) | Lbs. (kg)        |
| 1 x 1/2 x 1           | 840004196         | DT313            | 500                   | 1.50       | 1.36     | 1.50     | 0.64             |
| 25 x 15 x 25          |                   |                  | 3450                  | 38.10      | 34.54    | 38.10    | 0.29             |
| 1 x 3/4 x 1           | 840004204         | DT323            | 500                   | 1.50       | 1.45     | 1.50     | 0.73             |
| 25 x 20 x 25          |                   |                  | 3450                  | 38.10      | 36.83    | 38.10    | 0.33             |
| 1 x 1 x 1/2           | 840004212         | DT331            | 500                   | 1.26       | 1.26     | 1.36     | 0.71             |
| 25 x 25 x 15          |                   |                  | 3450                  | 32.00      | 32.00    | 34.54    | 0.32             |
| 1 x 1 x 3/4           | 840004220         | DT332            | 500                   | 1.37       | 1.37     | 1.45     | 0.76             |
| 25 x 25 x 20          |                   |                  | 3450                  | 34.80      | 34.80    | 36.83    | 0.34             |
| 1 x 1 x 1 1/4         | 840004238         | DT334            | 500                   | 1.67       | 1.67     | 1.58     | 0.98             |
| 25 x 25 x 32          |                   |                  | 3450                  | 42.41      | 42.41    | 40.13    | 0.44             |
| 1 x 1 x 1 1/2         | 840004246         | DT335            | 500                   | 1.80       | 1.80     | 1.65     | 1.16             |
| 25 x 25 x 40          |                   |                  | 3450                  | 45.72      | 45.72    | 41.91    | 0.53             |
| 1 1/4 x 1 x 1         | 840004253         | DT431            | 500                   | 1.34       | 1.26     | 1.53     | 0.82             |
| 32 x 25 x 15          |                   |                  | 3450                  | 34.04      | 32.00    | 38.86    | 0.37             |
| 1 1/4 x 1 x 3/4       | 840004261         | DT432            | 500                   | 1.45       | 1.37     | 1.62     | 0.90             |
| 32 x 25 x 20          |                   |                  | 3450                  | 36.83      | 34.80    | 41.15    | 0.41             |
| 1 1/4 x 1 x 1         | 840004279         | DT433            | 500                   | 1.58       | 1.50     | 1.67     | 1.00             |
| 32 x 25 x 25          |                   |                  | 3450                  | 40.13      | 38.10    | 42.42    | 0.45             |
| 1 1/4 x 1 x 1 1/4     | 840004287         | DT434            | 500                   | 1.75       | 1.67     | 1.75     | 1.08             |
| 32 x 25 x 32          |                   |                  | 3450                  | 44.45      | 42.42    | 44.45    | 0.49             |
| 1 1/4 x 1 x 1 1/2     | 840004295         | DT435            | 500                   | 1.88       | 1.80     | 1.82     | 1.42             |
| 32 x 25 x 40          |                   |                  | 3450                  | 47.75      | 45.72    | 46.22    | 0.64             |
| 1 1/4 x 1 1/4 x 1/2   | 840004303         | DT441            | 500                   | 1.34       | 1.34     | 1.53     | 0.86             |
| 32 x 32 x 15          |                   |                  | 3450                  | 34.04      | 34.04    | 38.86    | 0.39             |
| 1 1/4 x 1 1/4 x 3/4   | 840004311         | DT442            | 500                   | 1.45       | 1.45     | 1.62     | 0.92             |
| 32 x 32 x 20          |                   |                  | 3450                  | 36.83      | 36.83    | 41.15    | 0.42             |
| 1 1/4 x 1 1/4 x 1     | 840004329         | DT443            | 500                   | 1.58       | 1.58     | 1.67     | 0.95             |
| 32 x 32 x 25          |                   |                  | 3450                  | 40.13      | 40.13    | 42.42    | 0.43             |
| 1 1/4 x 1 1/4 x 1 1/2 | 840004337         | DT445            | 500                   | 1.88       | 1.88     | 1.82     | 1.45             |
| 32 x 32 x 40          |                   |                  | 3450                  | 47.75      | 47.75    | 46.22    | 0.66             |
| 1 1/4 x 1 1/4 x 2     | 840004345         | DT446            | 500                   | 2.10       | 2.10     | 1.90     | 1.75             |
| 32 x 32 x 50          |                   |                  | 3450                  | 53.34      | 53.34    | 48.26    | 0.79             |
| 1 1/2 x 1 x 1/2       | 840004352         | DT531            | 500                   | 1.41       | 1.34     | 1.66     | 0.95             |
| 40 x 25 x 15          |                   |                  | 3450                  | 35.81      | 34.04    | 42.16    | 0.43             |
| 1 1/2 x 1 x 3/4       | 840004360         | DT532            | 500                   | 1.52       | 1.37     | 1.75     | 1.14             |
| 40 x 25 x 20          |                   |                  | 3450                  | 38.61      | 34.80    | 44.45    | 0.52             |
| 1 1/2 x 1 x 1         | 840004378         | DT533            | 500                   | 1.65       | 1.50     | 1.80     | 1.17             |
| 40 x 25 x 25          |                   |                  | 3450                  | 41.91      | 38.10    | 45.72    | 0.53             |
| 1 1/2 x 1 x 1 1/4     | 840004386         | DT534            | 500                   | 1.82       | 1.67     | 1.88     | 1.34             |
| 40 x 25 x 32          |                   |                  | 3450                  | 46.23      | 42.42    | 47.75    | 0.61             |
| 1 1/2 x 1 x 1 1/2     | 840004394         | DT535            | 500                   | 1.94       | 1.80     | 1.94     | 1.45             |
| 40 x 25 x 40          |                   |                  | 3450                  | 49.28      | 45.72    | 49.28    | 0.66             |
| 1 1/2 x 1 1/4 x 1/2   | 840004402         | DT541            | 500                   | 1.41       | 1.34     | 1.66     | 1.05             |
| 40 x 32 x 15          |                   |                  | 3450                  | 35.81      | 34.04    | 42.16    | 0.48             |
| 1 1/2 x 1 1/4 x 3/4   | 840004410         | DT542            | 500                   | 1.52       | 1.45     | 1.75     | 1.15             |
| 40 x 32 x 20          |                   |                  | 3450                  | 38.61      | 36.83    | 44.45    | 0.52             |

| REDUCING TEE          |                   |                  |                       |            |          |          |                  |
|-----------------------|-------------------|------------------|-----------------------|------------|----------|----------|------------------|
| Nominal Size          | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions |          |          | Approx. Wt. Each |
|                       |                   |                  |                       | A          | B        | C        |                  |
| In. (mm)              |                   |                  | PSI (kPa)             | In. (mm)   | In. (mm) | In. (mm) | Lbs. (kg)        |
| 1 1/2 x 1 1/4 x 1     | 840004428         | DT543            | 500                   | 1.65       | 1.58     | 1.80     | 1.25             |
| 40 x 32 x 25          |                   |                  | 3450                  | 41.91      | 40.13    | 45.72    | 0.57             |
| 1 1/2 x 1 1/4 x 2     | 840004436         | DT546            | 500                   | 2.16       | 2.10     | 2.02     | 1.90             |
| 40 x 32 x 50          |                   |                  | 3450                  | 54.86      | 53.34    | 51.30    | 0.86             |
| 1 1/2 x 1 1/2 x 1/2   | 840004444         | DT551            | 500                   | 1.41       | 1.41     | 1.16     | 1.15             |
| 40 x 40 x 15          |                   |                  | 3450                  | 35.81      | 35.81    | 29.46    | 0.52             |
| 1 1/2 x 1 1/2 x 3/4   | 840004451         | DT552            | 500                   | 1.52       | 1.52     | 1.75     | 1.24             |
| 40 x 40 x 20          |                   |                  | 3450                  | 38.61      | 38.61    | 44.45    | 0.56             |
| 1 1/2 x 1 1/2 x 1     | 840004469         | DT553            | 500                   | 1.65       | 1.65     | 1.80     | 1.30             |
| 40 x 40 x 25          |                   |                  | 3450                  | 41.91      | 41.91    | 45.72    | 0.59             |
| 1 1/2 x 1 1/2 x 1 1/4 | 840004477         | DT554            | 500                   | 1.82       | 1.82     | 1.88     | 1.48             |
| 40 x 40 x 32          |                   |                  | 3450                  | 46.23      | 46.23    | 47.75    | 0.67             |
| 1 1/2 x 1 1/2 x 2     | 840004485         | DT556            | 500                   | 2.16       | 2.16     | 2.02     | 1.98             |
| 40 x 40 x 50          |                   |                  | 3450                  | 54.86      | 54.86    | 51.30    | 0.90             |
| 2 x 1 x 2             | 840004493         | DT636            | 500                   | 2.25       | 2.02     | 2.25     | 2.15             |
| 50 x 25 x 50          |                   |                  | 3450                  | 57.15      | 51.31    | 57.15    | 0.98             |
| 2 x 1 1/4 x 2         | 840004501         | DT646            | 500                   | 2.25       | 2.10     | 2.25     | 2.30             |
| 50 x 32 x 50          |                   |                  | 3450                  | 57.15      | 53.34    | 57.15    | 1.04             |
| 2 x 1 1/2 x 1/2       | 840004519         | DT651            | 500                   | 1.49       | 1.41     | 1.88     | 1.50             |
| 50 x 40 x 15          |                   |                  | 3450                  | 37.85      | 35.81    | 47.75    | 0.68             |
| 2 x 1 1/2 x 3/4       | 840004527         | DT652            | 500                   | 1.60       | 1.52     | 1.97     | 1.62             |
| 50 x 40 x 20          |                   |                  | 3450                  | 40.64      | 38.61    | 50.04    | 0.73             |
| 2 x 1 1/2 x 1         | 840004535         | DT653            | 500                   | 1.73       | 1.65     | 2.02     | 1.64             |
| 50 x 40 x 25          |                   |                  | 3450                  | 43.94      | 41.91    | 51.31    | 0.74             |
| 2 x 1 1/2 x 1 1/4     | 840004543         | DT654            | 500                   | 1.90       | 1.82     | 2.10     | 1.80             |
| 50 x 40 x 32          |                   |                  | 3450                  | 48.26      | 46.23    | 53.34    | 0.82             |
| 2 x 1 1/2 x 1 1/2     | 840004550         | DT655            | 500                   | 2.02       | 1.94     | 2.16     | 2.00             |
| 50 x 40 x 40          |                   |                  | 3450                  | 51.31      | 49.28    | 54.86    | 0.91             |
| 2 x 1 1/2 x 2         | 840004568         | DT656            | 500                   | 2.25       | 2.16     | 2.25     | 2.35             |
| 50 x 40 x 50          |                   |                  | 3450                  | 57.15      | 54.86    | 57.15    | 1.07             |
| 2 x 2 x 1 1/2         | 840004576         | DT661            | 500                   | 1.49       | 1.49     | 1.88     | 1.60             |
| 50 x 50 x 15          |                   |                  | 3450                  | 37.85      | 37.85    | 47.75    | 0.73             |
| 2 x 2 x 3/4           | 840004584         | DT662            | 500                   | 1.60       | 1.60     | 1.97     | 1.68             |
| 50 x 50 x 20          |                   |                  | 3450                  | 40.64      | 40.64    | 50.04    | 0.76             |
| 2 x 2 x 1             | 840004592         | DT663            | 500                   | 1.73       | 1.73     | 2.02     | 1.85             |
| 50 x 50 x 25          |                   |                  | 3450                  | 43.94      | 43.94    | 51.31    | 0.84             |
| 2 x 2 x 1 1/4         | 840004600         | DT664            | 500                   | 1.90       | 1.90     | 2.10     | 2.04             |
| 50 x 50 x 32          |                   |                  | 3450                  | 48.26      | 48.26    | 54.86    | 0.93             |
| 2 x 2 x 1 1/2         | 840004618         | DT665            | 500                   | 2.02       | 2.02     | 2.16     | 2.18             |
| 50 x 50 x 40          |                   |                  | 3450                  | 51.31      | 51.31    | 57.15    | 0.99             |
| 2 x 2 x 2 1/2         | -                 | DT667            | 500                   | 2.60       | 2.60     | 2.39     | 3.61             |
| 50 x 50 x 65          |                   |                  | 3450                  | 66.04      | 66.04    | 66.04    | 1.64             |
| 2 1/2 x 2 x 3/4       | -                 | DT762            | 500                   | 1.74       | 1.60     | 2.32     | 2.28             |
| 65 x 50 x 20          |                   |                  | 3450                  | 44.45      | 42.42    | 44.45    | 1.03             |

## MATERIAL SPECIFICATIONS

Ductile iron threaded fittings are UL & ULC Listed & Dimensions conform to ASME B16.3 Class 150.  
Factory Mutual Approved for 500 psi service. Threads are NPT per ANSI/ASME B1.20.1.  
Ductile iron per ASTM A536 Class 65-45-12.

**NOTICE:** Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened three turns beyond hand tight, but no more than four turns.



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details contact your  
AnvilStar™ Representative.

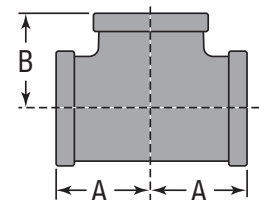
### PROJECT INFORMATION:

### APPROVAL STAMP:

|                              |               |  |
|------------------------------|---------------|--|
| <b>Project:</b>              |               |  |
| <b>Date:</b>                 | <b>Phone:</b> |  |
| <b>Architect / Engineer:</b> |               |  |
| <b>Contractor:</b>           |               |  |
| <b>Address:</b>              |               |  |
| <b>Notes 1:</b>              |               |  |
| <b>Notes 2:</b>              |               |  |



| STRAIGHT TEE |                   |                  |                       |               |               |                  |
|--------------|-------------------|------------------|-----------------------|---------------|---------------|------------------|
| Nominal Size | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions    |               | Approx. Wt. Each |
| In. (mm)     |                   |                  | PSI (kPa)             | A<br>In. (mm) | B<br>In. (mm) | Lbs. (kg)        |
| 1<br>25      | 840003164         | DT333            | 500<br>3450           | 1.50<br>38.10 | 1.50<br>38.10 | 0.85<br>0.39     |
| 1¼<br>32     | 840003172         | DT444            | 500<br>3450           | 1.75<br>44.45 | 1.75<br>44.45 | 1.22<br>0.55     |
| 1½<br>40     | 840003180         | DT555            | 500<br>3450           | 1.94<br>49.27 | 1.94<br>49.27 | 1.55<br>0.70     |
| 2<br>50      | 840003198         | DT666            | 500<br>3450           | 2.25<br>57.15 | 2.25<br>57.15 | 2.45<br>1.11     |



### MATERIAL SPECIFICATIONS

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Ductile iron per ASTM A536 Class 65-45-12. Threads are NPT per ANSI/ASME B1.20.1.

**NOTICE:** Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened three turns beyond hand tight, but no more than four turns.



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|------------------------------|---------------|
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| <b>Date:</b>                 | <b>Phone:</b> |
| <b>Architect / Engineer:</b> |               |
| <b>Contractor:</b>           |               |
| <b>Address:</b>              |               |
| <b>Notes 1:</b>              |               |
| <b>Notes 2:</b>              |               |

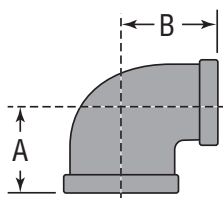
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# REDUCING 90° ELBOW



Ductile Iron

Submittal Sheet



## REDUCING 90° ELBOW

| Nominal Size  | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions |          | Approx. Wt. Each |
|---------------|-------------------|------------------|-----------------------|------------|----------|------------------|
|               |                   |                  |                       | A          | B        |                  |
| In. (mm)      |                   |                  | PSI (kPa)             | In. (mm)   | In. (mm) | Lbs. (kg)        |
| 1 x 1/2       | 840001036         | DB90031          | 500                   | 1.26       | 1.36     | 0.44             |
| 25 x 15       |                   |                  | 3450                  | 32.00      | 34.54    | 0.20             |
| 1 x 3/4       | 840001044         | DB90032          | 500                   | 1.37       | 1.45     | 0.52             |
| 25 x 20       |                   |                  | 3450                  | 34.79      | 36.83    | 0.24             |
| 1 1/4 x 1/2   | 840001051         | DB90041          | 500                   | 1.34       | 1.53     | 0.64             |
| 32 x 15       |                   |                  | 34550                 | 34.03      | 38.86    | 0.29             |
| 1 1/4 x 3/4   | 840001069         | DB90042          | 500                   | 1.45       | 1.62     | 0.72             |
| 32 x 20       |                   |                  | 3450                  | 36.83      | 41.14    | 0.33             |
| 1 1/4 x 1     | 840001077         | DB90043          | 500                   | 1.58       | 1.67     | 0.75             |
| 32 x 25       |                   |                  | 3450                  | 40.13      | 42.41    | 0.34             |
| 1 1/2 x 1     | 840001085         | DB90053          | 500                   | 1.65       | 1.80     | 0.92             |
| 40 x 25       |                   |                  | 3450                  | 41.91      | 45.72    | 0.42             |
| 1 1/2 x 1 1/4 | 840001093         | DB90054          | 500                   | 1.82       | 1.88     | 1.08             |
| 40 x 32       |                   |                  | 3450                  | 46.22      | 47.75    | 0.49             |
| 2 x 1/2       | 840001101         | DB90061          | 500                   | 1.49       | 1.88     | 1.08             |
| 50 x 15       |                   |                  | 3450                  | 37.84      | 47.75    | 0.49             |
| 2 x 3/4       | 840001119         | DB90062          | 500                   | 1.60       | 1.97     | 1.24             |
| 50 x 20       |                   |                  | 3450                  | 40.64      | 50.03    | 0.56             |
| 2 x 1         | 840001127         | DB90063          | 500                   | 1.73       | 2.02     | 1.40             |
| 50 x 25       |                   |                  | 3450                  | 43.94      | 51.30    | 0.64             |
| 2 x 1 1/4     | 840001135         | DB90064          | 500                   | 1.90       | 2.10     | 1.52             |
| 50 x 32       |                   |                  | 3450                  | 48.26      | 53.34    | 0.70             |
| 2 x 1 1/2     | 840001143         | DB90065          | 500                   | 2.02       | 2.16     | 1.65             |
| 50 x 40       |                   |                  | 3450                  | 51.30      | 54.86    | 0.75             |

## MATERIAL SPECIFICATIONS

Ductile iron threaded fittings are UL & ULC Listed & Factory Mutual Approved for 500 psi service. Dimensions conform to ASME B16.3 Class 150.  
Ductile iron per ASTM A536 Class 65-45-12. Threads are NPT per ANSI/ASME B1.20.1.

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details contact your  
AnvilStar™ Representative.

### PROJECT INFORMATION:

### APPROVAL STAMP:

|                       |        |
|-----------------------|--------|
| Project:              |        |
| Date:                 | Phone: |
| Architect / Engineer: |        |
| Contractor:           |        |
| Address:              |        |
| Notes 1:              |        |
| Notes 2:              |        |

# 45° ELBOW



Ductile Iron

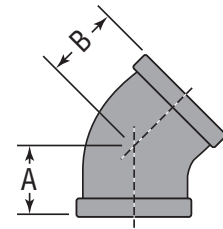
**ANVILStar™**  
Fire Products Division of Anvil® International

Submittal Sheet



## 45° ELBOW

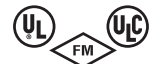
| Nominal Size | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions-   |               | Approx. Wt. Each |
|--------------|-------------------|------------------|-----------------------|---------------|---------------|------------------|
|              |                   |                  |                       | A             | B             |                  |
| In. (mm)     |                   |                  | PSI (kPa)             | In. (mm)      | In. (mm)      | Lbs. (kg)        |
| 1<br>25      | 840002133         | DB45033          | 500<br>3450           | 1.12<br>28.44 | 1.12<br>28.44 | 0.46<br>0.21     |
| 1¼<br>32     | 840002141         | DB45044          | 500<br>3450           | 1.29<br>32.76 | 1.29<br>32.76 | 0.73<br>0.33     |
| 1½<br>40     | 840002158         | DB45055          | 500<br>3450           | 1.43<br>36.32 | 1.43<br>36.32 | 0.92<br>0.42     |
| 2<br>50      | 840002166         | DB45066          | 500<br>3450           | 1.68<br>42.67 | 1.68<br>42.67 | 1.50<br>0.68     |



## MATERIAL SPECIFICATIONS

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### PROJECT INFORMATION:

### APPROVAL STAMP:

Project:

Date:

Phone:

Architect / Engineer:

Contractor:

Address:

Notes 1:

Notes 2:

# 90° ELBOW



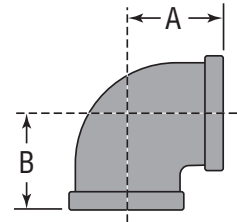
Ductile Iron

**ANVILStar™**  
Fire Products Division of Anvil® International

Submittal Sheet



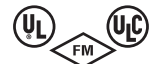
| 90° ELBOW    |                   |                  |                       |                    |                |                  |
|--------------|-------------------|------------------|-----------------------|--------------------|----------------|------------------|
| Nominal Size | Anvil Item Number | Universal Number | Max. Working Pressure | Dimensions-In.(mm) |                | Approx. Wt. Each |
| In. (mm)     |                   |                  | PSI (kPa)             | A<br>In. (mm)      | B<br>In. (mm)  | Lbs. (kg)        |
| 1<br>20      | 840000004         | DB90033          | 500<br>3450           | 1.50<br>38.10      | 1.50<br>38.10  | 0.62<br>0.28     |
| 1¼<br>32     | 840000012         | DB90044          | 500<br>3450           | 1.75<br>44.45      | 1.75<br>44.45  | 0.90<br>0.41     |
| 1½<br>40     | 840000020         | DB90055          | 500<br>3450           | 1.94<br>49.276     | 1.94<br>49.276 | 1.20<br>0.54     |
| 2<br>50      | 840000038         | DB90066          | 500<br>3450           | 2.25<br>57.15      | 2.25<br>57.15  | 1.85<br>0.84     |



## MATERIAL SPECIFICATIONS

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Project:

Date:

Phone:

Architect / Engineer:

Contractor:

Address:

Notes 1:

Notes 2:

HANGERS



## Fig. 200WON - "Trimline" Adjustable Band Hanger w/o Swivel Nut

**Size Range** — 1/2" thru 8" pipe

**Material** — Carbon Steel

**Function** — Recommended for the suspension of fire sprinkler and non-insulated pipe or insulated pipe with Fig. 220 shield. Generally installed with two hex nuts.

**Features** — Flared edges on sizes 1/2" thru 2". Eases installation and protects CPVC pipe from any abrasion.

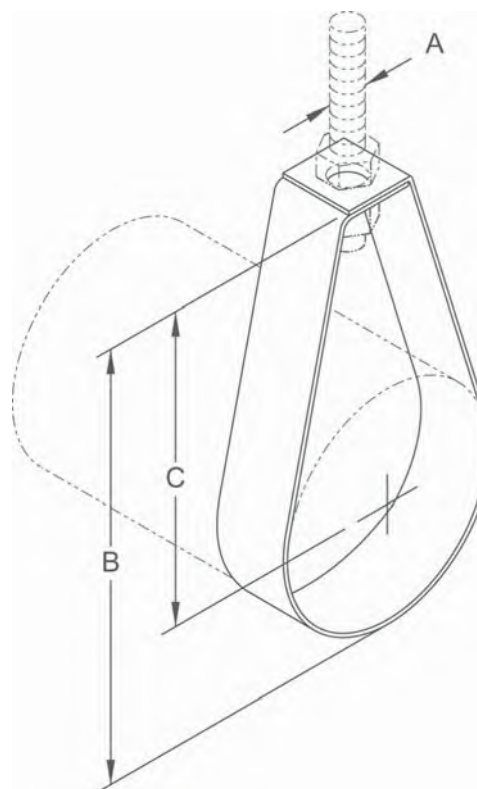
**Approvals** — Underwriters' Laboratories listed (1/2" thru 8") in the USA (**UL**) and Canada (**cUL**) for steel and CPVC plastic pipe. Conforms to Federal Specifications WW-171E, Type 7 and Manufacturers Standardization Society SP-69, Type 7

**Maximum Temperature** — 650°F

**Finish** — Mil. Galvanized to G-90

**Note** — Available in Stainless Steel materials

**Order By** — Figure number and pipe size



| Dimensions • Weights |            |        |       |                     |                 |
|----------------------|------------|--------|-------|---------------------|-----------------|
| Pipe Size            | Rod Size A | B      | C     | Max. Rec. Load Lbs. | Approx. Wt./100 |
| 1/2                  | 3/8        | 2 1/2  | 2     | 400                 | 8               |
| 3/4                  | 3/8        | 2 1/2  | 2     | 400                 | 8               |
| 1                    | 3/8        | 2 7/8  | 2 1/8 | 400                 | 9               |
| 1 1/4                | 3/8        | 3 3/8  | 2 1/2 | 400                 | 10              |
| 1 1/2                | 3/8        | 3 1/2  | 2 1/2 | 400                 | 11              |
| 2                    | 3/8        | 3 3/4  | 2 1/2 | 400                 | 12              |
| 2 1/2                | 3/8        | 5 1/8  | 3 5/8 | 600                 | 24              |
| 3                    | 3/8        | 5 3/8  | 3 1/2 | 600                 | 27              |
| 3 1/2                | 3/8        | 6 3/4  | 4 5/8 | 600                 | 32              |
| 4                    | 3/8        | 6 3/4  | 4 1/2 | 1000                | 33              |
| 5                    | 1/2        | 8 3/8  | 5 1/2 | 1250                | 60              |
| 6                    | 1/2        | 9 3/8  | 6     | 1250                | 68              |
| 8                    | 1/2        | 12 3/8 | 8     | 1250                | 130             |

## Fig. 98 - Rod Stiffener

## Fig. 98B - Rod Stiffener w/Break-off Bolt Head

**Size Range** — Secures 3/8" thru 7/8" hanger rod

**Material** — Carbon Steel

**Function** — Secures channel to hanger rod for vertical seismic bracing.

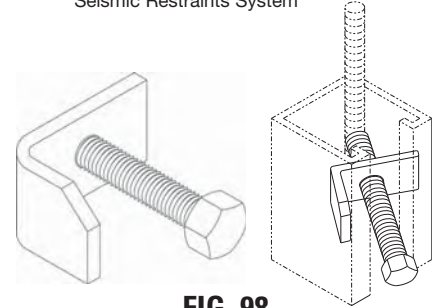
**Approvals** — Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development (**OSHPD**). For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines

**Finish** — Electro Galvanized

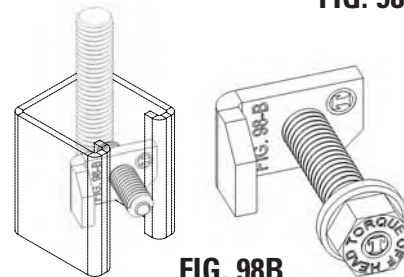
**Note** — Available in HDG finish or Stainless Steel materials.

**Order By** — Figure number

Component of State of  
California OSHPD Approved  
Seismic Restraints System



**FIG. 98**



**FIG. 98B**

## Fig. 99 - All Thread Rod Cut to Length

**Size Range** — Secures 3/8" thru 7/8" rod in 1" increments

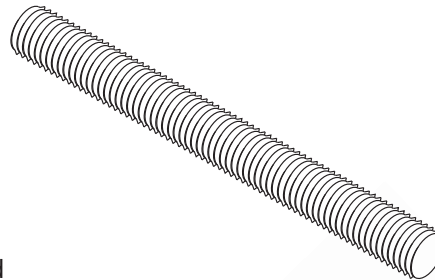
**Material** — Carbon Steel

**Maximum Temperature** — 750°F

**Finish** — Plain

**Note** — Available in Electro-Galvanized and HDG finish or Stainless Steel materials.

**Order By** — Figure number, rod diameter, rod length and finish



### Dimensions

| Rod Size | Max. Rec. Load Lbs.<br>For Service Temp<br>650°F |
|----------|--------------------------------------------------|
| 3/8      | 730                                              |
| 1/2      | 1350                                             |
| 5/8      | 2160                                             |
| 3/4      | 3230                                             |
| 7/8      | 4480                                             |

## Fig. 100 - All Thread Rod Full Length

**Size Range** — Secures 3/8" thru 1½" rod in 10' lengths

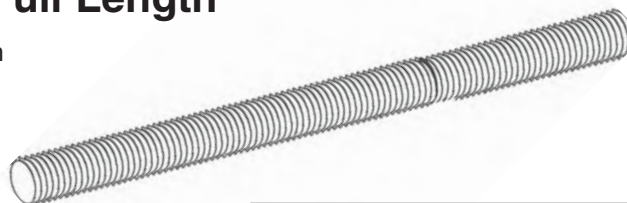
**Material** — Carbon Steel

**Maximum Temperature** — 750°F

**Finish** — Plain

**Note** — Available in Electro-Galvanized and HDG finish or Stainless Steel materials.

**Order By** — Figure number, rod diameter and finish



### Dimensions • Weights

| Rod Size | Max Rec. Load Lbs.<br>For Service Temps<br>650°F | Approx.<br>Wt./100 |
|----------|--------------------------------------------------|--------------------|
| 1/4      | 240                                              | 12                 |
| 3/8      | 730                                              | 29                 |
| 1/2      | 1350                                             | 53                 |
| 5/8      | 2160                                             | 84                 |
| 3/4      | 3230                                             | 123                |
| 7/8      | 4480                                             | 169                |
| 1        | 5900                                             | 222                |
| 1¼       | 9500                                             | 360                |
| 1½       | 13800                                            | 510                |

## Fig. 68S and 68W - Malleable, Reversible Beam Clamps 3/4" and 1-1/4" Throat Openings



**Size Range** — 3/8" thru 7/8" rod

**Material** — Cast Malleable Steel with hardened cup point set screw and jam nut

**Function** — Recommended for hanging from steel beam where flange thickness does not exceed 3/4" (Fig. 68S) or 1-1/4" (Fig. 68W)

**Features** — May be used on top or bottom flange of the beam. Beveled lip allows hanging from top flange where clearance is limited. may be installed with the set screw in the up or down position. Offset design permits unlimited rod adjustment by allowing the rod to be threaded completely through the clamp. The rear window design permits inspection of thread engagement.

**Approvals** — Factory Mutual Engineering Approved. Underwriters Laboratories Listed. Conforms to Federal Specification WW-H-171E, Type 23 and Manufacturers Standardization Society SP-58, Type 19. Fig. 68S 3/8" is cULus Listed to support up to 4" pipe with the set screw in the down position, up to 3" pipe with the set screw in the up position. Fig. 68S 1/2" is cULus Listed to support up to 8" pipe with the set screw in the down position, up to 6" pipe with the set screw in the up position. Fig. 68W 3/8" is cULus Listed to support up to 4" pipe with the set screw in the down position, up to 4" pipe with the set screw in the up position. Fig. 68W 1/2" is cULus Listed to support up to 6" pipe with the set screw in the down position, up to 6" pipe with the set screw in the up position. Factory Mutual Engineering approved only with the set screw in the down position.

**Finish** — Plain

**Note** — Available in Electro-Galvanized and HDG finish

**Order By** — Figure number, rod size & finish

**Fig. 68S**

| Dimensions • Weights |     |        |     |       |      |        |                          |                                  |                                    |                 |
|----------------------|-----|--------|-----|-------|------|--------|--------------------------|----------------------------------|------------------------------------|-----------------|
| Rod Size             | A   | B      | C   | D     | E    | F      | Max. Rec. Torque Ft/Lbs. | Max. Rec. Load Lbs. Set screw up | Max. Rec. Load Lbs. Set screw down | Approx. Wt./100 |
| 3/8                  | 3/8 | 1-1/2  | 3/4 | 1-1/8 | 7/16 | 7/8    | 5                        | 610                              | 610                                | 32              |
| 1/2                  | 3/8 | 1-5/8  | 3/4 | 1     | 7/16 | 1-1/8  | 5                        | 750                              | 1130                               | 54              |
| 5/8                  | 1/2 | 1-9/16 | 3/4 | 1     | 9/16 | 1-1/8  | 11                       | 750                              | 1130                               | 50              |
| 3/4                  | 1/2 | 1-3/4  | 3/4 | 1-1/8 | 9/16 | 1-1/4  | 11                       | 750                              | 1130                               | 81              |
| 7/8                  | 1/2 | 1-3/4  | 3/4 | 1-1/8 | 9/16 | 1-5/16 | 11                       | 750                              | 1130                               | 75              |

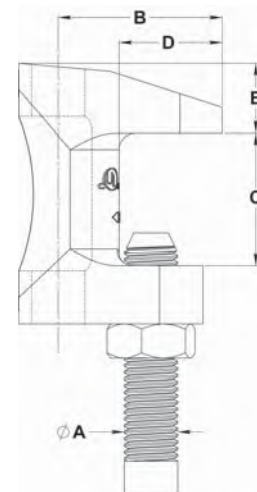
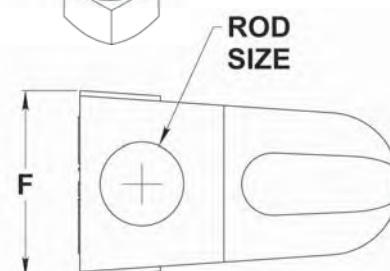
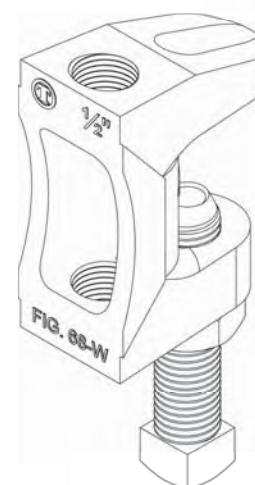
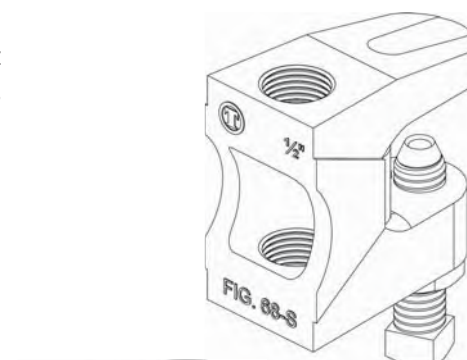
**Fig. 68W**

| Dimensions • Weights |     |        |       |       |      |        |                          |                                  |                                    |                 |
|----------------------|-----|--------|-------|-------|------|--------|--------------------------|----------------------------------|------------------------------------|-----------------|
| Rod Size             | A   | B      | C     | D     | E    | F      | Max. Rec. Torque Ft/Lbs. | Max. Rec. Load Lbs. Set screw up | Max. Rec. Load Lbs. Set screw down | Approx. Wt./100 |
| 3/8                  | 3/8 | 1-9/16 | 1-1/4 | 1-1/8 | 7/16 | 13/16  | 5                        | 610                              | 610                                | 41              |
| 1/2                  | 1/2 | 1-9/16 | 1-1/4 | 1     | 5/8  | 1-1/8  | 5                        | 750                              | 1130                               | 66              |
| 5/8                  | 1/2 | 1-1/2  | 1-1/4 | 1     | 9/16 | 1-1/8  | 11                       | 750                              | 1130                               | 68              |
| 3/4                  | 1/2 | 1-3/4  | 1-1/4 | 1-1/8 | 3/8  | 1-1/4  | 11                       | 750                              | 1130                               | 110             |
| 7/8                  | 1/2 | 1-3/4  | 1-1/4 | 1-1/8 | 9/16 | 1-5/16 | 11                       | 750                              | 1130                               | 98              |

NOTE: Install per set screw requirements of MSS SP-58; 3/8" = 5ft/lbs., 1/2" = 11ft/lbs.

Since torque wrenches are generally not used or available on most job sites.

Standard practice is to tighten the set screw "finger tight" then additionally tighten 1/4 turn.



**VALVES**

## FireLock® Butterfly Valve

### SERIES 705W WITH WEATHERPROOF ACTUATOR

The Series 705W butterfly valve features an approved weatherproof actuator housing approved for indoor or outdoor use. It has a ductile iron body and disc with EPDM disc coating. The body is coated with a heat fused polyphenylene sulfide blend to meet FM requirements. Designed for fire protection services only. Series 705W valve is UL Listed and FM Approved for 300 psi/2065 kPa service. The Series 705W is also LPCB approved for 20 Bar and VdS approved for 16 Bar service. Contact Victaulic for details of agency approvals.

#### WEATHERPROOF ACTUATOR

Pre-wired supervisory switches that monitor the valve in the fully open position for all sizes.

#### OPTIONAL SUPPLY-SIDE TAP

Series 705W valves are available with a ½" NPT supply side tap designed to allow direct water supply connection to Victaulic FireLock actuated fire protection valves. See separate drawings below. This is an optional feature and must be clearly noted on all orders.



CSFM: 7770-0531:113



#### MATERIAL SPECIFICATIONS

**Body:** Ductile iron conforming to ASTM A-536, coated with polyphenylene sulfide blend.

**Disc:** Ductile iron conforming to ASTM A-536, various grades, EPDM coated.

#### Disc Coating:

- **Grade "E" EPDM**

EPDM (Green color code). Temperature range –30°F to +230°F/–34°C to +110°C.

Recommended for cold and hot water service within the specified temperature range plus a variety of dilute acids, oil-free air and many chemical services. UL classified in accordance with ANSI/NSF 61 for cold +86°F/+30°C and hot +180°F/+82°C potable water service. NOT RECOMMENDED FOR PETROLEUM SERVICES.

**Stem Bearings:** Teflon impregnated fiberglass with stainless steel backing.

**Stem Bearing Nuts:** Type 416 Stainless Steel.

**Tap Plug:** Carbon steel, plated.

**O-Ring:** EPDM

**Bracket:** Carbon steel, painted.

#### Actuator:

- 2½ – 8"/65 – 200mm: Bronze traveling nut on a steel lead screw, in a ductile iron housing.
- 10 – 12"/250 – 300mm: Steel worm and cast iron quadrant gear, in a cast iron housing.

#### JOB/OWNER

System No. \_\_\_\_\_

Location \_\_\_\_\_

#### CONTRACTOR

Submitted By \_\_\_\_\_

Date \_\_\_\_\_

#### ENGINEER

Spec Sect \_\_\_\_\_ Para \_\_\_\_\_

Approved \_\_\_\_\_

Date \_\_\_\_\_

# FireLock® Butterfly Valve

**SERIES 705W  
WITH WEATHERPROOF ACTUATOR**

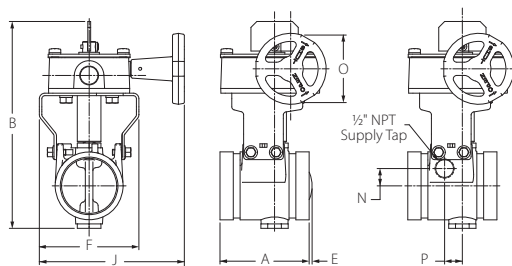
**DIMENSIONS –**   

| Size                         |                                         | Dimensions – inches/millimeters |                |              |                |                |               |                 |              | Aprx. Wgt. Each |
|------------------------------|-----------------------------------------|---------------------------------|----------------|--------------|----------------|----------------|---------------|-----------------|--------------|-----------------|
| Nominal Size<br>inches<br>mm | Actual Outside Diameter<br>inches<br>mm | End to End<br>“A”               | Hgt.<br>“B”    | “E”          | “F”            | “J”            | “O”           | “N” ‡           | “P” ‡        | lbs/kg          |
| 2½<br>65                     | 2.875<br>73.0                           | 3.77<br>95.6                    | 8.76<br>222.5  | —            | 4.21<br>106.9  | 6.08<br>154.4  | 3.00<br>76.2  | 0.00 *<br>0.0 * | 0.75<br>19.1 | 8.3<br>3.8      |
| 76.1 mm                      | 3.000<br>76.1                           | 3.77<br>95.6                    | 8.76<br>222.5  | —            | 4.21<br>106.9  | 6.08<br>154.4  | 3.00<br>76.2  | 0.00 *<br>0.0 * | 0.75<br>19.1 | 8.3<br>3.8      |
| 3<br>80                      | 3.500<br>88.9                           | 3.77<br>95.6                    | 9.40<br>238.8  | 0.08<br>2.0  | 4.21<br>106.9  | 6.08<br>154.4  | 3.00<br>76.2  | 0.00 *<br>0.0 * | 0.75<br>19.1 | 8.9<br>4.0      |
| 4<br>100                     | 4.500<br>114.3                          | 4.63<br>117.6                   | 10.84<br>275.3 | 0.07<br>1.8  | 6.01<br>152.7  | 6.98<br>177.3  | 3.00<br>76.2  | 0.73<br>18.5    | 1.13<br>28.7 | 14.9<br>6.8     |
| 139.7 mm                     | 5.500<br>139.7                          | 5.88<br>149.4                   | 12.38<br>314.5 | 0.43<br>10.9 | 6.01<br>152.7  | 8.57<br>217.7  | 4.50<br>114.3 | —               | —            | 21.0<br>9.5     |
| 5<br>125                     | 5.563<br>141.3                          | 5.88<br>149.4                   | 12.38<br>314.5 | 0.43<br>10.9 | 6.01<br>152.7  | 8.57<br>217.7  | 4.50<br>114.3 | —               | —            | 21.0<br>9.5     |
| 165.1 mm                     | 6.500<br>165.1                          | 5.88<br>149.4                   | 13.41<br>340.6 | 1.00<br>25.4 | 7.51<br>190.8  | 9.32<br>236.7  | 4.50<br>114.3 | 1.60<br>40.6    | 1.88<br>47.8 | 26.5<br>12.0    |
| 6<br>150                     | 6.625<br>168.3                          | 5.88<br>149.4                   | 13.41<br>340.6 | 1.00<br>25.4 | 7.51<br>190.8  | 9.32<br>236.7  | 4.50<br>114.3 | 1.60<br>40.6    | 1.88<br>47.8 | 26.5<br>12.0    |
| 8<br>200                     | 8.625<br>219.1                          | 5.33<br>135.4                   | 16.50<br>419.1 | 1.27<br>32.3 | 9.65<br>245.1  | 10.98<br>278.9 | 6.30<br>160.0 | 0.00 *<br>0.0 * | 0.68<br>17.3 | 43.0<br>19.5    |
| 10<br>250                    | 10.750<br>273.0                         | 6.40<br>162.6                   | 19.14<br>486.2 | 1.72<br>43.7 | 12.20<br>309.9 | 16.19<br>411.2 | 9.00<br>228.6 | —               | —            | 80.0<br>36.3    |
| 12<br>300                    | 12.750<br>323.9                         | 6.50<br>165.1                   | 21.54<br>547.1 | 2.66<br>67.6 | 14.25<br>362.0 | 17.22<br>437.4 | 9.00<br>228.6 | —               | —            | 102.0<br>46.3   |

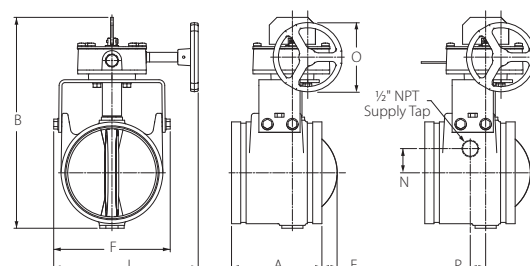
\* On Centerline

‡ These dimensions apply only to a Series 705W Butterfly Valve with a ½-inch NPT, supply-side tap

1. To prevent rotation of valves, it is recommended that Series 705W be installed with Victaulic Style 07 Zero-Flex®, Style 005 FireLock, Style 009/009V FireLock EZ, or Style HP-70 Rigid Couplings. If Victaulic flexible couplings are used, additional support may be required.
2. Valve must not be installed with disc in full open position. Disc must be partly closed so that no part is protruding beyond end of valve body.
3. Victaulic grooved end butterfly valves are permitted for use with grooved end pipe (IPS) only. Not permitted for use with plain end (IP) pipe.
4. Series 705W valves are designed for ambient weather conditions as opposed to submersible service.



2 ½ – 4-INCH/65 – 100-MM SIZES



5 – 12-INCH/125 – 300-MM SIZES

# FireLock® Butterfly Valve

**SERIES 705W  
WITH WEATHERPROOF ACTUATOR**

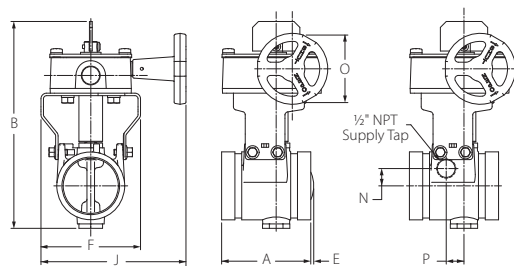
**DIMENSIONS –**     

| Size                         |                                         | Dimensions – inches/millimeters |                |              |                |                |               |                 |              | Aprx. Wgt. Each |
|------------------------------|-----------------------------------------|---------------------------------|----------------|--------------|----------------|----------------|---------------|-----------------|--------------|-----------------|
| Nominal Size<br>inches<br>mm | Actual Outside Diameter<br>inches<br>mm | End to End<br>"A"               | Hgt.<br>"B"    | "E"          | "F"            | "J"            | "O"           | "N" ‡           | "P" ‡        | lbs/kg          |
| 76.1 mm                      | 3.000<br>76.1                           | 3.77<br>95.6                    | 8.76<br>222.5  | —            | 4.21<br>106.9  | 6.08<br>154.4  | 4.50<br>114.3 | 0.00 *<br>0.0 * | 0.75<br>19.1 | 8.3<br>3.8      |
| 3<br>80                      | 3.500<br>88.9                           | 3.77<br>95.6                    | 9.40<br>238.8  | 0.08<br>2.0  | 4.21<br>106.9  | 6.08<br>154.4  | 4.50<br>114.3 | 0.00 *<br>0.0 * | 0.75<br>19.1 | 8.9<br>4.0      |
| 4<br>100                     | 4.500<br>114.3                          | 4.63<br>117.6                   | 10.84<br>275.3 | 0.07<br>1.8  | 6.01<br>152.7  | 6.98<br>177.3  | 4.50<br>114.3 | 0.73<br>18.5    | 1.13<br>28.7 | 14.9<br>6.8     |
| 139.7 mm                     | 5.500<br>139.7                          | 5.88<br>149.4                   | 12.38<br>314.5 | 0.43<br>10.9 | 6.01<br>152.7  | 8.57<br>217.7  | 7.87<br>200   | —               | —            | 21.0<br>9.5     |
| 6<br>150                     | 6.625<br>168.3                          | 5.88<br>149.4                   | 13.41<br>340.6 | 1.00<br>25.4 | 7.51<br>190.8  | 9.32<br>236.7  | 7.87<br>200   | 1.60<br>40.6    | 1.88<br>47.8 | 26.5<br>12.0    |
| 8<br>200                     | 8.625<br>219.1                          | 5.33<br>135.4                   | 16.50<br>419.1 | 1.27<br>32.3 | 9.65<br>245.1  | 10.98<br>278.9 | 7.87<br>200   | 0.00 *<br>0.0 * | 0.68<br>17.3 | 43.0<br>19.5    |
| 10<br>250                    | 10.750<br>273.0                         | 6.40<br>162.6                   | 19.14<br>486.2 | 1.72<br>43.7 | 12.20<br>309.9 | 16.19<br>411.2 | 9.84<br>250   | —               | —            | 80.0<br>36.3    |
| 12<br>300                    | 12.750<br>323.9                         | 6.50<br>165.1                   | 21.54<br>547.1 | 2.66<br>67.6 | 14.25<br>362.0 | 17.22<br>437.4 | 9.84<br>250   | —               | —            | 102.0<br>46.3   |

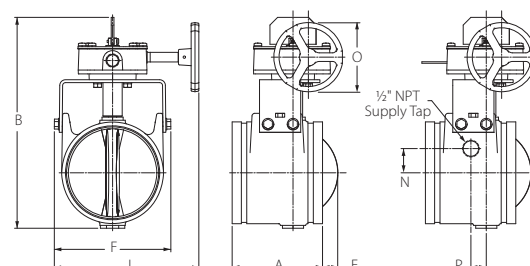
\* On Centerline

‡ These dimensions apply only to a Series 705W Butterfly Valve with a ½-inch NPT, supply-side tap

1. To prevent rotation of valves, it is recommended that Series 705W be installed with Victaulic Style 07 Zero-Flex®, Style 005 FireLock, Style 009/009V FireLock EZ, or Style HP-70 Rigid Couplings. If Victaulic flexible couplings are used, additional support may be required.
2. Valve must not be installed with disc in full open position. Disc must be partly closed so that no part is protruding beyond end of valve body.
3. Victaulic grooved end butterfly valves are permitted for use with grooved end pipe (IPS) only. Not permitted for use with plain end (IPS) pipe.
4. Series 705W valves are designed for ambient weather conditions as opposed to submersible service.



76.1MM – 4-INCH/65 – 100-MM NOMINAL SIZES



139.7MM – 12-INCH/125 – 300-MM NOMINAL SIZES

## FireLock® Butterfly Valve

**SERIES 705W  
WITH WEATHERPROOF ACTUATOR**

### PERFORMANCE

The chart expresses the frictional resistance of Victaulic Series 705W in equivalent feet/meters of straight pipe.

| Size                         |                                         |                       | Size                         |                                         |                       |
|------------------------------|-----------------------------------------|-----------------------|------------------------------|-----------------------------------------|-----------------------|
| Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm | Equiv. Feet/m of Pipe | Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm | Equiv. Feet/m of Pipe |
| 2½<br>65                     | 2.875<br>73.0                           | 5<br>1.6              | 165.1 mm                     | 6.500<br>165.1                          | 8<br>2.5              |
| 76.1 mm                      | 3.000<br>76.1                           | 5<br>1.6              | 6<br>150                     | 6.625<br>168.3                          | 8<br>2.5              |
| 3<br>80                      | 3.500<br>88.9                           | 5<br>1.6              | 8<br>200                     | 8.625<br>219.1                          | 11<br>3.4             |
| 4<br>100                     | 4.500<br>114.3                          | 12<br>3.7             | 10<br>250                    | 10.750<br>273.0                         | 12<br>3.7             |
| 139.7 mm                     | 5.500<br>139.7                          | 12<br>3.7             | 12<br>300                    | 12.750<br>323.9                         | 14<br>4.3             |
| 5<br>125                     | 5.563<br>141.3                          | 12<br>3.7             |                              |                                         |                       |

### MAXIMUM WORKINGS PRESSURE RATINGS

| Size                         |                                         | Maximum Working Pressure by Agency |           |             |            |
|------------------------------|-----------------------------------------|------------------------------------|-----------|-------------|------------|
| Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm | cULus<br>PSI                       | FM<br>PSI | LPCB<br>BAR | Vds<br>BAR |
| 2½<br>65                     | 2.875<br>73.0                           | 300                                | 300       | 20          | —          |
| 76.1 mm                      | 3.000<br>76.1                           | 300                                | 300       | 20          | 16         |
| 3<br>80                      | 3.500<br>88.9                           | 300                                | 300       | 20          | 16         |
| 4<br>100                     | 4.500<br>114.3                          | 300                                | 300       | 20          | 16         |
| 139.7 mm                     | 5.500<br>139.7                          | 300                                | 300       | 20          | 16         |
| 5<br>125                     | 5.563<br>141.3                          | 300                                | 300       | 20          | —          |
| 165.1                        | 6.500<br>165.1                          | 300                                | 300       | 20          | —          |
| 6<br>150                     | 6.625<br>168.3                          | 300                                | 300       | 20          | 16         |
| 8<br>200                     | 8.625<br>219.1                          | 300                                | 300       | 20          | 16         |
| 10<br>250                    | 10.750<br>273.0                         | 300                                | 300       | 20          | 16         |
| 12<br>300                    | 12.750<br>323.9                         | 300                                | 300       | 20          | 16         |



# FireLock® Butterfly Valve

**SERIES 705W**  
**WITH WEATHERPROOF ACTUATOR**

## PERFORMANCE

C<sub>v</sub> values for flow of water at +60°F/+16°C with a fully open valve are shown in the table below. For additional details, contact Victaulic.

Formulas for C<sub>v</sub> Values:

$$\Delta P = \frac{Q^2}{C_v^2}$$

$$Q = C_v \times \sqrt{\Delta P}$$

**Where:**

Q = Flow (GPM)

ΔP = Pressure Drop (psi)

C<sub>v</sub> = Flow Coefficient

| Size                         |                                         | C <sub>v</sub> | Size                         |                                         | C <sub>v</sub> | Size                         |                                         | C <sub>v</sub> |
|------------------------------|-----------------------------------------|----------------|------------------------------|-----------------------------------------|----------------|------------------------------|-----------------------------------------|----------------|
| Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm |                | Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm |                | Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm |                |
| 2½<br>65                     | 2.875<br>73.0                           | 325            | 139.7 mm                     | 5.500<br>139.7                          | 1150           | 8<br>200                     | 8.625<br>219.1                          | 3400           |
| 76.1 mm                      | 3.000<br>76.1                           | 325            | 5<br>125                     | 5.563<br>141.3                          | 1150           | 10<br>250                    | 10.750<br>273.0                         | 5750           |
| 3<br>80                      | 3.500<br>88.9                           | 482            | 165.1 mm                     | 6.500<br>165.1                          | 1850           | 12<br>300                    | 12.750<br>323.9                         | 8300           |
| 4<br>100                     | 4.500<br>114.3                          | 600            | 6<br>150                     | 6.625<br>168.3                          | 1850           |                              |                                         |                |

Formulas for K<sub>v</sub> Values:

$$\Delta P = \frac{Q^2}{K_v^2}$$

$$Q = K_v \times \sqrt{\Delta P}$$

**Where:**

Q = Flow ( $\frac{m^3}{hr.}$ )

ΔP = Pressure (bar)

K<sub>v</sub> = Flow Factor

| Size                         |                                         | K <sub>v</sub> | Size                         |                                         | K <sub>v</sub> | Size                         |                                         | K <sub>v</sub> |
|------------------------------|-----------------------------------------|----------------|------------------------------|-----------------------------------------|----------------|------------------------------|-----------------------------------------|----------------|
| Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm |                | Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm |                | Nominal Size<br>Inches<br>mm | Actual Outside Diameter<br>Inches<br>mm |                |
| 2½<br>65                     | 2.875<br>73.0                           | 280            | 139.7 mm                     | 5.500<br>139.7                          | 995            | 8<br>200                     | 8.625<br>219.1                          | 2940           |
| 76.1 mm                      | 3.000<br>76.1                           | 280            | 5<br>125                     | 5.563<br>141.3                          | 995            | 10<br>250                    | 10.750<br>273.0                         | 4975           |
| 3<br>80                      | 3.500<br>88.9                           | 415            | 165.1 mm                     | 6.500<br>165.1                          | 1600           | 12<br>300                    | 12.750<br>323.9                         | 7180           |
| 4<br>100                     | 4.500<br>114.3                          | 520            | 6<br>150                     | 6.625<br>168.3                          | 1600           |                              |                                         |                |

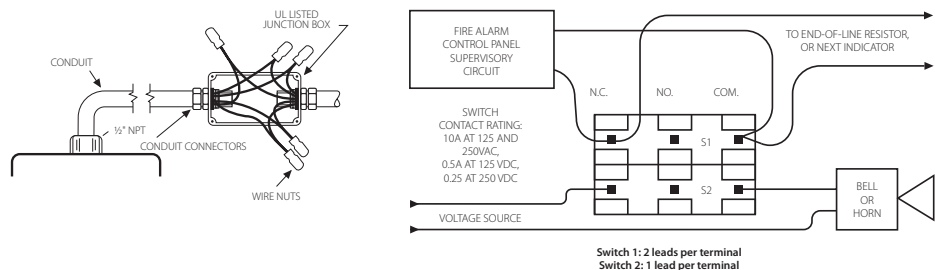
## FireLock® Butterfly Valve

**SERIES 705W  
WITH WEATHERPROOF ACTUATOR**

### SWITCH AND WIRING

1. The supervisory switch contains two, single pole, double throw, pre-wired switches.
2. Switches are rated:
  - 10 amps @ 125 or 250 VAC/60 Hz
  - 0.50 amps @ 125 VDC
  - 0.25 amps @ 250 VDC
3. Switches supervise the valve in the “open” position.
4. One switch has two #18 MTW wires per terminal, which permit complete supervision of leads (refer to diagrams and notes below). The second switch has one #18 MTW wire per terminal. This double circuit provides flexibility to operate two electrical devices at separate locations, such as an indicating light and an audible alarm, in the area that the valve is installed.
5. A #14 MTW ground lead (green) is provided.
  - Switch #1 = S1 For connection to the supervisory circuit of a UL Listed alarm control panel
  - Switch #2 = S2 Auxiliary switch that may be connected to auxiliary devices, per the authority having jurisdiction

|    |   |                                          |
|----|---|------------------------------------------|
| S1 | { | Normally Closed: (2) Blue                |
|    |   | Common: (2) Yellow                       |
| S2 | { | Normally Closed: Blue with Orange Stripe |
|    |   | Normally Open: Brown with Orange Stripe  |
|    |   | Common: Yellow with Orange Stripe        |



NOTE: The above diagram shows a connection between the common terminal (yellow – S1 and yellow-with-orange stripe – S2) and the normally closed terminal (blue – S1 and blue-with-orange stripe – S2). In this example, the indicator light and alarm will stay on until the valve is fully open. When the valve is fully open, the indicator light and alarm will go out. Cap off any unused wires (e.g. brown with orange stripe).

Only S1 (two leads per terminal) may be connected to the fire alarm control panel.

The connection of the alarm switch wiring shall be in accordance with NFPA 72 and the auxiliary switch per NFPA 70 (NEC).

## FireLock® Butterfly Valve

SERIES 705W  
WITH WEATHERPROOF ACTUATOR

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### WARRANTY

Refer to the Warranty section of the current Price List or contact Victaulic for details.

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### NOTE

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

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### INSTALLATION

Reference should always be made to the installation sheet included with the valve. Verify you have the latest revision by visiting our website at [www.victaulic.com](http://www.victaulic.com). Further reference can be found in the I-100 Victaulic Field Installation Handbook.



WCAS-7HFF85

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For complete contact information, visit [www.victaulic.com](http://www.victaulic.com)

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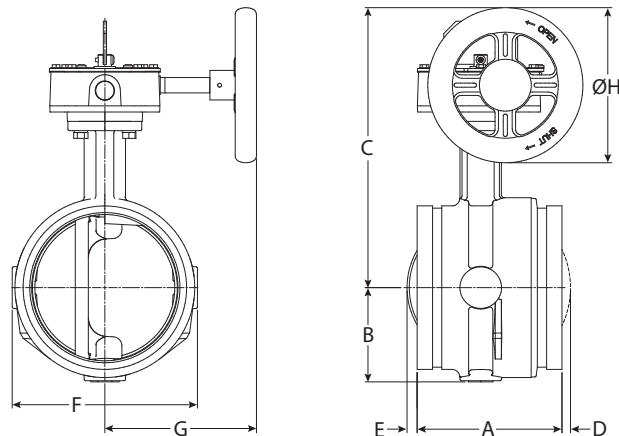
# FireLock® Butterfly Valve with Weatherproof Actuator

Series 765 (365-psi/25-Bar/2516-kPa)

Series 705 (300-psi/21-Bar/2068-kPa)

## DIMENSIONS

| Size                      |                                    | Dimensions – inches/millimeters |               |                |              |              |                |               |               | Aprx. Wgt. Each |
|---------------------------|------------------------------------|---------------------------------|---------------|----------------|--------------|--------------|----------------|---------------|---------------|-----------------|
| Nominal Size<br>inches/mm | Pipe Outside Diameter<br>inches/mm | End to End<br>"A"               | "B"           | "C"            | "D"          | "E"          | "F"            | "G"           | "gH"          | lbs/kg          |
| 2<br>50                   | 2.375<br>60.3                      | 4.25<br>108.0                   | 2.28<br>57.9  | 6.41<br>162.8  | —            | —            | 4.00<br>101.6  | 4.22<br>107.2 | 4.50<br>114.3 | 9.5<br>4.3      |
| 2½<br>65                  | 2.875<br>73.0                      | 3.77<br>95.8                    | 2.28<br>57.9  | 7.54<br>191.5  | —            | —            | 4.00<br>101.6  | 4.22<br>107.2 | 4.50<br>114.3 | 9.4<br>4.2      |
| 76.1 mm                   | 3.000<br>76.1                      | 3.77<br>95.8                    | 2.28<br>57.9  | 7.54<br>191.5  | —            | —            | 4.00<br>101.6  | 4.22<br>107.2 | 4.50<br>114.3 | 9.4<br>4.2      |
| 3<br>80                   | 3.500<br>88.9                      | 3.77<br>95.8                    | 2.53<br>64.3  | 7.79<br>197.9  | —            | —            | 4.50<br>114.3  | 4.22<br>107.2 | 4.50<br>114.3 | 10.2<br>4.6     |
| 108.0 mm                  | 4.250<br>108.0                     | 4.63<br>117.6                   | 2.88<br>73.2  | 8.81<br>223.8  | —            | —            | 5.50<br>139.7  | 4.22<br>107.2 | 4.50<br>114.3 | 13.8<br>6.2     |
| 4<br>100                  | 4.500<br>114.3                     | 4.63<br>117.6                   | 2.88<br>73.2  | 8.81<br>223.8  | —            | —            | 5.50<br>139.7  | 4.22<br>107.2 | 4.50<br>114.3 | 13.8<br>6.2     |
| 133.0 mm                  | 5.250<br>133.0                     | 5.88<br>149.4                   | 3.35<br>85.1  | 10.88<br>276.4 | —            | —            | 6.56<br>166.6  | 6.19<br>157.2 | 6.30<br>160.0 | 23.4<br>10.6    |
| 139.7 mm                  | 5.500<br>139.7                     | 5.88<br>149.4                   | 3.35<br>85.1  | 10.88<br>276.4 | —            | —            | 6.56<br>166.6  | 6.19<br>157.2 | 6.30<br>160.0 | 23.4<br>10.6    |
| 5<br>125                  | 5.563<br>141.3                     | 5.88<br>149.4                   | 3.35<br>85.1  | 10.88<br>276.4 | —            | —            | 6.56<br>166.6  | 6.19<br>157.2 | 6.30<br>160.0 | 23.4<br>10.6    |
| 159.0 mm                  | 6.250<br>159.0                     | 5.88<br>149.4                   | 3.84<br>97.5  | 11.38<br>289.1 | —            | 0.41<br>10.4 | 7.52<br>191.0  | 6.19<br>157.2 | 6.30<br>160.0 | 26.5<br>12.0    |
| 165.1 mm                  | 6.500<br>165.1                     | 5.88<br>149.4                   | 3.84<br>97.5  | 11.38<br>289.1 | —            | 0.41<br>10.4 | 7.52<br>191.0  | 6.19<br>157.2 | 6.30<br>160.0 | 26.5<br>12.0    |
| 6<br>150                  | 6.625<br>168.3                     | 5.88<br>149.4                   | 3.84<br>97.5  | 11.38<br>289.1 | —            | 0.41<br>10.4 | 7.52<br>191.0  | 6.19<br>157.2 | 6.30<br>160.0 | 26.5<br>12.0    |
| 8<br>200                  | 8.625<br>219.1                     | 5.33<br>135.4                   | 5.07<br>128.8 | 12.63<br>320.8 | 0.80<br>20.3 | 1.47<br>37.3 | 10.00<br>254.0 | 6.19<br>157.2 | 6.30<br>160.0 | 41.0<br>18.5    |
| 10<br>250                 | 10.750<br>273.0                    | 6.40<br>162.6                   | 6.37<br>161.8 | 15.64<br>397.3 | 1.41<br>35.8 | 1.81<br>46.0 | 12.25<br>311.2 | 5.30<br>134.6 | 9.00<br>228.6 | 88.0<br>39.9    |
| 12<br>300                 | 12.750<br>323.9                    | 6.50<br>165.1                   | 7.36<br>186.9 | 16.64<br>422.7 | 2.30<br>58.4 | 2.80<br>71.1 | 14.25<br>362.0 | 5.30<br>134.6 | 9.00<br>228.6 | 104.0<br>47.1   |



# FireLock® Butterfly Valve with Weatherproof Actuator

Series 765 (365-psi/25-Bar/2516-kPa)

Series 705 (300-psi/21-Bar/2068-kPa)

## IMPORTANT INSTALLATION INFORMATION

**⚠ WARNING**




- Read and understand all instructions before attempting to install any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, adjust, or maintain any Victaulic piping products.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in serious personal injury and/or property damage.

- Series 765 Butterfly Valves in 2 – 12-inch/60.3 – 323.9-mm sizes are cULus Listed for 365-psi/25-Bar/2516-kPa working pressure for indoor or outdoor use. The 2 – 8-inch/60.3 – 219.1-mm sizes are FM Approved for 365-psi/25-Bar/2516-kPa working pressure for indoor or outdoor use, and the 10 – 12-inch/273.0 – 323.9-mm sizes are FM Approved for 300-psi/20.7-Bar/2068-kPa working pressure for indoor or outdoor use.
- Series 705 Butterfly Valves are cULus Listed and FM Approved for 300-psi/21-Bar/2068-kPa working pressure for indoor or outdoor use.
- Flow performance for Series 765 and 705 Butterfly Valves satisfies UL Specification 1091.
- Installation of Series 765 and 705 Butterfly Valves must be made in accordance with NFPA 13 and NFPA 72.
- Series 765 and 705 Butterfly Valves are designed for ambient weather conditions. DO NOT use these valves in submersible services.
- DO NOT install valves with the disc in the full-open position. Make sure no part of the disc protrudes beyond the end of the valve body.
- Use ONLY grooved-end, IPS carbon steel pipe with Series 765 and Series 705 Butterfly Valves. DO NOT use plain-end IPS pipe or grooved cast ductile iron pipe.
- To prevent valves from rotating in the system, Victaulic recommends installing Series 765 and 705 Butterfly Valves with at least one Victaulic rigid coupling. If two Victaulic flexible couplings are used, additional support may be required to prevent the valve from rotating. Refer to the instructions, supplied with the couplings, for proper installation.
- Series 765 and 705 Butterfly Valves are not designed for use with handle extensions or chain-wheel operators.
- For outdoor applications, a weatherproof conduit and conduit connection MUST be installed on the housing to protect internal switches. Store the valve in a dry area prior to installation.**
- In the event of actuator failure, contact Victaulic. Only Victaulic replacement parts must be used.

**⚠ CAUTION**

- Use ONLY Victaulic replacement parts.

Failure to follow this instruction may cause improper valve operation, resulting in property damage.

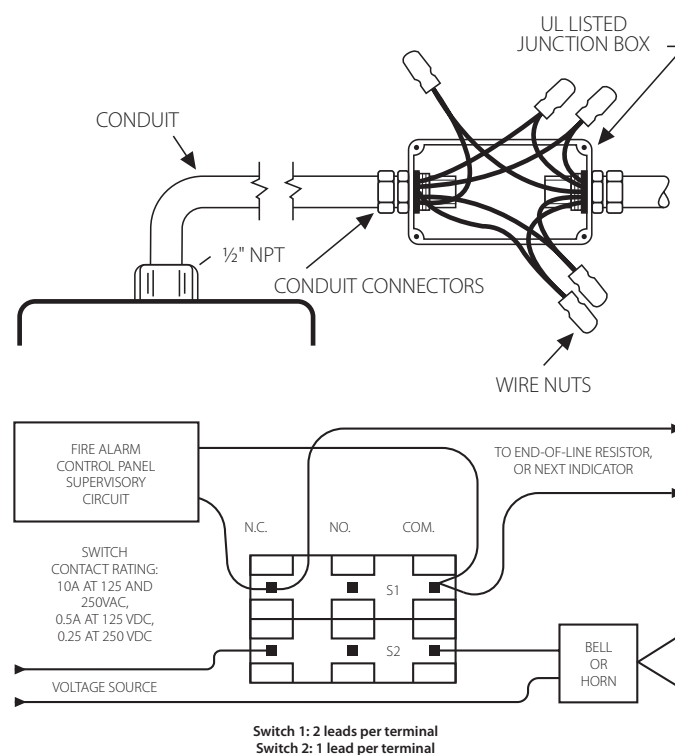
## INSTALLATION INSTRUCTIONS

- To prevent damage to the disc during installation, turn the hand wheel so that the disc is in the “SHUT” position. No portion of the disc should extend beyond the end of the valve body during installation.
- Install Series 765 and 705 Butterfly Valves with at least one Victaulic rigid coupling. Refer to the “Important Information” section on the previous page. When installing Victaulic couplings, the nuts must be tightened evenly to obtain metal-to-metal contact at the bolts pads. Always refer to the instructions, supplied with the coupling, or the I-100 Field Installation Handbook for complete installation instructions.

## SWITCH AND WIRING

- The supervisory switch contains two, single pole, double throw, pre-wired switches.
- Switches are rated:  
10 amps @ 125 or 250 VAC/60 Hz  
0.50 amps @ 125 VDC  
0.25 amps @ 250 VDC
- Switches supervise the valve in the “OPEN” position.**
- One switch has two #18 insulated wires per terminal, which permit complete supervision of leads (refer to diagrams and notes below). The second switch has one #18 insulated wire per terminal. This double circuit provides flexibility to operate two electrical devices at separate locations, such as an indicating light and an audible alarm, in the area that the valve is installed.
- A #14 insulated ground lead (green) is provided.  
Switch #1 = S1 For connection to the supervisory circuit of a UL Listed alarm control panel  
Switch #2 = S2 Auxiliary switch that may be connected to auxiliary devices, per the authority having jurisdiction

- S1** { Normally Closed: (2) Blue  
Common: (2) Yellow
- S2** { Normally Closed: Blue with Orange Stripe  
Normally Open: Brown with Orange Stripe  
Common: Yellow with Orange Stripe



**NOTE:** The above diagram shows a connection between the common terminal (yellow – S1 and yellow-with-orange stripe – S2) and the normally closed terminal (blue – S1 and blue-with-orange stripe – S2). In this example, the indicator light and alarm will stay on until the valve is fully open. When the valve is fully open, the indicator light and alarm will go out. Cap off any unused wires (e.g. brown with orange stripe).

Only S1 (two leads per terminal) may be connected to the fire alarm control panel.

The connection of the alarm switch wiring shall be in accordance with NFPA 72 and the auxiliary switch per NFPA 70 (NEC).



Specifications subject to change without notice.

| Ordering Information |       |           |             |
|----------------------|-------|-----------|-------------|
| Nominal Pipe Size    |       | Model     | Part Number |
| 2"                   | DN50  | VSR-2     | 1144402     |
| 2 1/2"               | DN65  | VSR-2 1/2 | 1144425     |
| 3"                   | DN80  | VSR-3     | 1144403     |
| 3 1/2"               | -     | VSR-3 1/2 | 1144435     |
| 4"                   | DN100 | VSR-4     | 1144404     |
| 5"                   | -     | VSR-5     | 1144405     |
| 6"                   | DN150 | VSR-6     | 1144406     |
| 8"                   | DN200 | VSR-8     | 1144408     |

**Optional:** Cover Tamper Switch Kit, stock no. 0090148

**Replaceable Components:** Retard/Switch Assembly, stock no. 1029030

**UL, CUL and CSFM Listed, FM Approved, LPCB Approved, For CE Marked (EN12259-5) / VdS Approved model use VSR-EU**

**Service Pressure:** 450 PSI (31 BAR) - UL

**Flow Sensitivity Range for Signal:**

4-10 GPM (15-38 LPM) - UL

**Maximum Surge:** 18 FPS (5.5 m/s)

**Contact Ratings:** Two sets of SPDT (Form C)  
10.0 Amps at 125/250VAC  
2.0 Amps at 30VDC Resistive  
10 mAmps min. at 24VDC

**Conduit Entrances:** Two knockouts provided for 1/2" conduit.  
Individual switch compartments suitable for dissimilar voltages.

**Environmental Specifications:**

- NEMA 4/IP54 Rated Enclosure suitable for indoor or outdoor use with factory installed gasket and die-cast housing when used with appropriate conduit fitting.
- Temperature Range: 40°F - 120°F, (4.5°C - 49°C) - UL
- Non-corrosive sleeve factory installed in saddle.

**Service Use:**

|                                          |          |
|------------------------------------------|----------|
| Automatic Sprinkler                      | NFPA-13  |
| One or two family dwelling               | NFPA-13D |
| Residential occupancy up to four stories | NFPA-13R |
| National Fire Alarm Code                 | NFPA-72  |

### WARNING

- Installation must be performed by qualified personnel and in accordance with all national and local codes and ordinances.
- Shock hazard. Disconnect power source before servicing. Serious injury or death could result.
- Risk of explosion. Not for use in hazardous locations. Serious injury or death could result.

### CAUTION

Waterflow switches that are monitoring wet pipe sprinkler systems shall not be used as the sole initiating device to discharge AFFF, deluge, or chemical suppression systems. Waterflow switches used for this application may result in unintended discharges caused by surges, trapped air, or short retard times.

**Important:** This document contains important information on the installation and operation of the VSR waterflow switches. Please read all instructions carefully before beginning installation. A copy of this document is required by NFPA 72 to be maintained on site.

#### General Information

The Model VSR is a vane type waterflow switch for use on wet sprinkler systems. It is UL Listed for use on a steel pipe; schedules 5 through 40, sizes 2" - 6" and is UL Listed and FM Approved for use on steel pipe; schedules 10 through 40, sizes 2" thru 8" (50 mm thru 200 mm). LPC approved sizes are 2" thru 8" (50 mm thru 200 mm). See Ordering Information chart.

The VSR may also be used as a sectional waterflow detector on large systems. The VSR contains two single pole, double throw, snap action switches and an adjustable, instantly recycling pneumatic retard. The switches are actuated when a flow of 10 GPM (38 LPM) or more occurs downstream of the device. The flow condition must exist for a period of time necessary to overcome the selected retard period.

#### Enclosure

The VSR switches and retard device are enclosed in a general purpose, die-cast housing. The cover is held in place with two tamper resistant screws which require a special key for removal. A field installable cover tamper switch is available as an option which may be used to indicate unauthorized removal of the cover. See bulletin number 5401103 for installation instructions of this switch.

Potter Electric Signal Company, LLC • St. Louis, MO • Phone: 866-956-1211/Canada 888-882-1833 • [www.pottersignal.com](http://www.pottersignal.com)

**Installation** (see Fig. 1)

These devices may be mounted on horizontal or vertical pipe. On horizontal pipe they shall be installed on the top side of the pipe where they will be accessible. The device should not be installed within 6" (15 cm) of a fitting which changes the direction of the waterflow or within 24" (60 cm) of a valve or drain.

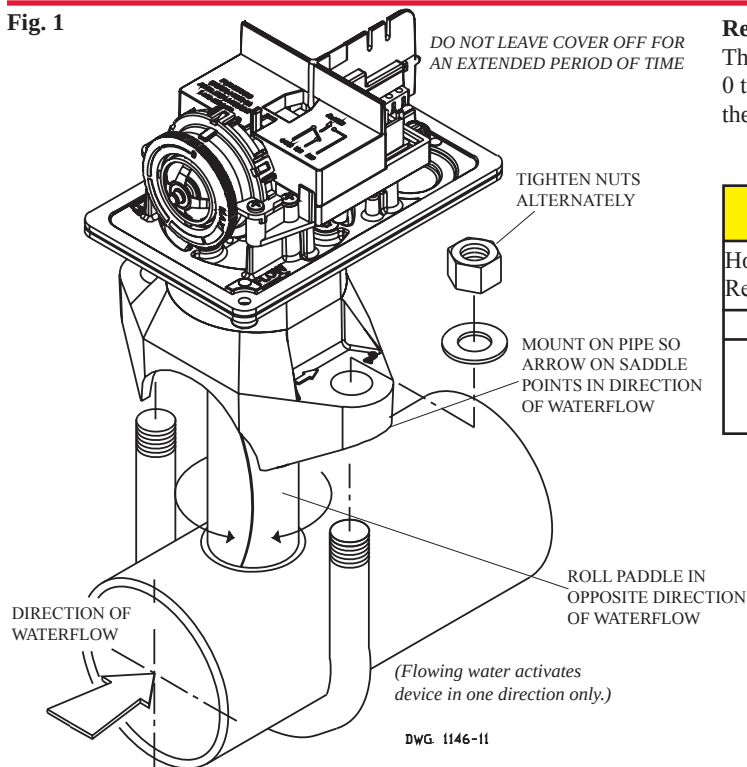
**NOTE:** Do not leave cover off for an extended period of time.

Drain the system and drill a hole in the pipe using a hole saw in a slow speed drill (see Fig. 1). Clean the inside pipe of all growth or other material for a distance equal to the pipe diameter on either side of the hole. Roll the vane so that it may be inserted into the hole; do not bend or crease it. Insert the vane so that the arrow on the saddle points in the direction of the waterflow. Take care not to damage the non-corrosive bushing in the saddle. The bushing should fit inside the hole in the pipe. Install the saddle strap and tighten nuts alternately to required torque (see the chart in Fig. 1). The vane must not rub the inside of the pipe or bind in any way.

**CAUTION**

Do not trim the paddle. Failure to follow these instructions may prevent the device from operating and will void the warranty. Do not obstruct or otherwise prevent the trip stem of the flow switch from moving when water flows as this could damage the flow switch and prevent an alarm. If an alarm is not desired, a qualified technician should disable the alarm system.

**Fig. 1**

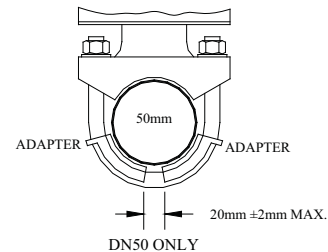
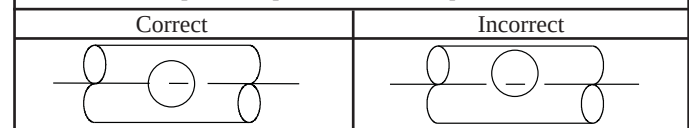


**Retard Adjustment**

The delay can be adjusted by rotating the retard adjustment knob from 0 to the max setting (60-90 seconds). The time delay should be set at the minimum required to prevent false alarms

**CAUTION**

Hole must be drilled perpendicular to the pipe and vertically centered. Refer to the Compatible Pipe/Installation Requirements chart for size.



USE (2) 5180162 ADAPTERS AS SHOWN ABOVE

DWG# 1146-1F

**Compatible Pipe/ Installation Requirements**

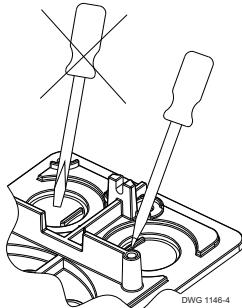
| Model     | Nominal Pipe Size |       | Nominal Pipe O.D. |       | Pipe Wall Thickness |       |                  |      |                  |      |               |     |          |     | Hole Size          |            | U-Bolt Nuts Torque |     |
|-----------|-------------------|-------|-------------------|-------|---------------------|-------|------------------|------|------------------|------|---------------|-----|----------|-----|--------------------|------------|--------------------|-----|
|           |                   |       |                   |       | Lightwall           |       | Schedule 10 (UL) |      | Schedule 40 (UL) |      | BS-1387 (LPC) |     | DN (VDS) |     |                    |            |                    |     |
|           | inch              | mm    | inch              | mm    | inch                | mm    | inch             | mm   | inch             | mm   | inch          | mm  | inch     | mm  | inch               | mm         | ft-lb              | n-m |
| VSR-2     | 2                 | DN50  | 2.375             | 60.3  | .065                | 1.651 | 0.109            | 2.77 | 0.154            | 3.91 | 0.142         | 3.6 | 0.091    | 2.3 | 1.25 ± .125/- .062 | 33.0 ± 2.0 | 20                 | 27  |
| VSR-2 1/2 | 2.5               | -     | 2.875             | 73.0  | .084                | 2.134 | 0.120            | 3.05 | 0.203            | 5.16 | -             | -   | -        | -   |                    |            |                    |     |
| VSR-2 1/2 | -                 | DN65  | 3.000             | 76.1  | -                   | -     | -                | -    | -                | -    | 0.142         | 3.6 | 0.102    | 2.6 |                    |            |                    |     |
| VSR-3     | 3                 | DN80  | 3.500             | 88.9  | .083                | 2.108 | 0.120            | 3.05 | 0.216            | 5.49 | 0.157         | 4.0 | 0.114    | 2.9 | 2.00 ± .125        | 50.8 ± 2.0 |                    |     |
| VSR-3 1/2 | 3.5               | -     | 4.000             | 101.6 | -                   | -     | 0.120            | 3.05 | 0.226            | 5.74 | -             | -   | -        | -   |                    |            |                    |     |
| VSR-4     | 4                 | DN100 | 4.500             | 114.3 | .084                | 2.134 | 0.120            | 3.05 | 0.237            | 6.02 | 0.177         | 4.5 | 0.126    | 3.2 |                    |            |                    |     |
| VSR-5     | 5                 | -     | 5.563             | 141.3 | -                   | -     | 0.134            | 3.40 | 0.258            | 6.55 | -             | -   | -        | -   |                    |            |                    |     |
| VSR-6     | 6                 | DN150 | 6.625             | 168.3 | .115                | 2.921 | 0.134            | 3.40 | 0.280            | 7.11 | 0.197         | 5.0 | 0.157    | 4.0 |                    |            |                    |     |
| VSR-8     | 8                 | DN200 | 8.625             | 219.1 | -                   | -     | 0.148            | 3.76 | 0.322            | 8.18 | 0.248         | 6.3 | 0.177    | 4.5 |                    |            |                    |     |

**NOTE:** For copper or plastic pipe use Model VSR-CF.



**Fig. 2**

To remove knockouts: Place screwdriver at inside edge of knockouts, not in the center.



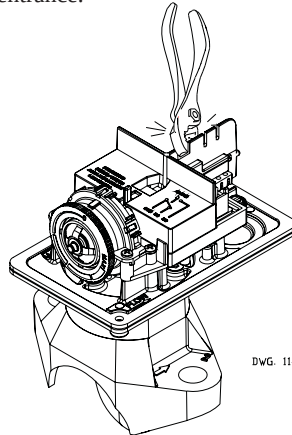
DWG. 1146-4

**NOTICE**

Do not drill into the base as this creates metal shavings which can create electrical hazards and damage the device. Drilling voids the warranty.

**Fig. 3**

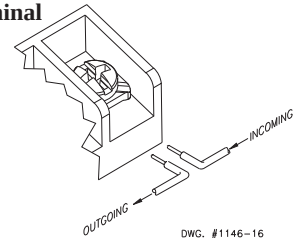
Break out thin section of cover when wiring both switches from one conduit entrance.



DWG. 1146-13

**Fig. 4**

**Switch Terminal Connections Clamping Plate Terminal**



DWG. #1146-16

**WARNING**

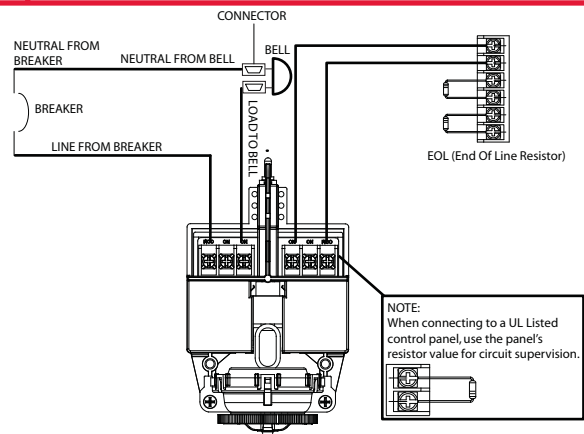
An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire become dislodged from under the terminal. Failure to sever the wire may render the device inoperable risking severe property damage and loss of life.

Do not strip wire beyond 3/8" of length or expose an uninsulated conductor beyond the edge of the terminal block. When using stranded wire, capture all strands under the clamping plate.

**Fig. 5 Typical Electrical Connections**

**Notes:**

1. The Model VSR has two switches, one can be used to operate a central station, proprietary or remote signaling unit, while the other contact is used to operate a local audible or visual annunciator.
2. For supervised circuits, see "Switch Terminal Connections" drawing and warning note (Fig. 4).



**Testing**

The frequency of inspection and testing for the Model VSR and its associated protective monitoring system shall be in accordance with applicable NFPA Codes and Standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

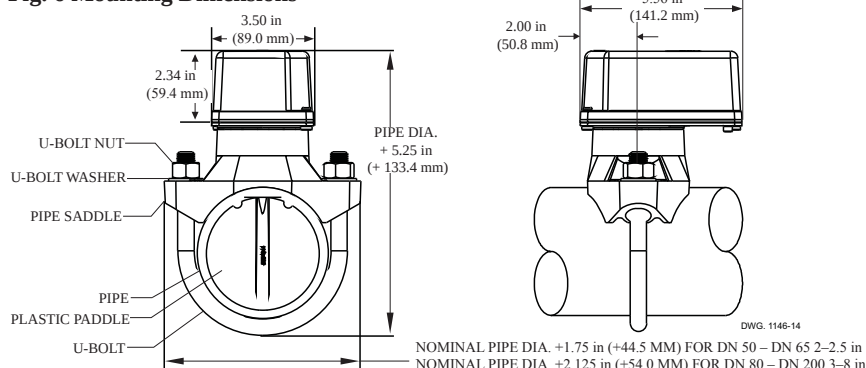
If provided, the inspector's test valve shall always be used for test purposes. If there are no provisions for testing the operation of the flow detection device on the system, application of the VSR is not recommended or advisable.

A minimum flow of 10 GPM (38 LPM) is required to activate this device.

**NOTICE**

Advise the person responsible for testing of the fire protection system that this system must be tested in accordance with the testing instructions.

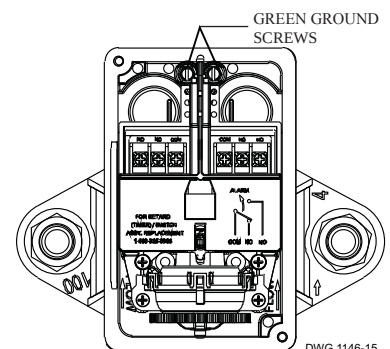
**Fig. 6 Mounting Dimensions**



NOMINAL PIPE DIA. +1.75 in (+44.5 MM) FOR DN 50 – DN 65 2–2.5 in  
NOMINAL PIPE DIA. +2.125 in (+54.0 MM) FOR DN 80 – DN 200 3–8 in

DWG. 1146-14

**Fig. 7**



DWG. 1146-15



### Maintenance

Inspect detectors monthly. If leaks are found, replace the detector. The VSR waterflow switch should provide years of trouble-free service. The retard and switch assembly are easily field replaceable. In the unlikely event that either component does not perform properly, please order replacement retard switch assembly stock #1029030 (see Fig. 8). There is no maintenance required, only periodic testing and inspection.

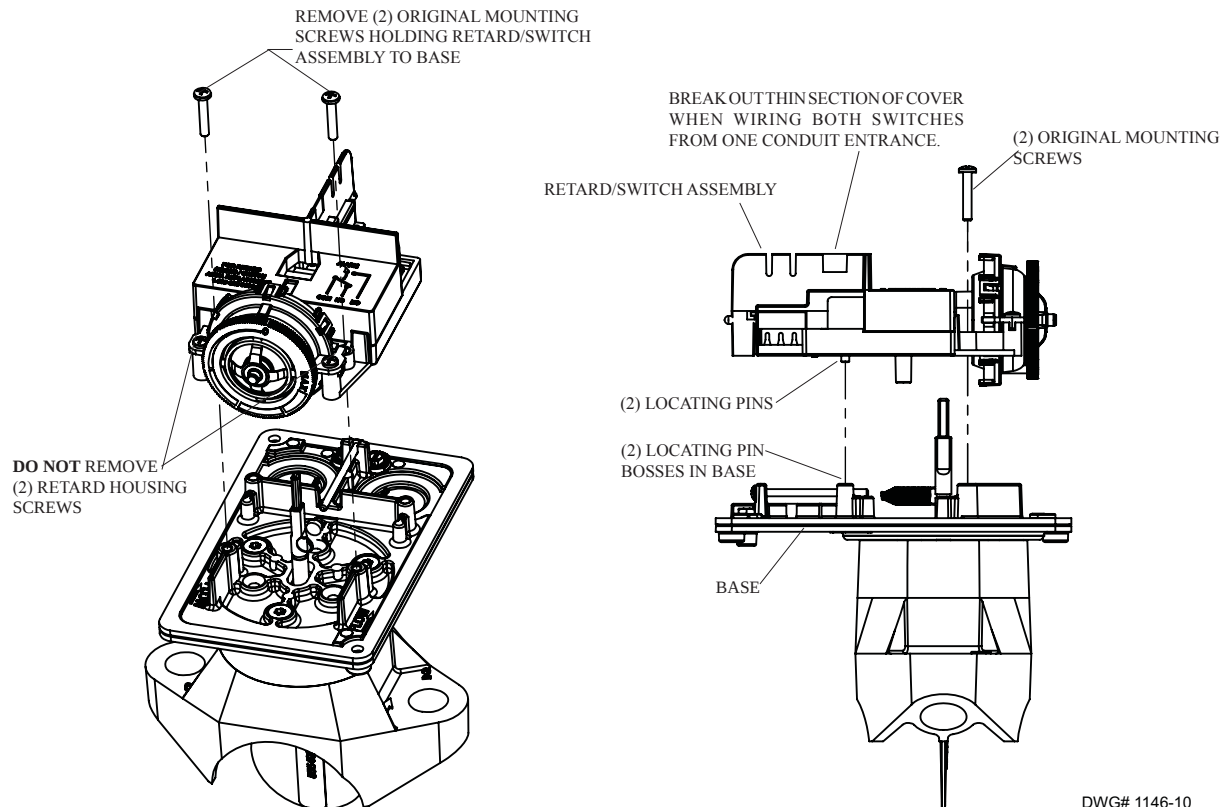
### Retard/Switch Assembly Replacement (See Fig. 8)

#### NOTICE

The Retard/Switch Assembly is field-replaceable without draining the system or removing the waterflow switch from the pipe.

1. Make sure the fire alarm zone or circuit connected to the waterflow switch is bypassed or otherwise taken out of service.
2. Disconnect the power source for local bell (if applicable).
3. Identify and remove all wires from the waterflow switch.
4. Remove the (2) mounting screws holding retard/switch assembly to the base. **Do not** remove the (2) retard housing screws.
5. Remove the retard assembly by lifting it straight up over the tripstem.
6. Install the new retard assembly. Make sure the locating pins on the retard/switch assembly fit into the locating pin bosses on the base.
7. Re-install the (2) original mounting screws.
8. Reconnect all wires. Perform a flow test and place the system back in service.

Fig. 8



### Removal of Waterflow Switch

- To prevent accidental water damage, all control valves should be shut tight and the system completely drained before waterflow detectors are removed or replaced.
- Turn off electrical power to the detector, then disconnect wiring.
- Loosen nuts and remove U-bolts.
- Gently lift the saddle far enough to get your fingers under it. With your fingers, roll the vane so it will fit through the hole while continuing to lift the waterflow detector saddle.
- Lift detector clear of pipe.

## Features

- Listed for indoor and outdoor use
- Outdoor use requires BBK-1 or HC-BB weatherproof back box
- Indoor use mounts directly to standard 4" box
- Low current draw
- High dB output
- AC and DC models
- DC models are motor driven, polarized, and have built in transient protection for supervised alarm circuits
- Available in 6", 8" and 10" sizes



\* ULC on MBA-DC Only

## Description

These vibrating type bells are designed for use as fire or general signaling devices. They have low power consumption and high decibel ratings. The unit mounts on a standard 4" (101mm) square electrical box for indoor use or on a model BBK-1 or HC-BB weatherproof backbox for outdoor applications. Weatherproof backbox model BBK-1 or HC-BB, Stock No. 1500001.

## Notes

1. Minimum dB ratings are calculated from integrated sound pressure measurements made at Underwriters Laboratories as specified in UL Standard 464. UL temperature range is -30° to 150°F (-34° to 66°C)
2. Typical dB ratings are calculated from measurements made with a conventional sound level meter and are indicative of output levels in an actual installation.
3. ULC only applies to MBA DC bells.

| Size inches (mm) | Voltage | Model Number | Stock Number | Current (Max.) | Typical dB at 10 ft. (3m) (2) | Minimum dB at 10 ft. (3m) (1) |
|------------------|---------|--------------|--------------|----------------|-------------------------------|-------------------------------|
| 6 (150)          | 12VDC   | MBA-6-12     | 1750070      | .12A           | 85                            | 76                            |
| 8 (200)          | 12VDC   | MBA-8-12     | 1750080      | .12A           | 90                            | 77                            |
| 10 (250)         | 12VDC   | MBA-10-12    | 1750060      | .12A           | 92                            | 78                            |
| 6 (150)          | 24VDC   | MBA-6-24     | 1750100      | .06A           | 87                            | 77                            |
| 8 (200)          | 24VDC   | MBA-8-24     | 1750110      | .06A           | 91                            | 79                            |
| 10 (250)         | 24VDC   | MBA-10-24    | 1750090      | .06A           | 94                            | 80                            |
| 6 (150)          | 24VAC   | PBA246       | 1806024*     | .17A           | 91                            | 78                            |
| 8 (200)          | 24VAC   | PBA248       | 1808024*     | .17A           | 94                            | 77                            |
| 10 (250)         | 24VAC   | PBA2410      | 1810024*     | .17A           | 94                            | 78                            |
| 6 (150)          | 120VAC  | PBA1206      | 1806120*     | .05A           | 92                            | 83                            |
| 8 (200)          | 120VAC  | PBA1208      | 1808120*     | .05A           | 99                            | 84                            |
| 10 (250)         | 120VAC  | PBA12010     | 1810120*     | .05A           | 99                            | 86                            |

All DC bells are polarized and have built-in transient protection. \* Does not have ULC listing.

## Technical Specifications

|                           |                                                                                                                                                                                       |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions                | 6" (150mm), 8" (200mm) and 10" (250mm)                                                                                                                                                |
| Enclosure                 | Cover: Steel Finish: Red Powder Coat<br>Base: non-corrosive composite material<br>All parts have corrosion resistant finishes<br>Model BBK-1 or HC-BB weatherproof backbox (optional) |
| Voltages Available        | 24VAC<br>120VAC<br>12VDC (10.2 to 15.6) Polarized<br>24VDC (20.4 to 31.2) Polarized                                                                                                   |
| Environmental Limitations | Indoor or outdoor use (See Note 1)<br>-40° to 150°F (-40° to 66°C)<br>(Outdoor use requires weatherproof backbox.)                                                                    |
| Termination               | AC Bells - 4 No. 18 AWG stranded wires<br>DC Bells - Terminal strip                                                                                                                   |
| Service Use               | NFPA 13, 72, local AHJ                                                                                                                                                                |

\*Specifications subject to change without notice.

### WARNING

- Installation must be performed by qualified personnel and in accordance with all national and local codes and ordinances.
- Shock hazard. Disconnect power source before servicing. Serious injury or death could result.
- Risk of explosion. Not for use in hazardous locations. Serious injury or death could result.

### WARNING

In outdoor or wet installations, bell must be mounted with weatherproof backbox, BBK-1 or HC-BB. Standard electrical boxes will not provide a weatherproof enclosure. If the bell and/or assembly is exposed to moisture, it may fail or create an electrical hazard.

## Installation

The bell shall be installed in accordance with NFPA 13, 72, or local AHJ. The top of the device shall be no less than 90" AFF and not less than 6" below the ceiling.

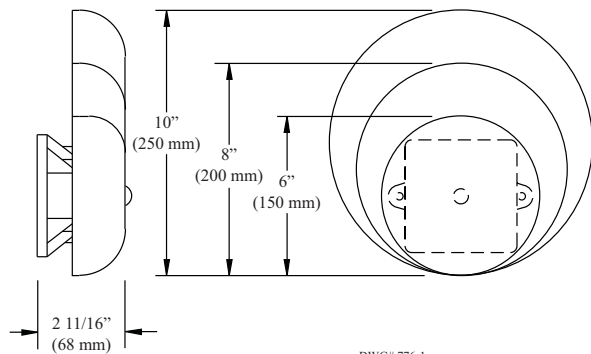
1. Remove the gong.
2. Connect wiring (see Fig. 3).
3. Mount bell mechanism to backbox (bell mechanism must be mounted with the striker pointing down).
4. Reinstall the gong (be sure that the gong positioning pin, in the mechanism housing, is in the hole in the gong).
5. Test all bells for proper operation and observe that they can be heard where required (bells must be heard in all areas as designated by the authority having jurisdiction).

### **WARNING**

Failure to install striker down will prevent bell from ringing.

## Bell Dimension Inches (mm)

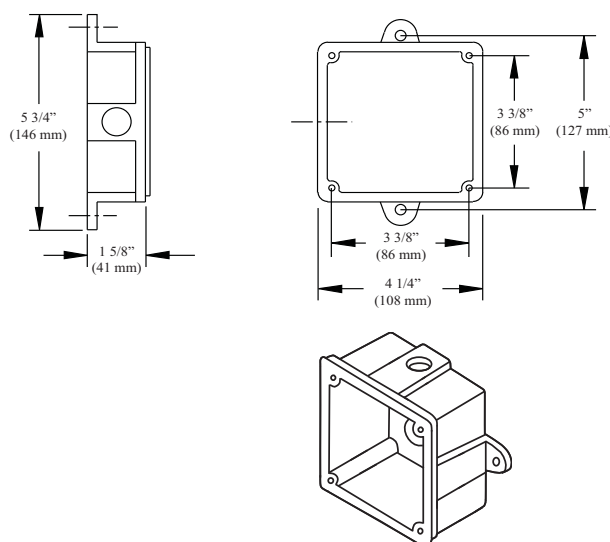
Fig 1



## Weatherproof Backbox Dimensions Inches (mm)

MODEL BBK-1 OR HC-BB

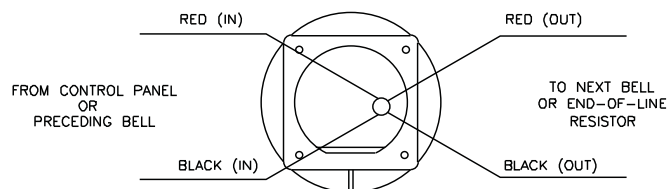
Fig 2



## Wiring Rear View

Fig 3

### D.C. BELLS (OBSERVE POLARITY)



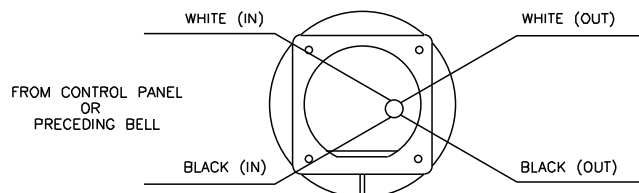
#### CAUTION:

WHEN ELECTRICAL SUPERVISION IS REQUIRED USE IN AND OUT LEADS AS SHOWN.

#### NOTES:

1. OBSERVE POLARITY TO RING D.C. BELLS.
2. RED WIRES POSITIVE (+).
3. BLACK WIRES NEGATIVE (-).
4. EOL RESISTOR IS SUPPLIED BY FIRE ALARM CONTROL PANEL.

### A.C. BELLS



#### CAUTION:

WHEN ELECTRICAL SUPERVISION IS REQUIRED USE IN AND OUT LEADS AS SHOWN.

#### NOTES:

1. WHEN USING A.C. BELLS, TERMINATE EACH EXTRA WIRE SEPERATELY AFTER LAST BELL.
2. END-OF-LINE RESISTOR IS NOT REQUIRED ON AC BELLS .