

SUBMITTAL DATA
PREPARED FOR:

CAROLINA DIESEL TRUCKS
LOBBY RENOVATION

62 PROGRESS DRIVE
FUQUAY VARINA, NC 27562

PREPARED BY:
J & D SPRINKLER CO, INC.
315 W. MAIN STREET
CLAYTON, NC 27520

PH: (919)-553-2356

FAX: (919)-359-0622

SPRINKLER HEADS



TECHNICAL DATA

VK3001 QUICK RESPONSE UPRIGHT SPRINKLER (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

1. DESCRIPTION

The Viking VK3001 Quick Response Upright Sprinkler is a small thermosensitive glass bulb spray sprinkler available with various finishes and temperature ratings to meet design requirements. The special Polyester and Electroless Nickel PTFE (ENT) coatings can be used in decorative applications where colors are desired. In addition, these coatings have been investigated for installation in corrosive environments and are Listed and Approved as indicated in the Approval Chart.

2. LISTINGS AND APPROVALS



UL Listed: Category VNIV



FM Approved: Classes 2016, 2043

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



CE: Standard EN12259-1, DOP_XT1A_1-3-21

Refer to the Approval Chart and Design Criteria for requirements that must be followed.

3. TECHNICAL DATA

Minimum Operating Pressure: 7 PSI (0.5 bar)

Rated to: UL - 250 PSI (24 bar) WWP

FM - 175 PSI (12 bar) WWP

Factory tested hydrostatically to 500 PSI (34.5 bar)

Thread size: 1/2" NPT (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.

Material Standards:

Sprinkler Body: Brass CW602N, UNS-C84400 or QM Brass

Deflector: Stainless Steel UNS S30400

Pip Cap Shell - Stainless Steel UNS-S44400

Pip Cap Disc - Stainless Steel UNS-S30100

Belleville Spring - Nickel Alloy

Pip Cap Seal - Polytetrafluoroethylene (PTFE)

Compression Screw: Brass CW612N, CW508L, UNS-C36000 or UNS-C26000

Shipping Cap: Polyethylene

Bulb: Glass, nominal 3 mm diameter

Ordering Information: (Refer to Table 1 and the current Viking List Price Book.)

4. INSTALLATION

Refer to appropriate NFPA, FM Global, and/or any other applicable installation standards. Refer to Figure 3

NOTICE Risk of permanent damage.

Over-tightening the sprinkler can cause permanent damage.

> Tighten the sprinkler to a **MAXIMUM torque of 14 ft-lbs (19 N-m).**

5. OPERATION

During fire conditions, when the temperature around the sprinkler reaches its operating temperature, the heat-sensitive liquid in the glass bulb expands, causing the bulb to shatter, releasing the pip cap assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE

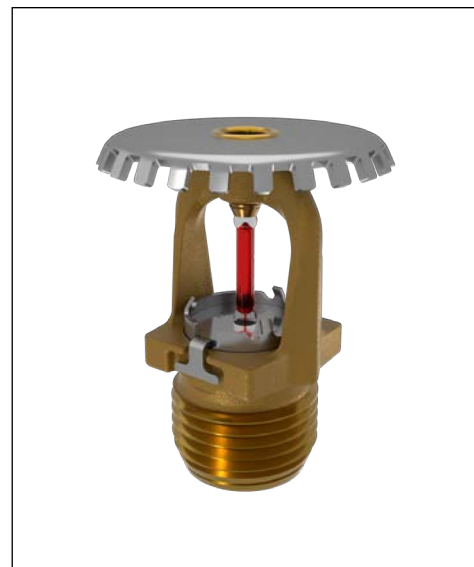
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY

Viking Sprinklers are available through a network of domestic and international distributors. See the website for the closest distributor or contact Viking.

8. GUARANTEE

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



WARNING: Cancer and Reproductive Harm-
www.P65Warnings.ca.gov



TECHNICAL DATA

VK3001 QUICK RESPONSE UPRIGHT SPRINKLER (K5.6)

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TABLE 1: ORDERING INFORMATION
 Instructions: Using the sprinkler base part number,
 (1) add the suffix for the desired Finish
 (2) add the suffix for the desired Temperature Rating.

Sprinkler Base Part Number	Size		1: Finishes		2: Temperature Ratings			
	NPT Inch	BSPT mm	Description	Suffix ¹	Nominal Rating	Bulb Color	Max. Ambient Ceiling Temperature ²	Suffix
23869	1/2	--	Brass	A	135 °F (57 °C)	Orange	100 °F (38 °C)	A
23881	--	15	Chrome	F	155 °F (68 °C)	Red	100 °F (38 °C)	B
			White Polyester ^{3,5}	M-/W	175 °F (79 °C)	Yellow	150 °F (65 °C)	D
			Black Polyester ^{3,5}	M-/B	200 °F (93 °C)	Green	150 °F (65 °C)	E
			ENT ^{3,4,5}	JN	286 °F (141 °C)	Blue	225 °F (107 °C)	G
					OPEN	--	--	Z

Example: 23869MB/W = VK3001 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) meaning if the area will experience temperatures above the maximum ambient rating, you shall use a higher temperature-rated sprinkler.

Accessories

Sprinkler Wrenches (see Figure 1):

Standard (straight) Wrench: Part number 23559MB.

Sprinkler Cabinet:

- A. Up to 6 sprinklers: Part number 01724A
- B. 6-12 sprinklers: Part number 01725A

Footnotes

1. Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.
2. 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.
3. UL Listed as corrosion resistant.
4. FM Approved as corrosion resistant.
5. The corrosion resistant and corrosion proofing 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.
6. UL Listed for 250 PSI (17.2 bar) WWP.



Figure 1: Sprinkler Wrench

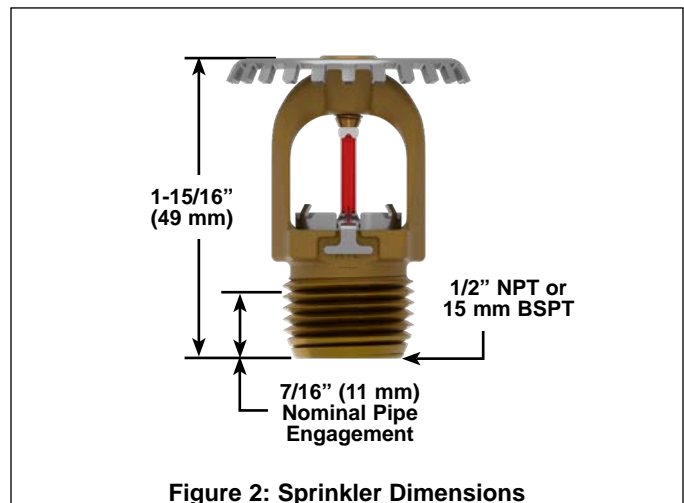


Figure 2: Sprinkler Dimensions



TECHNICAL DATA

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APPROVAL CHART

Viking Quick Response Upright Sprinkler VK3001 K5.6 (80.6 metric)

Finish(es) →	KEY
Temperature(s) → A 1 X	
Escutcheon(s), If applicable →	

Sprinkler Base Part Number ¹	Thread Size		Listings and Approvals ^{2,6}				
	NPT	BSPT	cULus		FM		CE ⁶
	Inch	mm	Approval Listing	Maximum WWP	Approval Listing	Maximum WWP	Approval Listing
23869	1/2	--	A1	250 PSI (17.2 bar)	A1	175 PSI (12 bar)	B1
23881	--	15	A1	250 PSI (17.2 bar)	A1	175 PSI (12 bar)	B1

Approved Temperature Ratings:

A = 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C) and 286 °F (141 °C)

B = 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C) and 286 °F (141 °C)

Approved Finishes:

1 = Brass, Chrome, White Polyester^{3,4}, Black Polyester^{3,4}, and ENT^{4,5}

Footnotes

- ¹ Base Part number is shown. For complete part number, refer to Viking's current price schedule.
- ² This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals.
- ³ Other colors are available upon request with the same Listings and Approvals as the standard colors.
- ⁴ cULus Listed as corrosion resistant.
- ⁵ FM Approved as corrosion resistant.
- ⁶ CE: Standard EN12259-1, Declaration of Performance DOP_XT1A_1-3-21.

DESIGN CRITERIA - UL

cULus Listing Requirements:

The Viking VK3001 Quick Response Upright Sprinkler is cULus Listed as indicated in Approval Chart for installation in accordance with the latest edition of NFPA 13 for standard spray sprinklers.

- Designed for use in Light and Ordinary Hazard occupancies.
- The sprinkler installation rules contained in NFPA 13 for standard spray upright sprinklers shall be followed.

DESIGN CRITERIA - FM

FM Approval Requirements:

The Viking VK3001 Quick Response Upright Sprinkler is FM Approved as quick response Non-Storage upright 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 UL and/or NFPA criteria.

IMPORTANT: Always refer to Form Number F_091699 - Care and Handling of Sprinklers. Also refer to Form Number 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, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

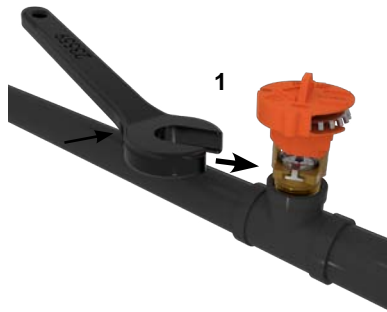


TECHNICAL DATA

**VK3001 QUICK RESPONSE
UPRIGHT SPRINKLER (K5.6)**

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1. Carefully slide the wrench onto the wrench flats.



2. Install the sprinkler into the pipe fitting.
NOTE: The sprinkler frame arms shall be parallel to the pipe.

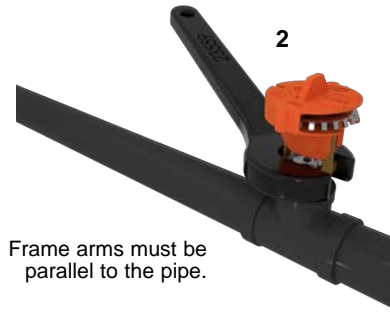


Figure 3: Installation



TECHNICAL DATA

VK3021 QUICK RESPONSE PENDENT SPRINKLER (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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1. DESCRIPTION

The Viking VK3021 Quick Response Pendent Sprinkler is a small thermosensitive glass bulb spray sprinkler available with various finishes and temperature ratings to meet design requirements. The special Polyester and Electroless Nickel PTFE (ENT) coatings can be used in decorative applications where colors are desired. In addition, these coatings have been investigated for installation in corrosive environments and are Listed and Approved as indicated in the Approval Chart.

2. LISTINGS AND APPROVALS



UL Listed: Category VNIV



FM Approved: Classes 2017, 2015, 2043

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



CE: Standard EN12259-1, DOP_XT1A_1-3-21

Refer to the Approval Chart and Design Criteria for requirements that must be followed.

3. TECHNICAL DATA

Specifications:

Minimum Operating Pressure: 7 PSI (0.5 bar)

Rated to: UL - 250 PSI (24 bar) WWP

FM - 175 PSI (12 bar) WWP

Factory tested hydrostatically to 500 PSI (34.5 bar)

Thread size: 1/2" NPT (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.

Material Standards:

Sprinkler Body: Brass CW602N, UNS-C84400 or QM Brass

Deflector: Stainless Steel UNS S30400

Pip Cap Shell - Stainless Steel UNS-S44400

Pip Cap Disc - Stainless Steel UNS-S30100

Belleville Spring - Nickel Alloy

Pip Cap Seal - Polytetrafluoroethylene (PTFE)

Compression Screw: Brass CW612N, CW508L, UNS-C36000 or UNS-C26000

Shipping Cap: Polyethylene

Bulb: Glass, nominal 3 mm diameter

Ordering Information: (Refer to Table 1 and the current Viking List Price Book.)

4. INSTALLATION

Refer to appropriate NFPA, FM Global, and/or any other applicable installation standards.

NOTICE Risk of permanent damage.

Over-tightening the sprinkler can cause permanent damage.

> Tighten the sprinkler to a **MAXIMUM** torque of 14 ft-lbs (19 N-m).

5. OPERATION

During fire conditions, when the temperature around the sprinkler reaches its operating temperature, the heat-sensitive liquid in the glass bulb expands, causing the bulb to shatter, releasing the pip cap assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern 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 website for the closest distributor or contact Viking.

8. GUARANTEE

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



WARNING: Cancer and Reproductive Harm
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TECHNICAL DATA

VK3021 QUICK RESPONSE PENDENT SPRINKLER (K5.6)

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TABLE 1: ORDERING INFORMATION

Instructions: Using the sprinkler base part number,
(1) add the suffix for the desired Finish
(2) add the suffix for the desired Temperature Rating.

Sprinkler Base Part Number	Size		1: Finishes		2: Temperature Ratings			
	NPT Inch	BSPT mm	Description	Suffix ¹	Nominal Rating	Bulb Color	Max. Ambient Ceiling Temperature ³	Suffix
23870 ⁷	1/2		Brass	A	135 °F (57 °C)	Orange	100 °F (38 °C)	A
23882 ⁷		15	Chrome	F	155 °F (68 °C)	Red	100 °F (38 °C)	B
			White Polyester ^{4,6}	M-/W	175 °F (79 °C)	Yellow	150 °F (65 °C)	D
			Black Polyester ^{4,6}	M-/B	200 °F (93 °C)	Green	150 °F (65 °C)	E
			ENT ^{4,5,6}	JN	286 °F (141 °C)	Blue	225 °F (107 °C)	G
					OPEN	--	--	Z

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) meaning if the area will experience temperatures above the maximum ambient rating, you shall use a higher temperature-rated sprinkler.

Accessories

Sprinkler Wrenches (see Figure 1):

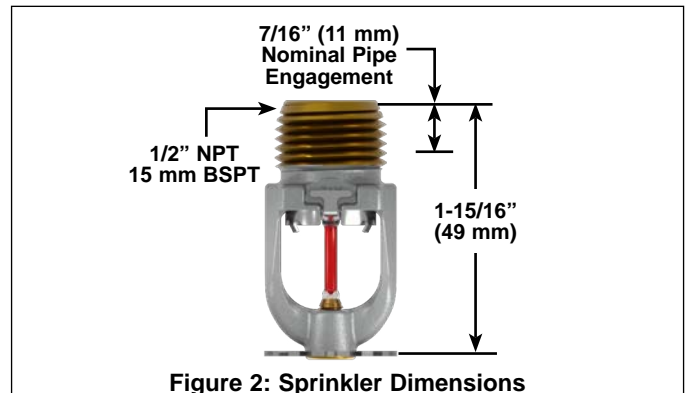
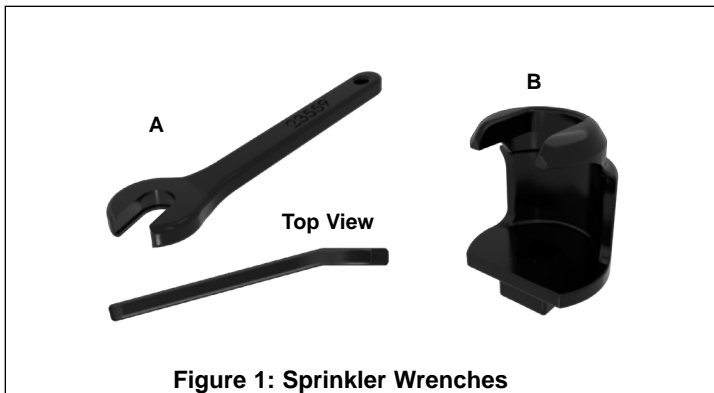
- A. Standard Wrench: Part number 23559MB
- B. Recessed Socket Wrench: Part number 23560MB²

Sprinkler Cabinet:

- A. Up to 6 sprinklers: Part number 01724A
- B. 6-12 sprinklers: Part number 01725A

Footnotes

1. Where a dash (-) is shown in the Finish suffix designation, insert the desired Temperature Rating suffix. See example above.
2. Requires a 1/2" ratchet which is not available from Viking.
3. 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.
4. UL Listed as corrosion resistant.
5. FM Approved as corrosion resistant.
6. 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.
7. UL Listed for 250 PSI (17 bar) WWP.





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APPROVAL CHART

Viking Quick Response Pendent Sprinkler VK3021 K5.6 (80.6 metric)

Finish(es) →	KEY
Temperature(s) → A 1 X	
Escutcheon(s), If applicable →	

Sprinkler Base Part Number ¹	Thread Size		Listings and Approvals ^{2,6}				
	NPT	BSPT	cULus		FM		CE ⁶
	Inch	mm	Approval Listings	Maximum WWP	Approval Listings	Maximum WWP	Approval Listings
23870	1/2	--	A1, B2X, B3Y	250 PSI (17 bar)	A1, B2X, B3Y	175 PSI (12 bar)	C1, D2X, D3Y
23882	--	15	A1, B2X, B3Y	250 PSI (17 bar)	A1, B2X, B3Y	175 PSI (12 bar)	C1, D2X, D3Y

Approved Temperature Ratings:

A = 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C) and 286 °F (141 °C)
B = 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)
C = 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C) and 286 °F (141 °C)
D = 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)

Approved Finishes:

1 = Brass, Chrome, White Polyester^{3,4}, Black Polyester^{3,4}, and ENT^{4,5}
2 = Brass, Chrome, White Polyester^{3,4}, and Black Polyester^{3,4}
3 = ENT^{4,5}

Approved Escutcheon Code:

X = Installed with Viking Recessed Escutcheons Models NP-1, NP-2, and NP-3, or Viking Standard Surface Mounted Escutcheons
Y = Installed with Viking Model NP-1 Recessed Escutcheon OR Standard Surface Mounted Escutcheons

Footnotes

- Base Part number is shown. For complete part number, refer to Viking's current price schedule.
- This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals.
- Other colors are available upon request with the same Listings and Approvals as the standard colors.
- cULus Listed as corrosion resistant.
- FM Approved as corrosion resistant.
- CE: Standard EN12259-1, Declaration of Performance DOP_XT1A_1-3-21.

DESIGN CRITERIA - UL

cULus Listing Requirements:

The Viking VK3021 Quick Response Pendent Sprinkler is cULus Listed as indicated in Approval Chart for installation in accordance with the latest edition of NFPA 13 for standard spray sprinklers.

- Designed for use in Light and Ordinary Hazard occupancies.
- The sprinkler installation rules contained in NFPA 13 for standard spray pendent sprinklers shall be followed.

IMPORTANT: Always refer to Form Number F_091699 - Care and Handling of Sprinklers. Also refer to Form Number 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.



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DESIGN CRITERIA - FM

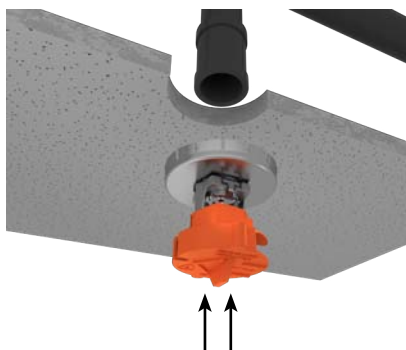
FM Approval Requirements:

The Viking VK3021 Quick Response Pendent Sprinkler is FM Approved as quick response Non-Storage 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.

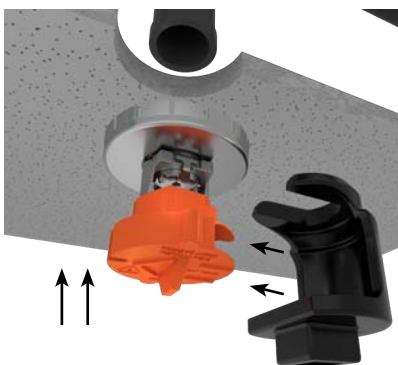
NOTE: The FM Installation guidelines may differ from UL and/or NFPA criteria.

IMPORTANT: Always refer to Form Number F_091699 - Care and Handling of Sprinklers. Also refer to Form Number 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.

1. Install the escutcheon inner ring onto the sprinkler threads.



2. Carefully slide the wrench** sideways around the protective cap then push upwards to engage with the sprinkler wrench flats.



3. Install the sprinkler and escutcheon assembly into the pipe fitting. Be sure the escutcheon outer ring contacts the surface of the finished ceiling.

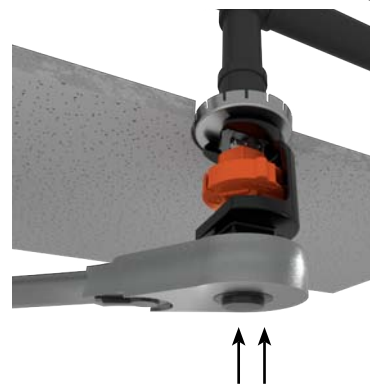
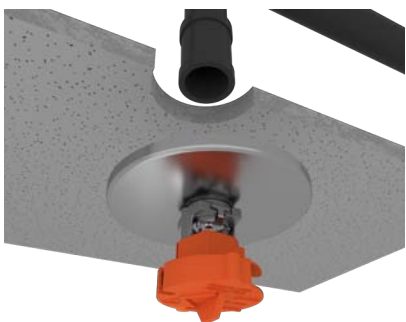


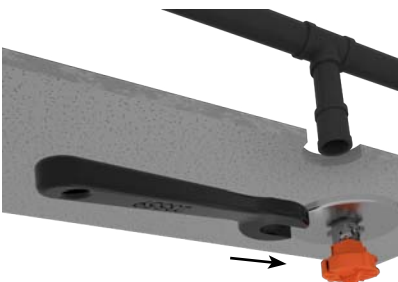
Figure 3: Recessed Installation (with Recessed Socket Wrench)

**A 1/2" ratchet is required (not available from Viking).

1. Install the escutcheon onto the sprinkler threads.



2. Carefully slide the wrench onto the sprinkler wrench flats.



3. Install the sprinkler and escutcheon assembly into the pipe fitting. Be sure the escutcheon contacts the surface of the finished ceiling.



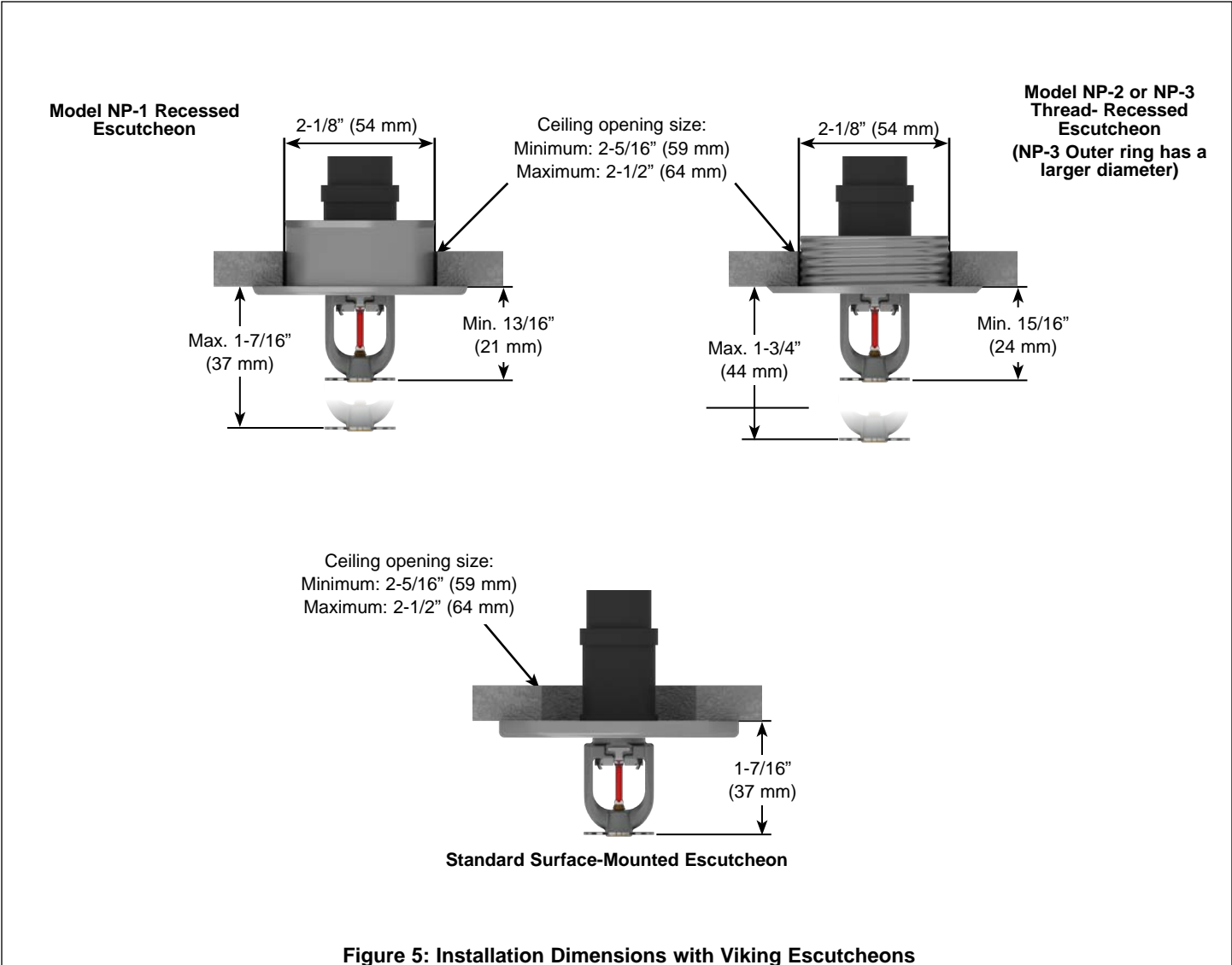
Figure 4: Installation (with Standard Wrench)



TECHNICAL DATA

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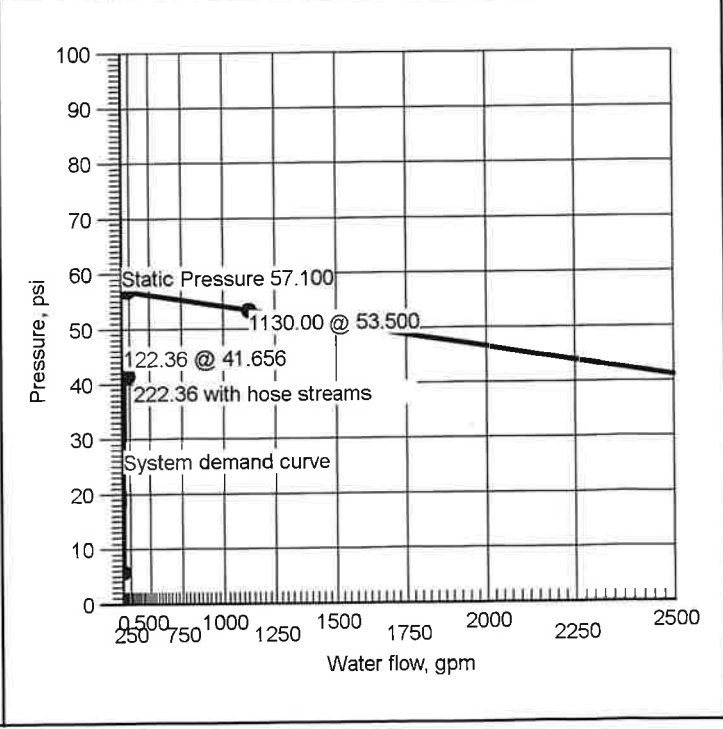
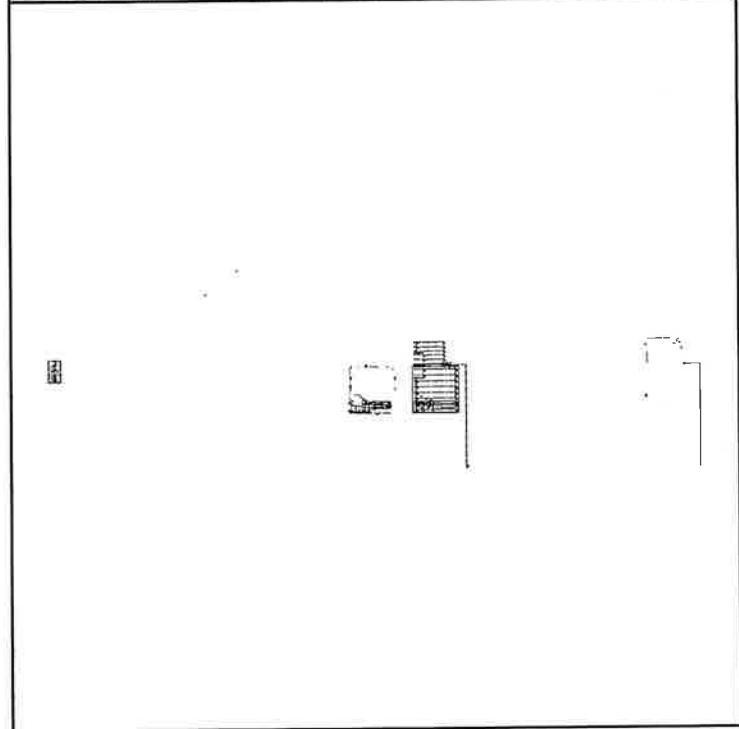
HYDRAULIC CALCULATIONS

Job	
Job Number JM22197	Design Engineer BKB
Job Name: CAROLINA DIESEL TRUCKS	Phone 919.243.2464
Address 1 62 PROGRESSIVE DR.	State Certification/License Number 16269FS
Address 2 FUQUAY VARINA, NC 27562	AHJ HARNETT CO.
Address 3	Job Site/Building LOBBY RENOVATION

System	
Density 0.10 gpm/ft²	Area of Application 1500 ft² (Actual 580 ft²)
Most Demanding Sprinkler Data 5.6 K-Factor 19.60 at 12.250	Hose Streams 100.00
Coverage Per Sprinkler 196 ft²	Number Of Sprinklers Calculated 6
System Pressure Demand 41.656	System Flow Demand 122.36
Total Demand 222.36 @ 41.656	Pressure Result +15.266 (26.8%)

Supplies						Check Point Gauges			
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)	Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
1	Water Supply	1130.00	100.00	57.100	53.500	BOR (171)	23.894	25.03	122.36

RENOVATION PIPING 2 Water Supply at Node 1 (1130.00, 250.00, 57.100, 53.500)



Hydraulic Calculations

for

Project Name: CAROLINA DIESEL TRUCKS

Location: 62 PROGRESSIVE DR., FUQUAY VARINA, NC 27562,

Drawing Name: RENOVATION PIPING 2

Calculation Date: 1/27/2023

Design

Remote Area Number: A
Remote Area Location: OFFICE
Occupancy Classification: Light Hazard
Commodity Classification: N/A

Density 0.10 gpm/ft²
Area of Application: 1500 ft² (Actual 580 ft²)
Coverage per Sprinkler: 196 ft²
Type of sprinklers calculated: Upright
No. of sprinklers calculated: 6
No. of nozzles calculated: 0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 100.00 at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 222.36 @ 41.656 (Safety Margin = 15.266)
Type of System: WET
Volume of Dry/PreAction/Antifreeze/Other: N/A

Name of Contractor:
Address:
Phone Number:
Name of designer: BKB
Authority Having Jurisdiction: HARNETT CO.

Notes:

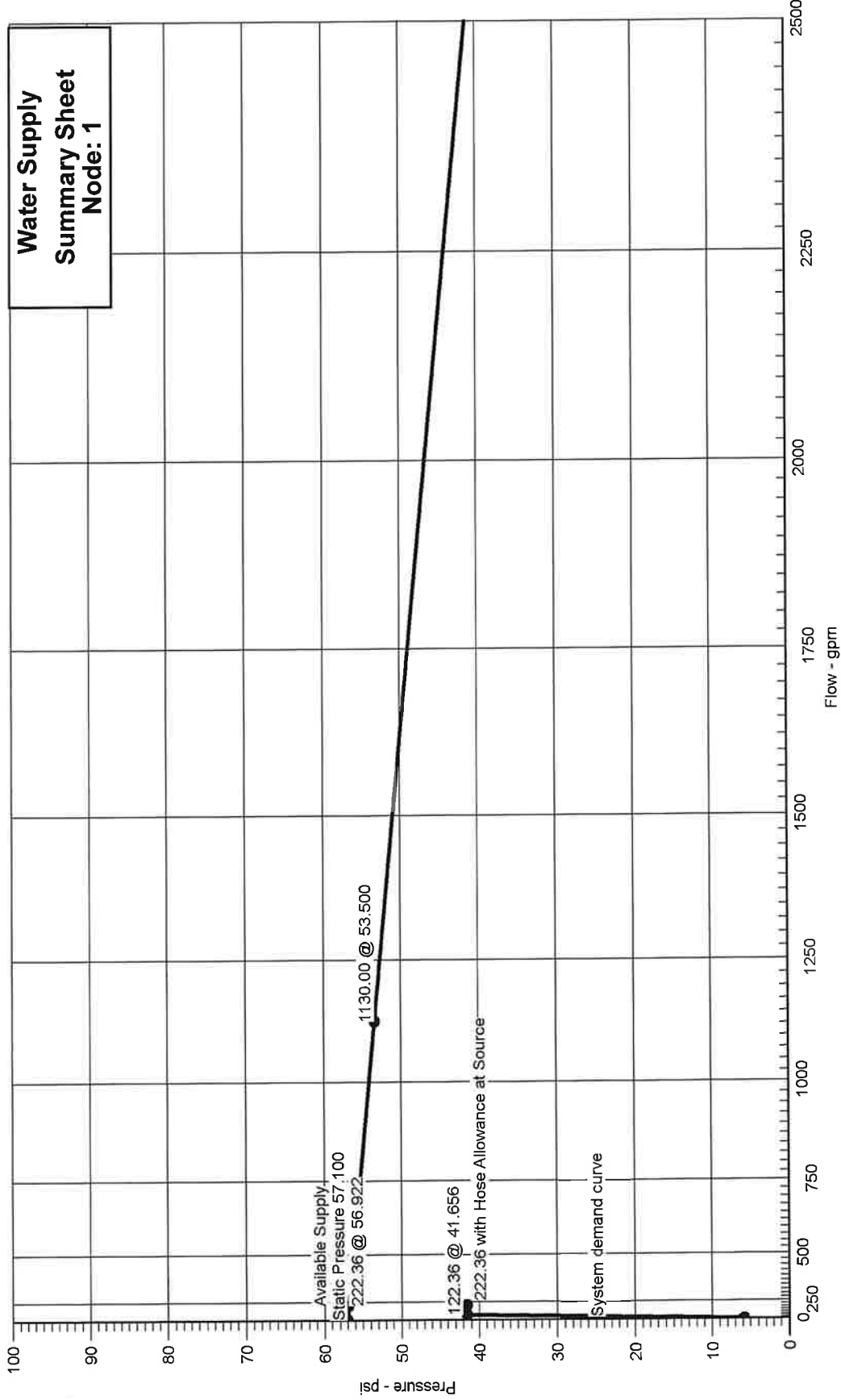
Automatic peaking results Left: N/A Right: N/A

Hydraulic Graph

Job Name: CAROLINA DIESEL TRUCKS
Remote Area Number: A

N^{1.85}

Date: 1/27/2023





Summary Of Outflowing Devices

Job Number: JM22197
Report Description: Light Hazard (A)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
Sprinkler	731	20.50	19.60	5.6	13.397			
⇒ Sprinkler	745	19.60	19.60	5.6	12.250			
Sprinkler	746	19.80	19.60	5.6	12.507			
Sprinkler	747	20.25	19.60	5.6	13.076			
Sprinkler	748	21.16	19.60	5.6	14.271			
Sprinkler	752	21.05	19.60	5.6	14.130			

⇒ Most Demanding Sprinkler Data

Supply Analysis							
Node	Name	Static (psi)	Residual (psi) @	Flow (gpm)	Available (psi) @	Total Demand (gpm)	Required Pressure (psi)
1	Water Supply	57.100	53.500	1130.00	56.922	222.36	41.656
Node Analysis							
Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes		
1	-3'-0	Supply	41.656	122.36			
731	7'-0	Sprinkler	13.397	20.50			
745	10'-8	Sprinkler	12.250	19.60			
746	10'-8	Sprinkler	12.507	19.80			
747	10'-8	Sprinkler	13.076	20.25			
748	10'-8	Sprinkler	14.271	21.16			
752	5'-2½	Sprinkler	14.130	21.05			
14	18'-10		16.831				
29	18'-6		17.052				
44	18'-10		16.830				
60	18'-6		17.052				
73	18'-10		16.829				
84	18'-6		17.053				
105	18'-10		16.820				
114	18'-6		17.055				
126	18'-10		16.817				
135	18'-6		17.058				
142	18'-6		17.077				
156	18'-10		16.811				

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
165	18'-6		17.025		
171	3'-0	Gauge	23.894		
182	3'-0		38.905		
208	18'-10		16.803		
220	18'-6		16.928		
231	18'-10		16.795		
243	18'-6		16.908		
264	18'-10		16.765		
277	18'-6		16.884		
287	18'-10		16.760		
300	18'-6		16.859		
311	18'-10		16.755		
324	18'-6		16.830		
340	18'-10		16.753		
354	18'-6		16.799		
365	18'-6		16.776		
382	7'-0		13.491		
394	18'-10		16.751		
416	18'-6		16.777		
427	10'-8		14.331		
457	18'-10		16.751		
473	18'-6		16.777		

Pipe Information									
Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Fitting (Foot) Total (Foot)	Pf Friction Loss Per Unit (psi)	Elev(Pe) Friction(Pf)	Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
745	10'-8	5.6	19.60	2	(See Notes)	8'-4½	120	12.250	••••• Route 1 ••••• Sprinkler
746	10'-8		61.15	2.1570		8'-4½	0.030733	0.257	
746	10'-8	5.6	19.80	2	(See Notes)	11'-0	120	12.507	Sprinkler
747	10'-8		80.95	2.1570		11'-0	0.051645	0.568	
747	10'-8	5.6	20.25	2	(See Notes)	3'-9½	120	13.076	Sprinkler, T(12'-3½)
427	10'-8		101.20	2.1570		12'-3½	0.078056	1.256	
						16'-1			
427	10'-8		21.16	2	(See Notes)	21'-11	120	14.331	Flow (q) from Route 4 3E(6'-2), mecT(12'-3½)
365	18'-6		122.36	2.1570		30'-9	0.110896	-3.396	
						52'-8		5.841	
365	18'-6			4		7'-6½	120	16.776	
354	18'-6		104.43	4.2600		7'-6½	0.003008	0.023	
354	18'-6			4		12'-0	120	16.799	
324	18'-6		96.52	4.2600		12'-0	0.002600	0.031	
324	18'-6			4		12'-10	120	16.830	
300	18'-6		89.94	4.2600		12'-10	0.002282	0.029	
300	18'-6			4		12'-0	120	16.859	
277	18'-6		84.75	4.2600		12'-0	0.002044	0.025	
277	18'-6			4		13'-0	120	16.884	
243	18'-6		80.90	4.2600		13'-0	0.001876	0.024	
243	18'-6			4		12'-0	120	16.908	
220	18'-6		76.36	4.2600		12'-0	0.001686	0.020	
220	18'-6			4	(See Notes)	36'-5	120	16.928	2E(13'-2)
165	18'-6		72.88	4.2600		26'-4	0.001546		
						62'-9		0.097	

Pipe Information

Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Fitting (Foot) Total (Foot)	Pf Friction Loss Per Unit (psi)	Elev(Pe) Friction(Pf)	
165	18'-6		7.80	4	(See Notes)	1'-5½	120	17.025	Flow (q) from Route 6 T(26'-4)
142	18'-6		80.69	4.2600		26'-4	0.001866	0.052	
						27'-9½			
142	18'-6		41.67	6	(See Notes)	24'-4	120	17.077	Flow (q) from Route 5 5E(17'-7), sCV(40'-3), BV(12'-7), BOR
171	3'-0		122.36	6.3570		140'-10	0.000574	6.722	
						165'-2		0.095	
171	3'-0			6	(See Notes)	1'-6	120	23.894	E(17'-7), BFP(-15.000)
182	3'-0		122.36	6.3570		17'-7	0.000574	-0.000	
						19'-1½		15.011	
182	3'-0			6	(See Notes)	260'-9	140	38.905	3E(22'-1), S
1	-3'-0		122.36	6.2800		66'-2½	0.000458	2.601	
						326'-11½		0.150	
			100.00					41.656	Hose Allowance At Source
1			222.36						Total(Pt) Route 1
731	7'-0	5.6	20.50	2	(See Notes)	4'-6½	120	13.397	***** Route 2 ***** Sprinkler, E(6'-2), T(12'-3½)
382	7'-0		20.50	2.1570		18'-5½	0.004068	0.094	
						23'-0			
382	7'-0		21.05	2	(See Notes)	10'-11	120	13.491	Flow (q) from Route 3 2E(6'-2)
745	10'-8		41.55	2.1570		12'-3½	0.015035	-1.590	
						23'-2½		0.349	
								12.250	Total(Pt) Route 2
752	5'-2½	5.6	21.05	2	(See Notes)	8'-3	120	14.130	***** Route 3 ***** Sprinkler, 2E(6'-2), T(12'-3½)
382	7'-0		21.05	2.1570		24'-7½	0.004274	-0.780	
						32'-10½		0.141	
								13.491	Total(Pt) Route 3
748	10'-8	5.6	21.16	2	(See Notes)	1'-8½	120	14.271	***** Route 4 ***** Sprinkler, T(12'-3½)
427	10'-8		21.16	2.1570		12'-3½	0.004313	0.060	
						14'-0½			
								14.331	Total(Pt) Route 4
73	18'-10		23.39	2	(See Notes)	67'-1	120	16.829	***** Route 5 ***** PO(12'-3½), Flow (q) from Route 8 2T(12'-3½), PO(12'-3½)
84	18'-6		7.79	2.1570		49'-2½	0.000680	0.145	
						116'-3½		0.079	

Pipe Information									
Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Fitting (Foot)	Pf Friction Loss Per Unit (psi)	Elev(Pe)	Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
						Total (Foot)		Friction(Pf)	
84	18'-6		15.60	4		8'-0	120	17.053	Flow (q) from Route 14
114	18'-6		23.39	4.2600		8'-0	0.000189	0.002	
114	18'-6		8.96	4		10'-0	120	17.055	Flow (q) from Route 9
135	18'-6		32.35	4.2600		10'-0	0.000344	0.003	
135	18'-6		9.32	4	(See Notes)	8'-6½	120	17.058	Flow (q) from Route 13 T(26'-4)
142	18'-6		41.67	4.2600		26'-4	0.000550	0.019	
						34'-10½			
								17.077	Total(Pt) Route 5
365	18'-6		104.43	4		5'-7½	120	16.776 Route 6 Flow (q) from Route 1
416	18'-6		17.93	4.2600		5'-7½	0.000115	0.001	
416	18'-6			4		12'-0	120	16.777	
473	18'-6		8.95	4.2600		12'-0	0.000032	0.000	
473	18'-6			2	(See Notes)	91'-5½	120	16.777	PO(12'-3½) T(12'-3½), E(6'-2), PO(12'-3½)
457	18'-10		8.95	2.1570		43'-1	0.000878	-0.145	
						134'-6		0.118	
457	18'-10			4		12'-0	120	16.751	
394	18'-10		8.95	4.2600		12'-0	0.000032	0.000	
394	18'-10		8.98	4		13'-1½	120	16.751	Flow (q) from Route 7
340	18'-10		17.93	4.2600		13'-1½	0.000115	0.002	
340	18'-10		7.91	4		12'-0	120	16.753	Flow (q) from Route 18
311	18'-10		25.84	4.2600		12'-0	0.000227	0.003	
311	18'-10		6.58	4		12'-10	120	16.755	Flow (q) from Route 10
287	18'-10		32.41	4.2600		12'-10	0.000345	0.004	
287	18'-10		5.19	4		12'-0	120	16.760	Flow (q) from Route 17
264	18'-10		37.60	4.2600		12'-0	0.000455	0.005	

Pipe Information

Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes
264	18'-10		3.85	4	(See Notes)	28'-9	120	16.765	Flow (q) from Route 15 2E(13'-2)
231	18'-10		41.45	4.2600		26'-4	0.000544		
						55'-1		0.030	
231	18'-10		4.54	4	(See Notes)	12'-0	120	16.795	Flow (q) from Route 16
208	18'-10		46.00	4.2600		12'-0	0.000660	0.008	
208	18'-10		3.48	4	(See Notes)	10'-8	120	16.803	Flow (q) from Route 11
156	18'-10		49.47	4.2600		10'-8	0.000755	0.008	
156	18'-10			2		53'-1		120	
165	18'-6		7.80	2.1570	49'-2½	0.000681	0.145		
					102'-3½		0.070		
								17.025	Total(Pt) Route 6
416	18'-6			2	(See Notes)	91'-5½	120	16.777	***** Route 7 ***** PO(12'-3½) T(12'-3½), E(6'-2), PO(12'-3½)
394	18'-10		8.98	2.1570		43'-1	0.000884	-0.145	
						134'-6		0.119	
								16.751	Total(Pt) Route 7
105	18'-10		32.35	4	(See Notes)	23'-6	120	16.820	***** Route 8 ***** Flow (q) from Route 12 2E(13'-2)
73	18'-10		23.39	4.2600		26'-4	0.000189		
						49'-10		0.009	
								16.829	Total(Pt) Route 8
105	18'-10		32.35	2	(See Notes)	53'-1	120	16.820	***** Route 9 ***** PO(12'-3½), Flow (q) from Route 12 2T(12'-3½), PO(12'-3½)
114	18'-6		8.96	2.1570		49'-2½	0.000880	0.145	
						102'-3½		0.090	
								17.055	Total(Pt) Route 9
324	18'-6			2	(See Notes)	91'-6½	120	16.830	***** Route 10 ***** PO(12'-3½) 2T(12'-3½), PO(12'-3½)
311	18'-10		6.58	2.1570		49'-2½	0.000497	-0.145	
						140'-9		0.070	
								16.755	Total(Pt) Route 10
220	18'-6			2	(See Notes)	76'-11½	120	16.928	***** Route 11 ***** PO(12'-3½) 2T(12'-3½), PO(12'-3½)
208	18'-10		3.48	2.1570		49'-2½	0.000153	-0.145	
						126'-2		0.019	
								16.803	Total(Pt) Route 11

Pipe Information

Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes	
										Elev(Pe)
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Fitting (Foot)	Pf Friction Loss Per Unit (psi)	Friction(Pf)	Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value	
156	18'-10		7.80	4		10'-0	120	16.811	***** Route 12 ***** Flow (q) from Route 6	
126	18'-10		41.67	4.2600		10'-0	0.000550	0.005		
126	18'-10			4		10'-0	120	16.817		
105	18'-10		32.35	4.2600		10'-0	0.000344	0.003		
								16.820	Total(Pt) Route 12	
126	18'-10			2	(See Notes)	53'-1	120	16.817	***** Route 13 ***** PO(12'-3½)	
135	18'-6		9.32	2.1570		49'-2½	0.000947	0.145		2T(12'-3½), PO(12'-3½)
						102'-3½		0.097		
								17.058	Total(Pt) Route 13	
14	18'-10		7.90	2	(See Notes)	67'-3½	120	16.831	***** Route 14 ***** PO(12'-3½), Flow (q) from Route 19	
29	18'-6		7.90	2.1570		43'-1	0.000697	0.145		T(12'-3½), E(6'-2), PO(12'-3½)
						110'-4½		0.077		
29	18'-6			4		10'-0	120	17.052		
60	18'-6		7.90	4.2600		10'-0	0.000025	0.000		
60	18'-6		7.70	4		9'-0	120	17.052		
84	18'-6		15.60	4.2600		9'-0	0.000089	0.001	Flow (q) from Route 20	
								17.053	Total(Pt) Route 14	
277	18'-6			2	(See Notes)	91'-6½	120	16.884	***** Route 15 ***** PO(12'-3½)	
264	18'-10		3.85	2.1570		49'-2½	0.000185	-0.145		2T(12'-3½), PO(12'-3½)
						140'-9		0.026		
								16.765	Total(Pt) Route 15	
243	18'-6			2	(See Notes)	76'-11½	120	16.908	***** Route 16 ***** PO(12'-3½)	
231	18'-10		4.54	2.1570		49'-2½	0.000250	-0.145		2T(12'-3½), PO(12'-3½)
						126'-2		0.032		
								16.795	Total(Pt) Route 16	
300	18'-6			2	(See Notes)	91'-6½	120	16.859	***** Route 17 ***** PO(12'-3½)	
287	18'-10		5.19	2.1570		49'-2½	0.000320	-0.145		2T(12'-3½), PO(12'-3½)
						140'-9		0.045		
								16.760	Total(Pt) Route 17	

Pipe Information									
Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Fitting (Foot)	Pf Friction Loss Per Unit (psi)	Elev(Pe)	
						Total (Foot)		Friction(Pf)	
354	18'-6			2	(See Notes)	91'-6½	120	16.799	***** Route 18 ***** PO(12'-3½) 2T(12'-3½), PO(12'-3½)
340	18'-10		7.91	2.1570		49'-2½	0.000699	-0.145	
						140'-9		0.098	
								16.753	Total(Pt) Route 18
73	18'-10		23.39	4		9'-0	120	16.829	***** Route 19 ***** Flow (q) from Route 8
44	18'-10		15.60	4.2600		9'-0	0.000089	0.001	
44	18'-10			4		10'-0		120	
14	18'-10		7.90	4.2600		10'-0	0.000025	0.000	
								16.831	
44	18'-10			2	(See Notes)	67'-3½	120	16.830	***** Route 20 ***** PO(12'-3½) 2T(12'-3½), PO(12'-3½)
60	18'-6		7.70	2.1570		49'-2½	0.000665	0.145	
						116'-6½		0.077	
								17.052	Total(Pt) Route 20

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Fittings Legend

ALV Alarm Valve	AngV Angle Valve	b Bushing
BaIV Ball Valve	BFP Backflow Preventer	BV Butterfly Valve
C Cross Flow Turn 90°	cplg Coupling	Cr Cross Run
CV Check Valve	DelV Deluge Valve	DPV Dry Pipe Valve
E 90° Elbow	EE 45° Elbow	Ee1 11¼° Elbow
Ee2 22½° Elbow	f Flow Device	fd Flex Drop
FDC Fire Department Connectic	fE 90° FireLock(TM) Elbow	fEE 45° FireLock(TM) Elbow
flg Flange	FN Floating Node	fT FireLock(TM) Tee
g Gauge	GloV Globe Valve	GV Gate Valve
Ho Hose	Hose Hose	HV Hose Valve
Hyd Hydrant	LtE Long Turn Elbow	mecT Mechanical Tee
Noz Nozzle	P1 Pump In	P2 Pump Out
PIV Post Indicating Valve	PO Pipe Outlet	PrV Pressure Relief Valve
PRV Pressure Reducing Valve	red Reducer/Adapter	S Supply
sCV Swing Check Valve	SFx Seismic Flex	Spr Sprinkler
St Strainer	T Tee Flow Turn 90°	Tr Tee Run
U Union	WirF Wirsbo	WMV Water Meter Valve
Z Cap		

WATER TEST

Hydrant Flow Test Report

Test Date 8/3/2022

Test Time 10 AM

Location

Progress Dr
Fuquay Varina

Tested by

J & D Sprinkler Co.

Notes

Test conducted by Jim Mattocks and Farrin Dunn with J&D Sprinkler Co.

Read Hydrant

57.1 psi static pressure
53.5 psi residual pressure
hydrant elevation

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1		2.5			1130 gpm

Flow Graph

